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November 12, 2021

The Honorable Lopa P. Kolluri
Principal Deputy Assistant Secretary
Office of Housing and Federal Housing Administration
U.S. Department of Housing and Urban Development
451 Seventh Street, S.W., Room 9100
Washington, D.C. 20410

Dear Secretary Kolluri:

Pinnacle Actuarial Resources, Inc. (Pinnacle) has completed the final report for the Fiscal Year 2021 Independent Actuarial Review of the Mutual Mortgage Insurance: Economic Value of Forward Mortgage Insurance-In-Force. The attached report details our estimate of the Cash Flow Net Present Value for Fiscal Year 2021 as of September 30, 2021.

Roosevelt C. Mosley, Jr., FCAS, MAAA, CSPA, is responsible for the content and conclusions set forth in the report. I am a Fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries, and am qualified to render the actuarial opinion contained herein.

It has been a pleasure working with you and your team to complete this study. I remain available for any questions or comments you have regarding the report and its conclusions.

Respectfully Submitted,

Roosevelt C. Mosley, Jr.

Roosevelt C. Mosley, Jr., FCAS, MAAA, CSPA
Principal and Consulting Actuary

Fiscal Year 2021 Independent Actuarial Review of the Mutual Mortgage Insurance Fund: Economic Value of Forward Mortgage Insurance-In-Force

Final Report Based on Data as of September 30, 2021

November 2021

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Commitment Beyond Numbers

Fiscal Year 2021 Independent Actuarial Review of the Mutual Mortgage Insurance Fund: Economic Value of Forward Mortgage Insurance-In-Force

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SUMMARY OF FINDINGS

This report presents the results of Pinnacle Actuarial Resources, Inc.'s (Pinnacle's) independent actuarial review of the Economic Value associated with forward mortgages insured by the Mutual Mortgage Insurance Fund (MMI or Fund) for Fiscal Year 2021. The Economic Value associated with Home Equity Conversion Mortgages (HECMs) are analyzed separately and are excluded from this report. In the remainder of this report, the term MMI refers to forward mortgages and excludes HECMs.

Below we summarize the findings associated with each of the required deliverables.

Deliverable 1: Produce a written Actuarial Study for Forward that provides actuarial central estimates of MMI Economic Net Worth as of the end of Fiscal Year 2021 and assesses HUD's estimates of Economic Net Worth.

The Economic Net Worth is defined as cash available to the Fund plus the Net Present Value (NPV) of all future cash outflows and inflows that are expected to result from the mortgages currently insured by the MMI.

As of the end of Fiscal Year 2021, Pinnacle's Actuarial Central Estimate (ACE) of the MMI Forward Cash Flow NPV is $25.696 billion.

The total capital resource as reported in the Annual Report to Congress Regarding the Status of the FHA Mutual Mortgage Insurance Fund is $78.500 billion at the end of Fiscal Year 2021. Thus, the ACE of the Economic Net Worth of the MMI is $104.196 billion. The total capital resource is comprised of two accounts: a financing account and a capital reserve account. The financing account covers the estimated losses over the life of the loan cohorts, and the capital reserve covers losses in excess of what is carried in the financing account.

Deliverable 2: Include a review of the risk characteristics of existing MMI loans including commentary on how such characteristics have changed in recent years.

A review of the risk characteristics of existing MMI loans, and a commentary on how these risk characteristics have changed, is included in Section 4.

Deliverable 3: Apply the final Forward actuarial model to the existing portfolio to produce conditional (and cumulative) claim, prepayment, and loss-given-default rates at various levels of aggregation across loans, and for individual policy years and policy year-quarter. Cash-flow summaries should also be provided for major categories (e.g., premium revenues, claim expenses and recoveries or net loss due to claim, with affected loan counts and balances).

Appendix G shows the interim and final claim rates, non-claim termination rates and loss severities by cohort. Each of these elements is calculated for each year of developed experience, and final projections are also included. Cash flow summaries by major category and credit subsidy cohort are shown below and discussed in more detail in Sections 2 and 3.

Table 1: Projected Cash Flow Summaries

Cash Flow Category	Net Present Value of Cash Flow
Mortgage Insurance Premium	53,978,107,366
Loss Incurred	22,863,363,464
Loss Mitigation Expense	746,551,127
HAMP Expense	14,574,301,414
HAMP Recovery	9,902,061,265

Deliverable 4: To promote transparency of the Studies' assessments, the Studies should identify methodological vulnerabilities that may occur in its actuarial models or in HUD's analyses of Economic Net Worth. This discussion should evaluate the scope and scale of such vulnerabilities in creating possible forecast risk and suggest possible lines of research in these areas. The Studies should assess and comment upon HUD's own models that estimate Economic Net Worth for methodological vulnerabilities and compare HUD's methodologies with those in the Studies.

The assumptions and judgments on which the Cash Flow NPV estimates are based are summarized in Section 5 of this report. Appendix B shows the specifications and assumptions related to the transition models. Appendix C details the loss severity models. Section 3 describes the economic assumptions incorporated into the Cash Flow NPV estimates and the sensitivity of the estimates to alternative economic scenarios. Section 5 and Appendix E summarize the assumptions associated with the cash flow analysis.

Section 3 provides a discussion of the economic conditions that could result in material adverse change to the Cash Flow NPV.

Appendix F provides a discussion of the HUD methodologies for estimating Economic Net Worth, a comparison of HUD modeling methodology to the methodology used in this study, and methodological vulnerabilities of the HUD models.

Deliverable 5: The Studies should include historical data on changes in program terms as well as relevant loan and borrower characteristics (e.g., credit scores, loan-to-value ratios) by cohort and other sub-populations. Loan performance data (claim rates, prepayment rates, severity and recovery

rates) both historical and projected shall be presented in the "finger-table" formats (arrayed by cohort and policy years for different loan products).

A review of the risk characteristics of existing MMI loans, and a commentary of how these risk characteristics have changed is included in Section 4. Appendix G shows the interim and final claim rates, non-claim termination rates and loss severities by cohort. Each of these elements is calculated for each year of developed experience, and final projections are also included.

Deliverable 6: The Contractor should use the President's Economic Assumptions, provided by Office of Risk Management and Regulatory Affairs (ORMRA), for the actuarial central estimates of the Studies. However, in addition to the central single path economic forecast, the Studies shall test alternative economic forecasts for stress-testing and sensitivity analysis to estimate ranges of reasonableness.

Pinnacle's ACE of Cash Flow NPV is based on the Economic Assumptions for the 2022 Budget from the Office of Management and Budget (OMB Economic Assumptions). Pinnacle also estimated Cash Flow NPV outcomes based on economic scenarios from Moody's Analytics (Moody's). The Cash Flow NPV results based on these scenarios are shown in Table 2.

Table 2: Range of Cash Flow NPV Outcomes Based on OMB & Moody's Scenarios

Economic Scenario	Fiscal Year 2021 Cash Flow NPV
Pinnacle ACE	25,695,952,627
Baseline	28,262,781,438
Alternative 0 – Upside (4th Percentile)	33,494,257,457
Alternative 1 – Upside (10th Percentile)	32,455,910,139
Alternative 2 – Downside (75th Percentile)	21,331,128,967
Alternative 3 – Downside (90th Percentile)	5,190,535,079
Alternative 4 – Downside (96th Percentile)	(8,858,851,260)
Slower-Trend Growth	17,957,772,253
Stagflation	17,693,585,919
Next-Cycle Recession	24,188,893,724
Low Oil Price	26,353,834,594

The range of results based on the Moody's estimates is negative $8.859 billion to positive $33.494 billion.

In addition, Pinnacle has estimated a range of outcomes based on 100 randomly generated stochastic simulations of key economic variables. Based on these simulations, the range of Cash Flow NPV estimates is negative $38.612 billion to positive $28.298 billion.

The Cash Flow NPV estimate provided by the Federal Housing Administration (FHA) to be used in the FHA's Annual Report to Congress is positive $16.481 billion. Based on Pinnacle's ACE and range of reasonable estimates, we conclude that the FHA estimate of Cash Flow NPV to be used in the FHA's Annual Report to Congress is reasonable.

Pinnacle's Cash Flow NPV by cohort is shown below for the largest negative outcome and the largest positive outcome based on the stochastic simulation results.

Table 3: Range of Cash Flow NPV Estimates - Forward Portfolio

	sim37	sim87	SG
Cohort	**Largest Negative**	**Largest Positive**	**Pinnacle ACE**
1992	-81,692	-44,089	-85,203
1993	-348,713	-296,420	-382,183
1994	-1,017,506	-1,018,926	-955,065
1995	-1,148,174	-1,131,609	-1,316,308
1996	-4,100,541	-2,549,156	-3,356,419
1997	-7,202,735	-4,158,904	-5,459,005
1998	-16,771,475	-8,443,842	-12,326,487
1999	-29,029,452	-12,434,307	-18,913,171
2000	-29,732,228	-12,880,010	-16,104,875
2001	-112,186,618	-19,004,491	-27,235,220
2002	-207,522,330	-28,928,468	-41,191,798
2003	-334,034,597	-41,527,655	-59,500,457
2004	-552,190,704	-72,402,470	-100,834,440
2005	-588,243,602	-69,624,801	-102,890,376
2006	-542,598,269	-74,395,167	-110,420,201
2007	-752,775,923	-108,634,672	-165,442,957
2008	-1,792,707,395	-283,629,801	-430,900,201
2009	-2,390,094,098	-344,759,880	-556,917,217
2010	-2,327,372,918	-274,468,948	-522,822,952
2011	-1,384,565,909	-232,542,782	-429,193,007
2012	-1,803,837,731	-263,955,695	-490,432,580
2013	-2,296,161,436	-188,149,428	-480,378,453
2014	-150,978,866	1,233,354,358	1,096,238,664
2015	-1,075,433,406	1,942,987,521	1,790,734,864
2016	-2,633,765,570	2,338,819,166	2,130,595,336
2017	-3,716,808,955	1,985,771,939	1,519,262,223
2018	-4,663,995,286	829,320,648	131,833,219
2019	-5,507,750,742	565,170,761	24,349,037
2020	-3,659,127,067	6,973,770,134	7,393,610,101
2021	-2,029,939,648	14,473,809,993	15,186,387,758
Total	-38,611,523,586	28,298,022,999	25,695,952,627

Deliverable 7: To provide comparability to HUD estimates of Economic Net Worth, the Contractor shall use Federal Credit Reform Act discounting assumptions and procedures.

The Pinnacle estimates of Economic Net Worth have been developed using the Federal Credit Reform Act discounting assumptions.

Deliverable 8: This Study should use stochastic or Monte Carlo simulations of future economic conditions including for interest rates and house price appreciation. The objective of these requirements is to illustrate the sensitivity of forecasts to economic uncertainty and other forms of forecast error.

Additional economic assumptions were generated using Monte Carlo simulations and Moody's economic scenarios. These results are discussed in further detail in Section 3.

Deliverable 9: Provide econometric appendices to the Study that include variable specifications and statistical output from all regressions in the Studies.

Appendix B shows the predictive model parameters and goodness of fit measures for the Transition models. Appendix C shows the parameters and goodness of fit measures for the Loss Severity models. See the Binomial Model Results and Model Validation sections in Appendix B and the Model Parameters and Model Validation sections in Appendix C.

EXECUTIVE SUMMARY

The 1990 Cranston-Gonzalez National Affordable Housing Act (NAHA) requires an independent actuarial analysis of the economic value of the FHA and Department of Housing and Urban Development's (HUD's) MMI. Enacted on July 30, 2008, the Housing and Economic Recovery Act of 2008 (HERA) moved the requirement for an independent actuarial review into 12 USC 1708(a)-(4).

HERA also moved several additional programs into the MMI. One of the programs is the HECM program, which are reverse mortgages. HECMs are analyzed separately and excluded from this report. In the remainder of this report, the term MMI refers to forward mortgages and excludes HECMs.

The primary purpose of this actuarial analysis is to estimate the Economic Net Worth of the current book of business. The Economic Net Worth is defined as cash available to the Fund plus the NPV of all future cash outflows and inflows that are expected to result from the mortgages currently insured by the MMI.

We have calculated a range of estimates using economic projections from the OMB Economic Assumptions for the 2022 Budget, ten economic projection scenarios from Moody's and a stochastic simulation approach.

Based on our analysis, we estimate that the Cash Flow NPV as of the end of Fiscal Year 2021 is $25.696 billion. We also estimate that the range of Cash Flow NPV based on randomly generated economic scenarios is between negative $38.612 billion and positive $28.298 billion.

The total capital resource as reported in the Annual Report to Congress Regarding the Status of the FHA Mutual Mortgage Insurance Fund is $78.500 billion at the end of Fiscal Year 2021. Thus, the estimated Economic Net Worth of the MMI is $104.196 billion.

Impact of Economic Forecasts

The Cash Flow NPV of the MMI depends on many factors. One of the most important set of factors is the prevailing economic conditions over the next 30 years, and most critically during the next 10 years. We incorporate the most significant factors in the U.S. economy affecting the performance of the mortgages insured by the MMI through the use of the following variables in our models:

- 30-year fixed rate mortgage (FRM) rates
- 10-year Constant Maturity Treasury (CMT) rates
- Three-year CMT rates

- One-year CMT rates
- Housing price index (HPI)
- Unemployment rates

The projected Cash Flow NPV of FHA's books of business is affected by changes in these economic variables. The ACE in this report is derived from using the required OMB Economic Assumptions.

We have also estimated the Cash Flow NPV of the MMI under ten economic scenarios from Moody's. These scenarios are:

1. Baseline
2. Alternative 0 – Upside (4th Percentile)
3. Alternative 1 – Upside (10th Percentile)
4. Alternative 2 – Downside (75th Percentile)
5. Alternative 3 – Downside (90th Percentile)
6. Alternative 4 – Downside (96th Percentile)
7. Slower-Trend Growth
8. Stagflation
9. Next-Cycle Recession
10. Low Oil Price

These scenarios do not represent the full range of possible future economic paths, but represent a considerable variation of economic conditions. Therefore, they provide insights into the projected Cash Flow NPV of the MMI under a range of economic environments.

The summary of the estimated Cash Flow NPV resulting from each scenario is shown in Table 4.

Table 4: Projected Forward Cash Flow NPV Using Alternative Economic Scenarios

Economic Scenario	Fiscal Year 2021 Cash Flow NPV
Pinnacle ACE	25,695,952,627
Baseline	28,262,781,438
Alternative 0 – Upside (4th Percentile)	33,494,257,457
Alternative 1 – Upside (10th Percentile)	32,455,910,139
Alternative 2 – Downside (75th Percentile)	21,331,128,967
Alternative 3 – Downside (90th Percentile)	5,190,535,079
Alternative 4 – Downside (96th Percentile)	(8,858,851,260)
Slower-Trend Growth	17,957,772,253
Stagflation	17,693,585,919
Next-Cycle Recession	24,188,893,724
Low Oil Price	26,353,834,594

We also randomly generated 100 stochastic simulations of key economic variables. Based on these simulations, the range of Cash Flow NPV estimates is negative $38.612 billion to positive $28.298 billion.

DISTRIBUTION AND USE

This report is being provided to FHA for its use and the use of makers of public policy in evaluating the Economic Net Worth of the MMI. Permission is hereby granted for its distribution on the condition that the entire report, including the exhibits and appendices, is distributed rather than any excerpt. Pinnacle also acknowledges that this report will be included in the FHA's Annual Report to Congress, and permission is granted for this purpose as well. We are available to answer any questions that may arise regarding this report.

Any third parties receiving the report should recognize that the furnishing of this report is not a substitute for their own due diligence and should place no reliance on this report or the data contained herein that would result in the creation of any duty or liability by Pinnacle to the third party.

Our conclusions are predicated on a number of assumptions as to future conditions and events. These assumptions, which are documented in subsequent sections of the report, must be understood in order to place our conclusions in their appropriate context. In addition, our work is subject to inherent limitations, which are also discussed in this report.

RELIANCES AND LIMITATIONS

Listed in Section 5 are the data sources Pinnacle has relied upon in our analysis. We have relied on the accuracy of these data sources in our calculations. If it is subsequently discovered that the underlying data or information is erroneous, then our calculations would need to be revised accordingly.

We have relied on a significant amount of data and information from external sources without audit or verification. This includes economic data projected over the next 30 years from Moody's and OMB. However, we did review as many elements of the data and information as practical for reasonableness and consistency with our knowledge of the mortgage insurance industry. It is possible that the historical data used to develop our estimates may not be predictive of future default and claim experience. We have not anticipated any extraordinary changes to the legal, social or economic environment which might affect the number or cost of mortgage defaults beyond those contemplated in the economic scenarios described in this report. To the extent that the realized economic conditions deviate significantly from these assumptions, the Economic Net Worth projections may differ, perhaps significantly, from actual results.

A substantial source of uncertainty relates to the impact of the COVID-19 pandemic which emerged in 2020 and continues to impact the MMI program in 2021. This uncertainty could impact the projection

of Cash Flow NPV in several different ways, including distortion of historical patterns due to changes in MMI claims handling and changes in loan origination exposure. Some of these uncertainties may also impact the settlement of claims that began prior to COVID-19 being declared a pandemic. We have developed projection methods to incorporate the impact of COVID-19, however as its effects continue to emerge, these effects could materially impact our projections.

The predictive models used in this analysis are based on a theoretical framework and certain assumptions. This model structure predicts the rates of default, claim, loss and prepayment based on a number of individual mortgage characteristics and economic variables. The models are built by applying predictive modeling techniques to actual historical experience of FHA-insured mortgages. The parameters of the predictive models are estimated over a wide variety of mortgages originated since 1975 and their performance under the range of economic conditions and mortgage market environments experienced during the past 46 years. The predictive models are combined with assumptions about future behavior of current mortgage endorsements and certain key economic assumptions to produce future projections of the performance of the existing mortgages insured by the MMI.

Pinnacle is not qualified to provide formal legal interpretation of federal legislation or FHA policies and procedures. The elements of this report that require legal interpretation should be recognized as reasonable interpretations of the available statutes, regulations and administrative rules.

SECTION 1: INTRODUCTION

Scope

HUD and FHA have engaged Pinnacle to perform the annual independent Actuarial Review of the MMI. This study is required by 12 USC 1708(a)-(4) and must be completed in compliance with the Federal Credit Reform Act as implemented and all applicable Actuarial Standards of Practice (ASOPs). This study provides an analysis of the financial position of MMI as of September 30, 2021 using data through September 30, 2021.

The MMI is a group of accounts of the federal government which record transactions associated with the FHA's guarantee programs for single family mortgages. Currently, the FHA insures approximately 7.42 million forward mortgages under the MMI and just over 406,000 reverse mortgages under the HECM program.

Per 12 USC 1711-(f), FHA must endeavor to ensure that the MMI maintains a capital ratio of not less than 2.0%. The capital ratio is defined as the ratio of capital to the MMI obligations on outstanding mortgages (IIF). Capital is defined as cash available to the Fund plus the Net Present Value (NPV) of all future cash outflows and inflows that are expected to result from the mortgages currently insured by the MMI.

The deliverables included in this study, as defined by the Statement of Work, are as follows:

1. Produce a written Actuarial Study for Forward that provides the actuarial central estimate of MMI Economic Net Worth as of the end of the subject Fiscal Year and assesses HUD's estimates of Economic Net Worth.

2. Include a review of the risk characteristics of existing MMI loans including commentary on how such characteristics have changed in recent years.

3. Apply the final Forward actuarial models to the existing portfolio to produce conditional (and cumulative) claim, prepayment, and loss-given-default rates at various levels of aggregation across loans, and for individual policy years and policy year-quarter. Cash-flow summaries should also be provided for major categories (e.g., premium revenues, claim expenses and recoveries or net loss due to claim, with affected loan counts and balances).

4. To promote transparency of the Studies' assessments, the Studies should identify methodological vulnerabilities that may occur in its actuarial models or in HUD's analyses of

Economic Net Worth. This discussion shall evaluate the scope and scale of such vulnerabilities in creating possible forecast risk and suggest possible lines of research in these areas. The Studies should assess and comment upon HUD's own models that estimate Economic Net Worth for methodological vulnerabilities and compare HUD's methodologies with those in the Studies.

5. The Studies should include historical data on changes in program terms as well as relevant loan and borrower characteristics (e.g., credit scores, loan-to-value ratios) by cohort and other sub-populations. Loan performance data (claim rates, prepayment rates, severity and recovery rates) both historical and projected shall be presented in the "finger-table" formats (arrayed by cohort and policy years for different loan products).

6. The Contractor should use the President's Economic Assumptions (PEA), provided by ORMRA for the actuarial central estimates (ACEs) of the Studies. However, in addition to the central single path economic forecast, the Studies shall test alternative economic forecasts for stress-testing and sensitivity analysis to estimate ranges of reasonableness.

7. To provide comparability to HUD estimates of Economic Net Worth, the Contractor shall use Federal Credit Reform Act discounting assumptions and procedures.

8. This Study shall use stochastic or Monte Carlo simulations of future economic conditions, including for interest rates and house price appreciation. The objective of these requirements is to illustrate the sensitivity of forecasts to economic uncertainty and other forms of forecast error.

9. Provide econometric appendices to the Study that include variable specifications and statistical output from all regressions in the Studies.

Background

Congress created FHA in 1934. The FHA "provides mortgage insurance on loans made by FHA-approved lenders. FHA insures mortgages on single family and multifamily properties, residential care facilities and hospitals throughout the United States and its territories."[1] The mortgage insurance provided was done so through the establishment of the MMI.

HUD was established in 1937 by the U.S. Housing Act of 1937. The current mission of HUD is:

[1] https://www.hud.gov/program_offices/housing/fhahistory

> *…to create strong, sustainable, inclusive communities and quality affordable homes for all. HUD is working to strengthen the housing market to bolster the economy and protect consumers; meet the need for quality affordable rental homes; utilize housing as a platform for improving quality of life; build inclusive and sustainable communities free from discrimination, and transform the way HUD does business.*[2]

The National Affordable Housing Act (NAHA), enacted in 1990, introduced a minimum capital requirement for the MMI[3]. By 1992, the capital ratio was to be at least 1.25%, and by 2000 the capital ratio was to be no less than 2.0%. The capital ratio is defined by NAHA as the ratio of capital to unamortized IIF. NAHA also implemented the requirement that an independent actuarial study of the MMI be completed annually. The Housing and Economic Recovery Act (HERA) amended 12 USC 1708(a)-(4) to include the requirement for the annual Actuarial Study.

Given the purpose of HUD and FHA, availability of mortgages to a broad segment of the home-buying market is important to promote and strengthen the U.S. housing market. However, the capital requirements established by NAHA can potentially be in conflict with the desire for widespread availability of mortgage insurance. Since the implementation of NAHA, many of the steps taken by HUD have attempted to balance broader availability of mortgage insurance and the financial stability of the MMI.

Mortgage Insurance Premiums

Adequate mortgage insurance premium (MIP) is key in maintaining the economic strength of the MMI, but the level of MIP can also impact the ability of potential home buyers to afford a home. A summary of the adjustments in MIP since 1991 is shown below:

- In 1991, it was established that MIP would be determined as the combination of an upfront MIP and a yearly premium which was a percentage of the remaining outstanding mortgage balance each year.[4] Overall, this represented an increase in MIP, which was needed to help meet the new capital requirement established by NAHA.

- In 1994, the upfront MIP was decreased by 75 basis points to 2.25%.[5] This was in response to improved financial experience of the MMI.

[2] https://portal.hud.gov/hudportal/HUD?src=/about/mission
[3] Public Law 101-625, 101st Congress, November 28, 1990, Section 332.
[4] Mortgagee Letter 91-26, May 30, 1991: Single Family Insurance Processing for Risk Based Insurance Premiums.
[5] Mortgagee Letter 94-14, March 31, 1994: Single Family Loan Production – Reduced Upfront Mortgage Insurance Premium (UFMIP).

- In 1996, the upfront MIP was decreased by 25 basis points to 2.00% for first-time homebuyers that received mortgage counseling prior to purchasing their home.[6] This was implemented based on the success of a pilot program which showed that first-time homebuyers who received this counseling had better default experience.

- In 1997, the upfront MIP was decreased by an additional 25 basis points to 1.75% for first-time homebuyers that received mortgage counseling prior to purchasing their home. In total, the upfront MIP was 50 basis points lower than it would be for a homebuyer who did not receive counseling.[7]

- In 2000, in recognition of the improved experience of the MMI, several changes were implemented. First, the upfront MIP was reduced by 75 basis points to 1.50%. Second, the upfront MIP refund schedule was shortened to five years instead of seven years. Third, a provision to cancel the annual MIP once the loan-to-value (LTV) ratio was 78% or less was implemented. Also, the discount in the upfront MIP for first-time homebuyers that received counseling was discontinued.[8]

- In April of 2010, upfront MIP was increased by 75 basis points to 2.25%.[9] This increase in premium was in response to the housing and economic crisis of 2008, and was the first in a series of increases over the next three years.

- In October of 2010, upfront MIP was decreased but annual MIP was increased significantly.[10] Overall, this resulted in an increase in MIP.

- In 2011, the annual MIP was increased by 25 basis points.[11]

- In 2012, the annual MIP was increased by 10 basis points.[12]

[6] Mortgagee Letter 96-48, August 28, 1996: Single Family Production – Reduction in Up-Front Mortgage Insurance Premiums (UFMIP) for First-Time Homebuyers Who Receive Housing Counseling.
[7] Mortgagee Letter 97-37, August 13, 1997: Single Family Production – Further Reduction in Up-Front Mortgage Insurance Premiums (UFMIP) for First-Time Homebuyers Who Receive Housing Counseling.
[8] Mortgagee Letter 2000-38, October 27, 2000: Single Family Loan Production – Further Reduction in Upfront Mortgage Insurance Premiums and Other Mortgage Insurance Premium Changes.
[9] Mortgagee Letter 2010-02, January 21, 2010: Increase in Upfront Premiums for FHA Mortgage Insurance.
[10] Mortgagee Letter 2010-28, September 1, 2010: Changes to FHA Mortgage Insurance Premiums.
[11] Mortgagee Letter 2011-10, February 14, 2011: Annual Mortgage Insurance Premium Changes and Guidance on Case Numbers.
[12] Mortgagee Letter 2012-04, March 6, 2012: Single Family Mortgage Insurance: Annual and Up-Front Mortgage Insurance Premium – Changes.

- In 2013, several changes were implemented related to annual MIP. First, the term for collection of MIP was extended to 11 years for mortgages with an initial LTV ratio of 90% or less, and for 30 years for mortgages with an initial LTV ratio of greater than 90%. Second, mortgages with terms of 15 years or less and LTV ratio of 78% or less at the time of origination, which were exempt from MIP, would no longer be exempt. Lastly, the annual MIP was increased by 5 to 10 basis points for mortgages with terms of 15 years or less and LTV ratios of 78% or less at origination.[13]

- As a result of improved financial experience, in 2015 annual MIP rates were decreased by 50 basis points for loans with terms greater than 15 years.[14]

- In 2017, a decrease was proposed for annual MIP rates,[15] but this decrease was suspended later in the year.[16]

Down Payment and Closing Costs

The source of funds for down payment and closing costs has been a significant issue for HUD. There are limitations on closing costs and down payment assistance that can be provided by sources other than the borrower or family, and there have been several mortgagee letters addressing this issue. Allowing assistance with down payments and closing costs increases the opportunity for more people to achieve homeownership. Historically, however, mortgages for which a larger percentage of the down payment and closing costs were provided by sources other than the borrowers own funds have demonstrated poorer performance. A summary of mortgagee letters addressing this is provided below:

- Prior to 1992, closing costs could not be financed in the loan. In 1992, the limitation on financing of closing costs was removed, but mortgages were still subject to LTV ratio limits.[17] This provision was implemented to make it easier for homebuyers to meet the down payment requirements.

[13] Mortgagee Letter 2013-04, January 31, 2013: Revision of Federal Housing Administration (FHA) policies concerning cancellation of the annual Mortgage Insurance Premium (MIP) and increase to the annual MIP.
[14] Mortgagee Letter 2015-01, January 9, 2015: Reduction of Federal Housing Administration (FHA) annual Mortgage Insurance Premium (MIP) rates and Temporary Case Cancellation Authority.
[15] Mortgagee Letter 2017-01, January 9, 2017: Reduction of Federal Housing Administration (FHA) Annual Mortgage Insurance Premium (MIP) Rates.
[16] Mortgagee Letter 2017-07, January 20, 2017: Suspension of Mortgagee Letter 2017-01 – Reduction of Federal Housing Administration (FHA) Annual Mortgage Insurance Premium (MIP) Rates.
[17] Mortgagee Letter 92-39, October 16, 1992: Single Family Loan Production - Elimination of Limit on Financing Closing Costs.

- In 1996, HUD allowed family members to lend the borrower 100% of the down payment.[18] This also was intended to make it easier for borrowers to achieve homeownership.

- Two provisions were implemented in 1998. First, it was prohibited for the seller or any other party to pay mortgage interest for the buyer. In addition, any interest rate buydown could not result in a reduction in the interest rate of more than 2% below the note rate. These changes were implemented to avoid a significant increase in the payment amount once the seller-paid mortgage interest funds were depleted or the interest rate buydown term was complete.[19]

- In 2000, guidance was provided by HUD to mortgagees to ensure that the source of the gifts to buyers is documented, and the person giving the gift must certify that the funds did not come from someone with an interest in the transaction. This was implemented to combat a practice of the sellers providing funds to family members of the buyer that would then be used for the down payment.[20]

- Section 2113 of the Housing And Economic Recovery Act Of 2008 prohibited down payment contributions from a seller or any other person or entity that would financially benefit from the transaction.[21]

- In 2019, guidance by HUD was provided to clarify the rules associated with funds being provided by a governmental source for down payment assistance. The mortgagee letter requires the mortgagee to verify that the funds provided by the government agency were transferred to the Borrower before or at the time of closing, and that the governmental agency was acting in its legal capacity in providing these funds. Documentation is also required from the government that the agency has the authority to provide the funds, and from an attorney for the government entity verifying that the property is within the government agency's jurisdiction. There can be no direct transfer of assistance from the government agency to the mortgagee, and there can be no requirement that the loan be transferred to a specific mortgagee as a condition of receiving assistance from the government agency.[22]

[18] Mortgagee Letter 96-58, October 23, 1996: Single Family Loan Production - Secondary Financing from Family Members.
[19] Mortgagee Letter 98-1, January 2, 1998: Single Family Loan Production - Underwriting Adjustable Rate Mortgages, Interest Buydowns, Homeownership Counseling and Other Credit Policy Issues
[20] Mortgagee Letter 2000-28, August 7, 2000: Gift Documentation, Mortgage Forms and other Credit Policy and Appraisal Issues.
[21] https://www.congress.gov/110/plaws/publ289/PLAW-110publ289.pdf
[22] Mortgagee Letter 19-06, April 18, 2019: Downpayment Assistance and Operating in a Governmental Capacity.

This guidance was subsequently suspended until further notice[23] and ultimately rescinded.[24]

Homebuyer Counseling

Counseling for homebuyers was encouraged historically by FHA with the idea that if homebuyers were educated on issues of homeownership and mortgages, they would be less likely to default on the mortgage and would be more responsible homeowners. The history of mortgagee letters related to homebuyer counseling is outlined below:

- In 1993, a pilot of a counseling program for pre-purchase and pre-foreclosure situations was announced.[25]

- In 1996, after the pilot of the counseling program, the upfront MIP was decreased by 25 basis points for first-time homebuyers who complete homeownership counseling.[26] Just one year later in 1997, the upfront MIP was decreased by an additional 25 basis points for first-time homebuyers who complete homeownership counseling.[27] This discount was provided to recognize expected improvement in default experience.

- In 1998, a mortgagee letter was released indicating that the homeownership counseling program would be reviewed. This was in response to homeownership counseling programs that were being used that did not meet FHA guidelines. While the requirements of the counseling program were that it should involve 15 to 20 hours of instruction, there were cases where homebuyers were being provided with workbooks without additional interaction or instruction.

- The guidelines of the homeownership counseling program were reiterated in this letter.[28]

[23] Mortgagee Letter 19-10, July 23, 2019: Suspension of the Effective Date of Mortgagee Letter 2019-06, *Downpayment Assistance and Operating in a Governmental Capacity*.
[24] Mortgagee Letter 19-12, August 13, 2019: Rescission of Mortgagee Letters 2019-06, *Downpayment Assistance and Operating in a Governmental Capacity*; 2019-07, *Extension of the Effective Date of Mortgagee Letter 2019-06*, *Downpayment Assistance and Operating in a Governmental Capacity*; and 2019-10, *Suspension of the Effective Date of Mortgagee Letter 2019-06, Downpayment Assistance and Operating in a Governmental Capacity*.
[25] Mortgagee Letter 93-28, September 20, 1993: Prepurchase and Foreclosure Prevention Counseling Demonstration.
[26] Mortgagee Letter 96-48, August 28, 1996: Single Family Production - Reduction in Up-Front Mortgage Insurance Premiums (UFMIP) for First-Time Homebuyers Who Receive Housing Counseling.
[27] Mortgagee Letter 97-37, August 13, 1997: Single Family Production - Further Reduction in Up-Front Mortgage Insurance Premiums (UFMIP) for First-Time Homebuyers Who Receive Housing Counseling.
[28] Mortgagee Letter 98-1, January 2, 1998: Single Family Loan Production - Underwriting Adjustable Rate Mortgages, Interest Buydowns, Homeownership Counseling and Other Credit Policy Issues.

- In 2000, in conjunction with an overall reduction in upfront MIP, the homeownership counseling discount was discontinued.[29]

Automated Underwriting Systems

Beginning in 1995, the use of automated underwriting systems (AUSs) began to increase. Theoretically, the use of AUSs increases the availability of mortgages, and improves the efficiency and speed of mortgage processing:

- In 1995, HUD approved usage of AUSs. Mortgagees had to request permission to use these systems and receive approval from HUD.[30]

- In 1996, criteria were established for the approval by HUD of AUSs.[31]

In 1998, FHA approved Freddie Mac's Loan Prospector for underwriting FHA-insured mortgages, using a scorecard custom-estimated for FHA endorsed loans. FHA also made a substantial number of revisions to its credit policies and reduced documentation requirements for loans assessed by Loan Prospector. This was the first time that FHA incorporated an AUS in its insurance endorsement process. Fannie Mae's Desktop Underwriter and PMI Mortgage Services' Automated Underwriting Risk Analysis (AURA) were approved to underwrite FHA mortgages in 1999, followed soon thereafter by Countrywide Funding Corporation's Countrywide Loan-Underwriting Expert System (CLUES) and JP Morgan-Chase's Zippy. Beginning in May 2004, all approved AUSs applied FHA's Technology-Open-To-Approved-Lenders (TOTAL) mortgage scorecard to evaluate loan applications for possible automated approval for FHA insurance. Initially, more than two-thirds of loans submitted generally received automated approval, eliminating the need for manual underwriting reviews. Since May 2004, HUD required lenders to submit borrower credit scores. Starting in July 2008, all loans were to be submitted through FHA's TOTAL scorecard. Additional guidance issued in February 2011 prohibited the use of the TOTAL scorecard on streamline refinance (SR) transactions.

Adjustable Rate Mortgages

Adjustable rate mortgages (ARMs) are mortgages where the interest rate adjusts over the life of the loan. The interest rate adjustments are tied to interest rate indexes, such as CMT rates. The interest rate at the beginning of the loan is typically lower than the prevailing fixed rate mortgage, and

[29] Mortgagee Letter 2000-38, October 27, 2000: Single Family Loan Production - Further Reduction in Upfront Mortgage Insurance Premiums and Other Mortgage Insurance Premium Changes
[30] Mortgagee Letter 95-7, January 27, 1995: Single Family Loan Production - Revised Underwriting Guidelines and Other Policy Issues.
[31] Mortgagee Letter 96-34, July 10, 1996: Single Family Loan Production - Automated Underwriting Systems.

increases over the early years of the loan. The initial interest rate can be fixed for a varying period of time (one year, three years, five years, etc.) and, after the fixed interest rate period, can change yearly. Most ARMs also have a lifetime cap on how much the interest rate can increase relative to the initial interest rate.

Historically, the default rates related to ARMs have been higher than the default rates for fixed rate mortgages. This is based in part on the fact that as the interest rate increases, the monthly mortgage payment increases, and, as a result, the likelihood of borrower defaults increases. However, there is an offsetting impact, as the likelihood of prepayments decrease as interest rates increase. To address this, HUD has issued a series of mortgagee letters related to ARMs:

- In 1998, HUD issued guidance that for ARMs, borrowers must qualify using mortgage payments based on the contract or initial rate plus one percent, which effectively represents the second year interest rate. This applied to all mortgages with LTV ratios of greater than or equal to 95%. In addition, it prohibited any form of a temporary interest rate buydown. This was due to the fact that the payment shock associated with the termination of the buydown was causing default rates to increase to an unacceptable level.[32]

- In 2004, HUD expanded mortgage insurance availability to cover three-, five-, seven- and 10-year ARMs.[33]

- In 2007, the one-year London Interbank Offered Rate (LIBOR) was added as an acceptable index for ARMs.[34]

Foreclosure Avoidance and Loss Mitigation Programs

The pre-foreclosure sale (PFS) program allows mortgagors to sell their homes and use the proceeds to satisfy their mortgage debt obligations even if the proceeds were less than owed. Ultimately, these programs help limit the number of defaults that turn into claims, and also limit the losses sustained by MMI when a claim occurs. There are also certain situations where HUD can pursue a deficiency judgment against the borrower if they PFS amount does not cover the mortgage balance if it is consistent with state law.

[32] Mortgagee Letter 98-1, January 2, 1998: Single Family Loan Production - Underwriting Adjustable Rate Mortgages, Interest Buydowns, Homeownership Counseling and Other Credit Policy Issues.
[33] Mortgagee Letter 2004-10, March 19, 2004: Adjustable Rate Mortgages.
[34] Mortgagee Letter 2007-13, October 12, 2007: Adjustable Rate Mortgages—Addition of LIBOR Index.

Over the years, FHA has issued a number of mortgagee letters related to foreclosure and loss mitigation:

- In 1996, a mortgagee letter was released to provide information on the loss mitigation procedures, including special forbearance plans, mortgage modifications, PFSs, deeds in lieu of foreclosure and partial claims. The primary objective was to keep the homeowner in the home, and if that was not possible then the objective was disposition of the property without full foreclosure.[35]

- In 2008, due to the increase in defaults resulting from the housing crisis, FHA released a mortgagee letter reminding mortgagees of PFS as an option and also consolidated the provisions of the PFS program into one place. This letter also updated provisions of the PFS to better address the mortgage crisis.[36]

- In 2010, FHA released a mortgagee letter announcing enhancements to the FHA refinance program to allow responsible borrowers an opportunity to stay in their homes. This could occur if the lender agreed to write off at least 10% of the principal balance and if the remaining loan provisions were met.[37]

- In 2011, FHA issued guidance requiring a trial payment program prior to completing a permanent loan modification or partial claim. During the trial payment period, the borrower must complete three months of payments at the amount that will continue under the modification.[38]

- In 2012, FHA revised the Loss Mitigation Home Retention Options to reduce the claims against the MMI and help more borrowers stay in their homes. These revisions included eliminating the maximum back-end debt to income ratio; eliminating the restriction on the principal, interest, taxes and insurance that can be included in the claim; and, eliminating the requirement that the existing mortgage be no more than 12 months past due.[39]

- In 2013, FHA established updated requirements for PFSs and Deed in Lieu (DIL) requirements. These changes included the use of the Deficit Income Test (DIT) – a test to determine if

[35] Mortgagee Letter 96-61, November 12, 1996: FHA Loss Mitigation Procedures - Special Instructions.
[36] Mortgagee Letter 2008-43, December 24, 2008: Pre-Foreclosure Sale (PFS) Program - Utilizing the PFS Loss Mitigation Option to Assist Families Facing Foreclosure.
[37] Mortgagee Letter 2010-23, August 6, 2010: FHA Refinance of Borrowers in Negative Equity Positions.
[38] Mortgagee Letter 2011-28, August 15, 2011: Trial Payment Plan for Loan Modifications and Partial Claims under Federal Housing Administration's Loss Mitigation Program.
[39] Mortgagee Letter 2012-22, November 16, 2012: Revisions to FHA's Loss Mitigation Home Retention Options.

expenses exceed income and whether a hardhip exists – and the elimination of the financial hardship/deficit income PFS requirement for servicemen who have received a Permanent Change of Station order.[40]

- In 2013, additional modifications were made to the FHA Loss Mitigation Home Retention Options. These changes included defining continuous income that can be considered in the transaction, allowing for arrearages to be included in partial claims, and allowing for modifications for mortgagors in bankruptcy.[41]

- In 2014, the updated PFS guideline required a minimum marketing period of 15 calendar days for all PFS transactions. It also clarified that non-arms-length transactions are permitted only if they are necessary to comply with state law.[42]

- Also in 2014, FHA issued a mortgagee letter to increase the use of Claims Without Conveyance of Title (CWCOT) procedures. This letter also established that the Commissioner's Adjusted Fair Market Value must be used for all foreclosure sales and PFS efforts.[43]

- In 2018, FHA issued a mortgagee letter implementing special loss mitigation processes for victims of Hurricanes Irma, Harvey and Maria and the California Wildfires. These procedures were implemented to help homeowners stay in their homes and reduce losses to FHA.[44]

- Later in 2018, FHA issued a mortgagee letter in response to continued elevated default rates and lower utilization of loss mitigation options in Puerto Rico and the U.S. Virgin Islands. This mortgagee letter expanded loss mitigation assistance to borrowers in default.[45]

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[40] Mortgagee Letter 2013-23, July 9, 2013: Updated Pre-Foreclosure Sale (PFS) and Deed in Lieu (DIL) of Foreclosure Requirements.
[41] Mortgagee Letter 2013-32, September 20, 2013: Update to FHA's Loss Mitigation Home Retention Options.
[42] Mortgagee Letter 2014-15, July 10, 2014: Updated Requirements for Pre-Foreclosure Sales (PFS) and Deeds in Lieu (DIL) of Foreclosure.
[43] Mortgagee Letter 2014-24, November 26, 2014: Increasing Use of FHA's Claims Without Conveyance of Title (CWCOT) Procedures.
[44] Mortgagee Letter 2018-01, February 22, 2018: Loss Mitigation for borrowers with FHA-insured mortgages whose property and/or place of employment is located in Presidentially-Declared Major Disaster Areas, adversely affected by Hurricanes Harvey, Irma, Maria, certain California wildfires that occurred in October 2017 (FEMA-DR-4344) or certain California Wildfires, Flooding, Mudflows, and Debris Flows that occurred in December 2017 (FEMA-DR-4353).
[45] Mortgagee Letter 2018-05, August 15, 2018: Updated Loss Mitigation for mortgagees servicing mortgage loans for borrowers with FHA-insured mortgages whose property and/or place of employment is located in the Presidentially-Declared Major Disaster Areas (PDMDAs) of Puerto Rico Hurricane Maria DR-4339 or Virgin Islands Hurricane Maria DR-4340 and Disaster Foreclosure Moratorium for certain FHA-insured mortgages secured by properties located in areas of Puerto Rico and the U.S. Virgin Islands that the U.S. Department of Homeland Security's Federal Emergency Management

- In 2019, HUD incorporated additional changes to further streamline and revise Loss Mitigation Procedures for Presidentially Declared Major Disaster Areas (PDMDAs).[46]

COVID-19 Pandemic

The President of the United States proclaimed that the COVID-19 outbreak in the United States constitutes a national emergency as of March 1, 2020. As a result, for a period of time many jurisdictions reduced services, businesses closed, and other activities were curtailed. In addition, the pandemic impeded the ability of Americans to work and provide for their families. This directly impacted the financial wellbeing of individuals, families, and businesses. Furthermore, many Americans were asked to remain in their homes to stem the tide of COVID-19 as many states implemented shelter-in-place orders.

COVID-19 is still a national emergency, and it is not yet clear when this declaration will end. To ensure families are not displaced during this critical period, several mortgagee letters have been issued.

- March 18, 2020: Properties secured by FHA-insured mortgages were subject to a 60-day moratorium on foreclosures. This moratorium applied to the initiation of foreclosures and foreclosures in process.[47] On May 14, 2020, the foreclosure moratorium was extended through June 30, 2020.[48] On June 17, 2020, the moratorium was extended through August 31, 2020,[49] and on August 27, 2020 the moratorium was extended through December 31, 2020.[50] On December 17, 2020, the moratorium was extended through February 28, 2021.[51] On January 21, 2021, the moratorium was extended through March 31, 2021.[52] On February 16, 2021, the

Agency (FEMA) has declared to be eligible for Individual Assistance (Affected Counties) as a result of Hurricane Maria (Puerto Rico Hurricane Maria DR-4339 and Virgin Islands Hurricane Maria DR-4340).

[46] Mortgagee Letter 2019-14, August 29, 2019: Updates to FHA's Loss Mitigation Options for Borrowers in Presidentially-Declared Major Disaster Areas (PDMDAs)

[47] Mortgagee Letter 2020-04, March 18, 2020: Foreclosure and Eviction Moratorium in connection with the Presidentially Declared COVID-19 National Emergency.

[48] Mortgagee Letter 2020-13, May 14, 2020: Extension of Foreclosure and Eviction Moratorium in connection with the Presidentially-Declared COVID-19 National Emergency and New Reporting Requirements Related to FHA Single Family's CARES Act Loss Mitigation Options.

[49] Mortgagee Letter 2020-19, June 17, 2020: Extension of Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency.

[50] Mortgagee Letter 2020-27, August 27, 2020: Extension of Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency.

[51] Mortgagee Letter 2020-43, December 17, 2020: Extension of Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency.

[52] Mortgagee Letter 2021-03, January 21, 2021: Extension of Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency.

moratorium was extended through June 30, 2021.[53] On June 25, 2021, the moratorium was extended through July 31, 2021.[54] On July 30, 2021, the moratorium was extended through September 30, 2021.[55] Deadlines for the first legal action and reasonable diligence times were extended by 90 days from the date of the expiration of the moratorium.

- March 27, 2020: Rules for re-verification of employment were adjusted to account for the fact that many businesses were closed during shelter-in-place orders. Also, changes were made to FHA Appraisal Protocols to allow for exterior only and desktop appraisals in order to maintain appropriate social distancing.[56] On May 14, 2020, the applicability of this changes were extended through June 30, 2020.[57] On June 29, 2020, the applicability of these changes were extended through August 31, 2020.[58] On August 28, 2020, the applicability of these changes was extended through October 31, 2020.[59] On October 28, 2020, the applicability of these changes was extended through December 31, 2020.[60] On December 17, 2020, the applicability of these changes was extended through February 28, 2021.[61] On February 23, 2021, the applicability of these changes was extended through June 30, 2021.[62]

[53] Mortgagee Letter 2021-05, February 16, 2021: Extensions of Single Family Foreclosure and Eviction Moratorium, Start Date of COVID-19 Initial Forbearance, and HECM Extension Period; Expansion of COVID-19 Loss Mitigation Options
[54] Mortgagee Letter 2021-15, June 25, 2021: Extension of the Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency, Further Expansion of the COVID-19 Forbearance and the COVID-19 Home Equity Conversion Mortgage (HECM) Extensions, and Establishment of the COVID-19 Advance Loan Modification (COVID-19 ALM).
[55] Mortgagee Letter 2021-19, July 30, 2021: Extension of the Foreclosure-Related Eviction Moratorium and Expiration of the Foreclosure Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency.
[56] Mortgagee Letter 2020-05, March 27, 2020: Re-verification of Employment and Exterior-Only and Desktop-Only Appraisal Scope of Work Options for FHA Single Family Programs Impacted By COVID-19.
[57] Mortgagee Letter 2020-14, May 14, 2020: Extension of the Effective Date of Mortgagee Letter 2020-05, Re-verification of Employment and Exterior-Only and Desktop-Only Appraisal Scope of Work Options for FHA Single Family Programs Impacted By COVID-19.
[58] Mortgagee Letter 2020-20, June 29, 2020: Re-Extension of the Effective Date of Mortgagee Letter 2020-05, Re-verification of Employment and Exterior-Only and Desktop-Only Appraisal Scope of Work Options for FHA Single Family Programs Impacted By COVID-19.
[59] Mortgagee Letter 2020-28, August 28, 2020: Re-Extension of the Effective Date of Mortgagee Letter (ML) 2020-05, Reverification of Employment and Exterior-Only and Desktop-Only Appraisal Scope of Work Options for the Federal Housing Administration (FHA) Single Family programs impacted by the Coronavirus Disease of 2019 (COVID-19).
[60] Mortgagee Letter 2020-37, October 28, 2020: Extension of Re-verification of Employment Guidance and Updated Appraisal Scope of Work Option for Federal Housing Administration (FHA) Single Family Programs Impacted by the Coronavirus Disease of 2019 (COVID-19).
[61] Mortgagee Letter 2020-47, December 17, 2020: Extension of Re-verification of Employment and Exterior only Appraisal scope of work option for Federal Housing Administration (FHA) Single Family programs impacted by the Coronavirus Disease of 2019 (COVID-19).
[62] Mortgagee Letter 2021-06, February 23, 2021: Extension of Re-verification of Employment and Exterior-Only Appraisal scope of work (SOW) option for Federal Housing Administration (FHA) Single Family programs impacted by the Coronavirus Disease of 2019 (COVID-19).

- April 1, 2020: Borrowers who experienced an adverse impact on their ability to make on-time mortgage payments were eligible for forbearance for an initial period of six months, and this initial period could be extended by up to six additional months. While in forbearance, the borrower must be evaluated for loss mitigation options.[63] On July 8, 2020, HUD issued a mortgagee letter detailing the full suite of loss mitigation options available for borrowers affected by COVID-19.[64] On October 20, 2020, the date for approving a COVID-19 forbearance was extended to December 31, 2020.[65] On December 17, 2020, the date for approving a COVID-19 forbearance was extended to February 28, 2021.[66] On January 26, 2021, the date for approving a COVID-19 forbearance was extended to March 31, 2021.[67] On February 16, 2021, the date for approving a COVID-19 forbearance was extended to June 30, 2021.[68] This extension also expanded mitigation options, including adding additional forbearance options, increasing borrower eligibility for COVID-19 forbearance, and removing the restriction that borrowers can receive only one COVID-19 home retention option. On June 25, 2021, the date for approving a COVID-19 forbearance was extended to July 31, 2021.[69] On September 27, 2021, HUD provided an additional six months of COVID-19 Forbearance when the initial forbearance was requested between July 1, 2021 and September 30, 2021, and also established an initial Forbearance period of up to six months when requested between October 1, 2021 and the end of the COVID-19 National Emergency.[70] This mortgagee letter also introduced an Advance Loan Modification, which could significantly reduce the payment for borrowers.

- June 4, 2020: Mortgages in forbearance due to the effects of COVID-19 were allowed to be endorsed by HUD if at the time of the closing the buyer met all necessary requirements and the

[63] Mortgagee Letter 2020-06, April 1, 2020: FHA's Loss Mitigation Options for Single Family Borrowers Affected by the Presidentially-Declared COVID-19 National Emergency in Accordance with the CARES Act.
[64] Mortgagee Letter 2020-22, July 8, 2020: FHA's COVID-19 Loss Mitigation Options.
[65] Mortgagee Letter 2020-34, October 20, 2020: Update to the Date for Approving a COVID-19 Forbearance or COVID19 Home Equity Conversion Mortgage (HECM) Extension.
[66] Mortgagee Letter 2020-44, December 17, 2020: Second Update to the COVID-19 Forbearance Start Date and the COVID19 Home Equity Conversion Mortgage (HECM) Extension Period.
[67] Mortgagee Letter 2021-04, January 26, 2021: Update to the COVID-19 Forbearance Start Date and the COVID-19 Home Equity Conversion Mortgage (HECM) Extension Period.
[68] Mortgagee Letter 2021-05, February 16, 2021: Extensions of Single Family Foreclosure and Eviction Moratorium, Start Date of COVID-19 Initial Forbearance, and HECM Extension Period; Expansion of COVID-19 Loss Mitigation Options
[69] Mortgagee Letter 2021-15, June 25, 2021: Extension of the Foreclosure and Eviction Moratorium in Connection with the Presidentially-Declared COVID-19 National Emergency, Further Expansion of the COVID-19 Forbearance and the COVID-19 Home Equity Conversion Mortgage (HECM) Extensions, and Establishment of the COVID-19 Advance Loan Modification (COVID-19 ALM).
[70] Mortgagee Letter 2021-24, September 27, 2021: Extension for COVID-19 Forbearance and COVID-19 Home Equity Conversion Mortgage (HECM) Extensions.

mortgage was current at the time of forbearance.[71] On November 25, 2020, the applicability of this endorsement guidance was extended through December 31, 2020.[72] On December 17, 2020, this endorsement guidance was extended through March 31, 2021.[73]

- June 12, 2020: Claims for loss mitigation options were allowed to be submitted electronically.[74]

- July 23, 2021: HUD established COVID-19 Recovery Loss Mitigation Options, which included the COVID-19 Standalone Partial Claim, the COVID-19 Recovery Modification, and the COVID-19 Non-Occupant Load Modification.[75]

The COVID-19 pandemic, the shelter-in-place orders and the modifications to the loss mitigation and forbearance guidelines have had a significant impact on the Cash Flow NPV of the MMI. We have considered these impacts as part of our analysis, and will highlight throughout the report how COVID-19 has impacted our analysis and the Cash Flow NPV projections.

Current and Future Market Environment

In addition to the policies related to the MMI, the default and claim rates and ultimately the Cash Flow NPV of the MMI are dependent on the economic environment. As interest rates increase, mortgage rates tend to increase, which in turn causes default rates to increase.

The general health of the economy impacts the value of homes. As home values increase, losses to the MMI will tend to decrease as the value received in the disposition of a home increases. Also, as the general health of the economy improves, the demand for mortgages increases. This generally results in an increase in the demand for mortgages endorsed by the MMI for mortgage insurance.

The impacts of COVID-19 on the economy have been significant. For some of the economic variables considered in the analysis, the impact of COVID-19 has caused levels that have not been seen

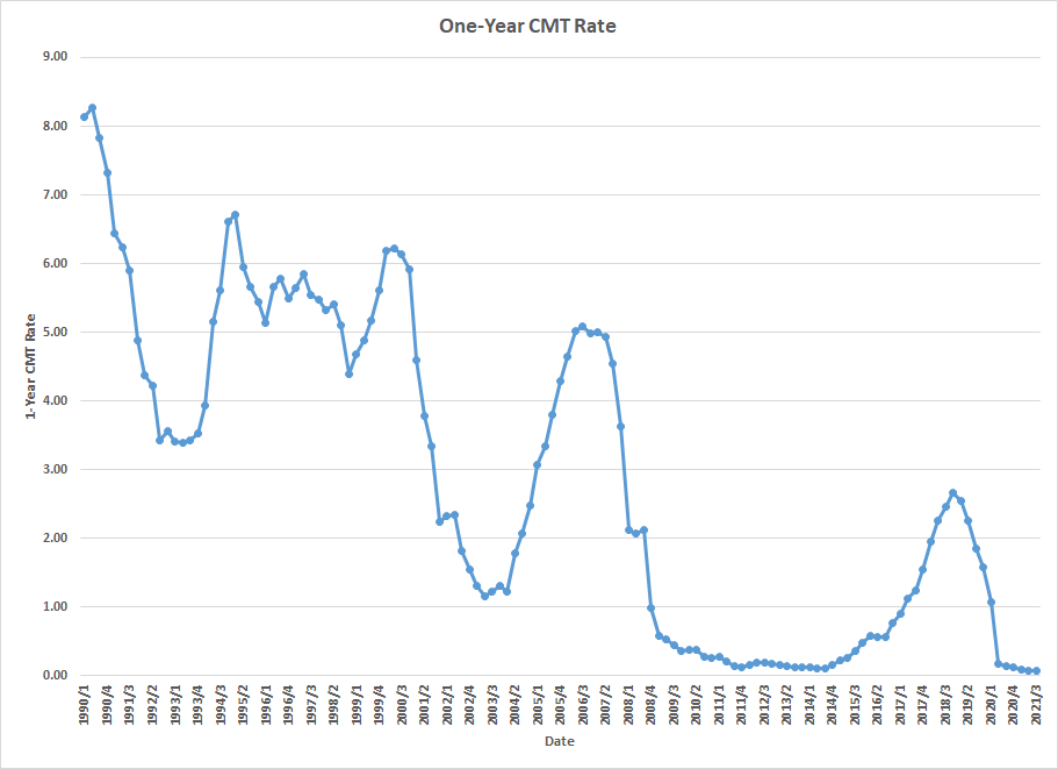
[71] Mortgagee Letter 2020-16, June 4, 2020: FHA Catalyst: Case Binder Module – Single Family Forward and Home Equity Conversion Mortgage (HECM) Electronic Endorsement Submission.
[72] Mortgagee Letter 2020-29, November 25,2020. Extension of Temporary Guidance for Endorsement of Mortgages under Forbearance for Borrowers Affected by the Presidentially-Declared COVID19 National Emergency consistent with the Coronavirus Aid, Relief, and Economic Security (CARES) Act.
[73] Mortgagee Letter 2020-45, December 17, 2020: Extension of Temporary Guidance for Endorsement of Mortgages under Forbearance for Borrowers Affected by the Presidentially-Declared COVID19 National Emergency consistent with the Coronavirus Aid, Relief, and Economic Security (CARES) Act.
[74] Mortgagee Letter 2020-18, June 12, 2020: FHA Catalyst: Claims Module - Single Family Forward Loss Mitigation Home Retention Claims.
[75] Mortgagee Letter 2021-18, July 23, 2021: COVID-19 Recovery Loss Mitigation Options.

historically. Throughout the analysis, we have analyzed the impact of COVID-19 on economic and other variables and the Cash Flow NPV.

Interest Rates

Figure 1 shows the historical one-year CMT rate since 1990.

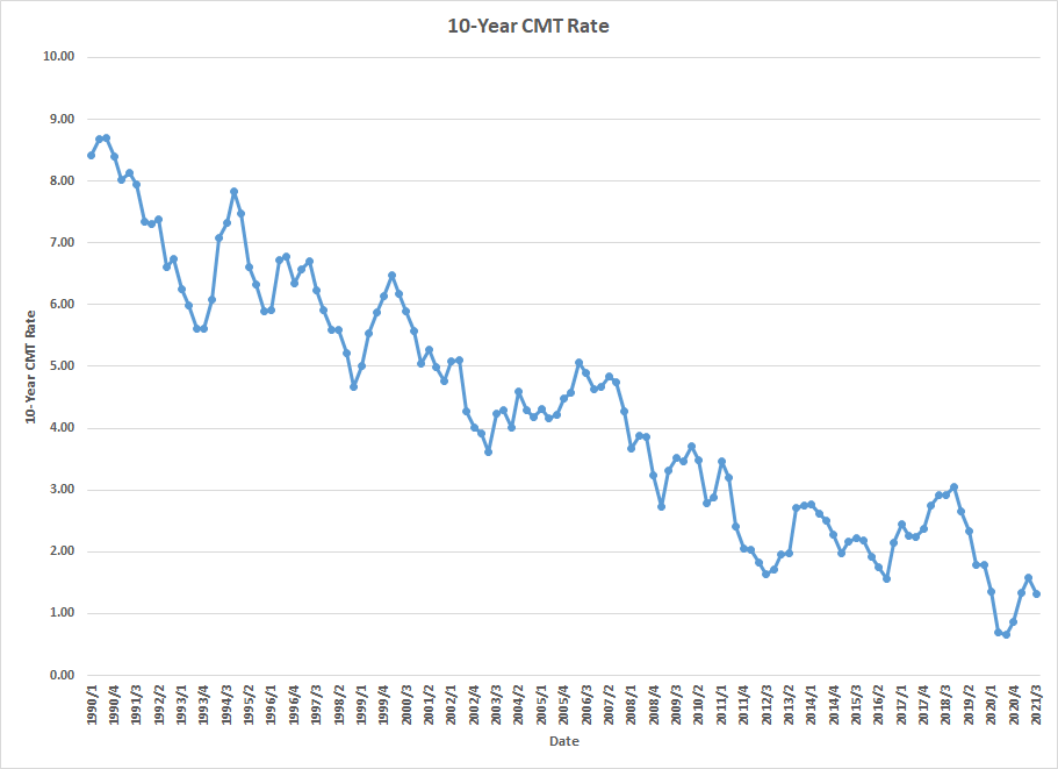
Figure 1: One-Year CMT Rate



In 2008, in response to the housing crisis and economic recession, the Federal Reserve began decreasing interest rates as part of an active monetary policy. At the beginning of 2007, the one-year CMT rate was around 5%. Over the next seven years, the rate dropped steadily to a low of 0.1% in the second quarter of 2014. Subsequent to 2014, the rate began increasing again to a high of 2.7% by December 2018. Since that time, the rate had been decreasing, and as of the second quarter of 2021 reached 0.06%, the lowest level since the one-year CMT rate began in 1953. The rate as of the third quarter of 2021 is 0.08%. Recent decreases in the one-year CMT have been a direct result of monetary policy in response to the economic impact of COVID-19.

Figure 2 shows the 10-year CMT rate since 1990.

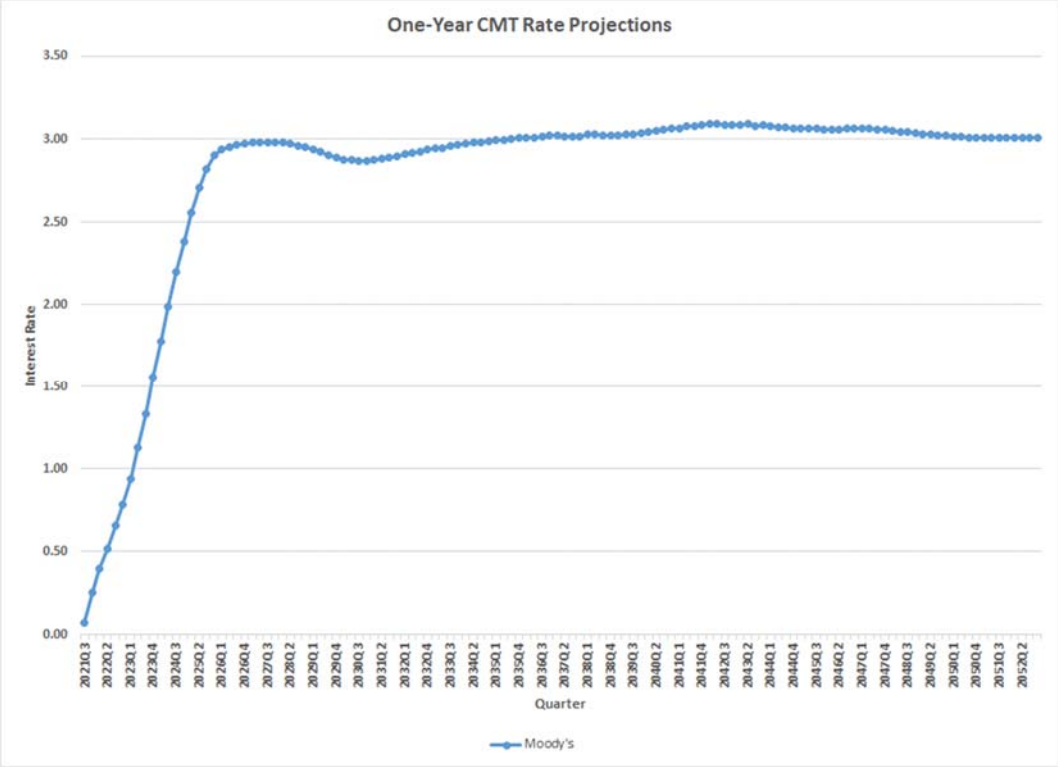
Figure 2: 10-Year CMT Rate



The 10-year CMT rate shows a similar trend, although the changes are not as significant. In mid-2007, the 10-year CMT rate was over 5%. Since that time, the rate dropped to under 2% in 2012. Subsequent to 2012, the rate increased to just over 3.0% by December 2018. The rate had since been decreasing, and due to the economic impacts of COVID-19 had dropped to 0.64% by the third quarter of 2020, the lowest level in the last 30 years. Since then, the rate has increased to 1.3% as of the third quarter of 2021.

For the purposes of projecting Cash Flow NPV, it is required that Pinnacle produce an estimate using the projection figures from the OMB. In addition to OMB projections, Pinnacle has also used Moody's economic projections to generate a range of indications of the economic value. Figure 3 shows the one-year CMT rate projection from Moody's Baseline Scenario.

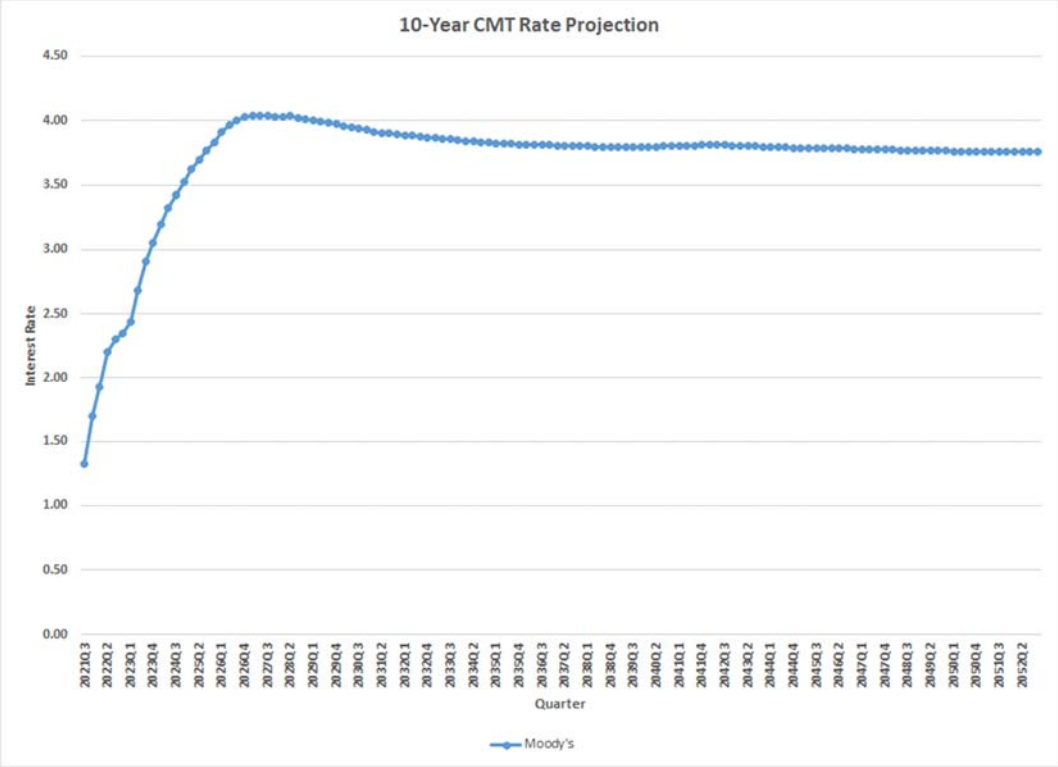
Figure 3: One-Year CMT Rate Projections



Moody's projections show increases in the one-year CMT rate. The rate increases to 3.0% by 2026, and then remains in the range of 2.9% to 3.1% for the rest of the projection period.

The 10-year CMT rate projection from Moody's is shown below.

Figure 4: 10-Year CMT Rate Projection

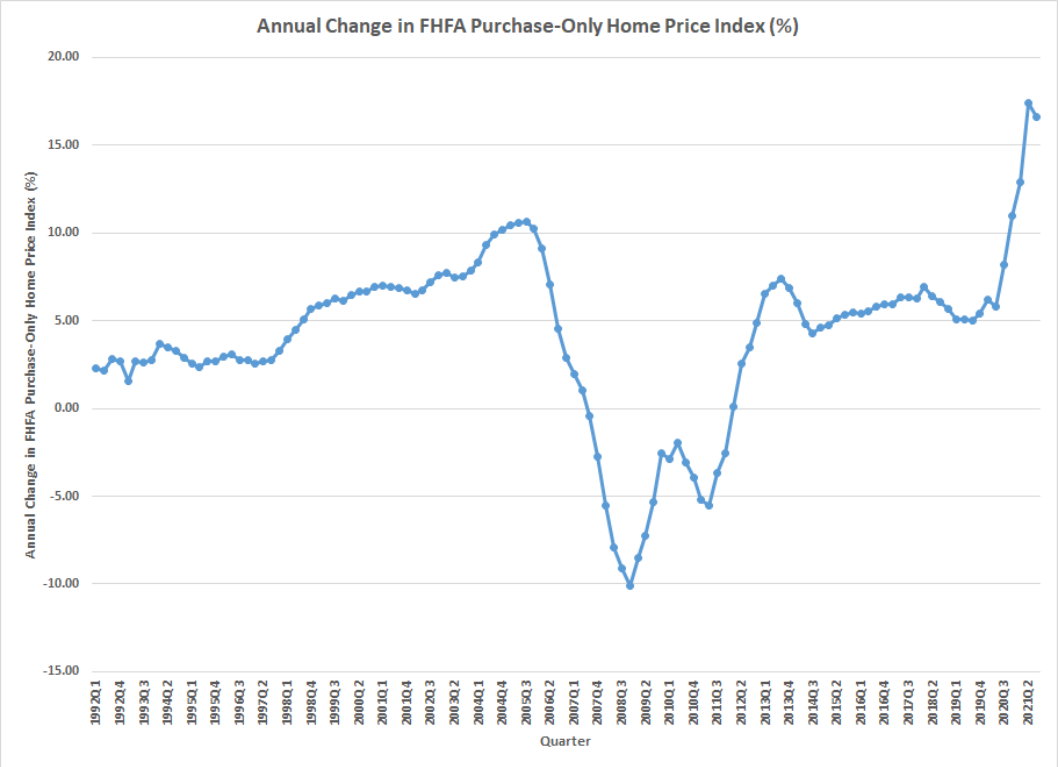


The 10-year CMT rate increases gradually and then stabilizes at approximately 3.8% by the end of the projection period.

Home Price Index Growth

The growth rate in home prices will have an impact on the volume of mortgages endorsed by FHA, the percentage of defaults in mortgages and the ultimate cost of the mortgage insurance claims. The annual percentage change in the historical Federal Housing Finance Agency (FHFA) Purchase Only House Price Index by quarter is shown below.

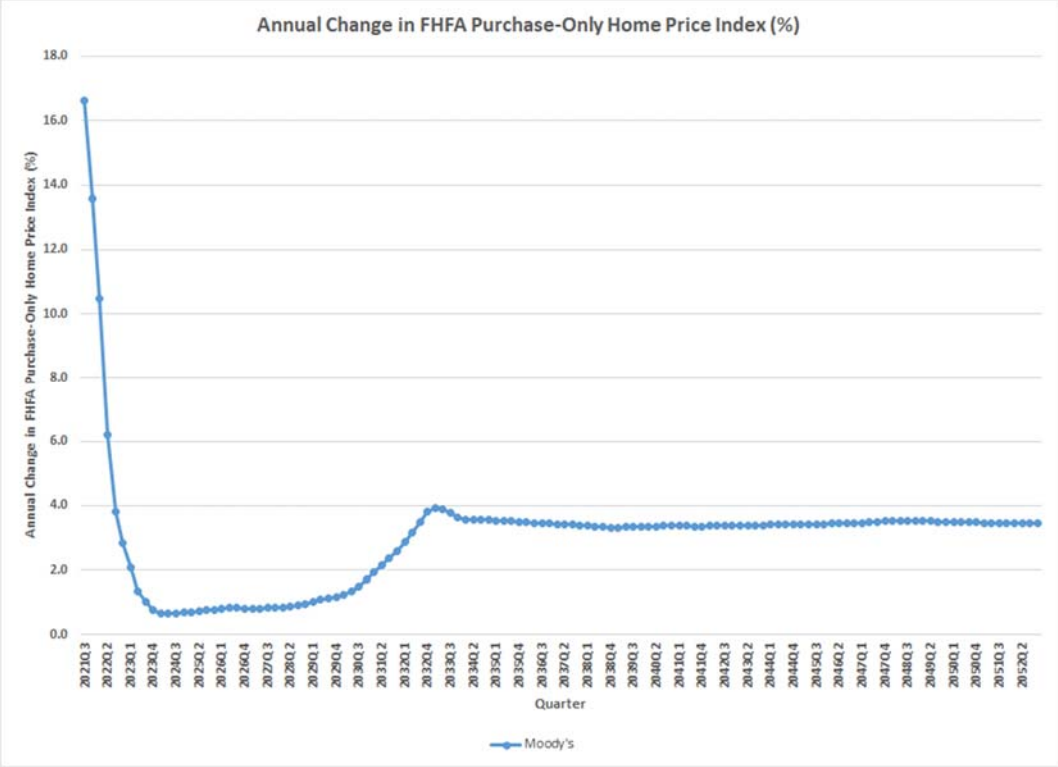
Figure 5: Historical FHFA Purchase Only House Price Index



From 1992 through 2005, the annual rate of change increased to a high of over 10%. During the housing crisis that began in 2006, the annual rate of change decreased significantly, dropping to a low of -10% in 2008, and remained negative through 2011. The trend then increased again, and continued through 2013, and the rate then remained between 5% and 7% through the second quarter of 2020. The rate then began increasing in the third quarter of 2020 due to a significant increase in housing demand, and is now at 17.4% as of the third quarter of 2021.

Moody's projects the home price index to 2050. Moody's also produces a forecast for local areas, including metropolitan areas and states. The annual percentage change in the countrywide projected FHFA Purchase Only House Price Index by quarter is shown below for Moody's baseline projections.

Figure 6: FHFA Purchase Only House Price Index – Moody's Baseline Projections

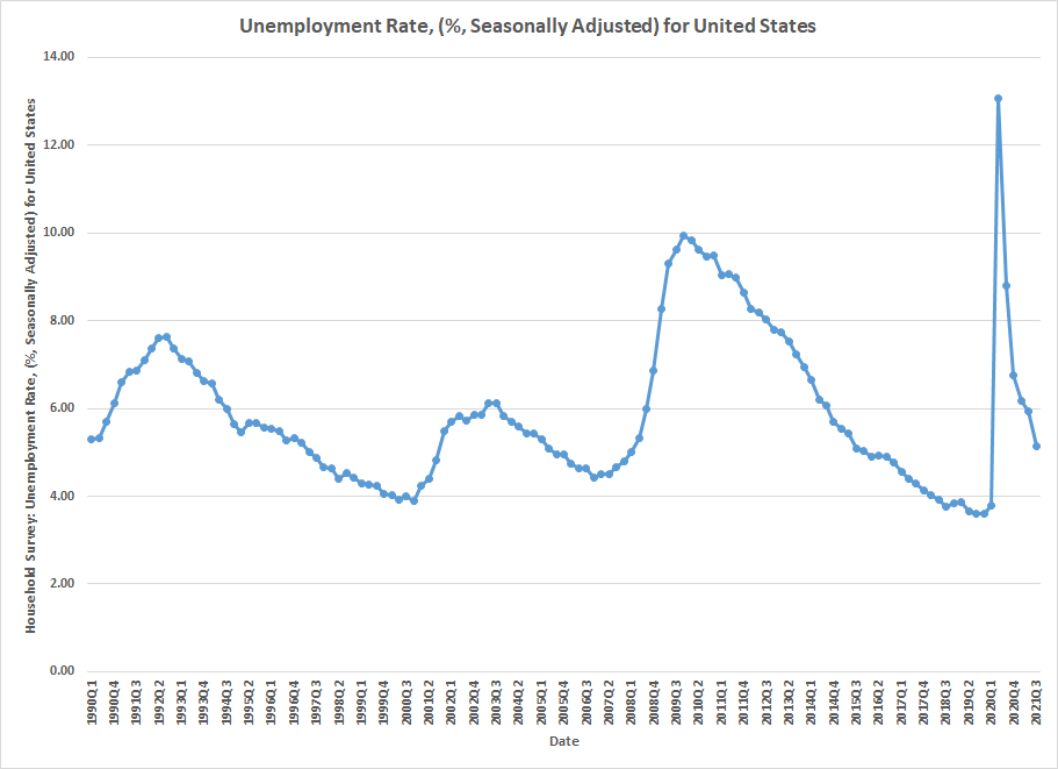


For Moody's Baseline projections, the annual percentage change for the index decreases 0.7% by 2024. The rate then increases sharply to 3.9% by 2032, then decreases and stabilizes long-term near 3.5%.

Unemployment Rate

The unemployment rate has an impact on the ability of homeowners to make their mortgage payments. This impacts the default rates and ultimate projections of the MMI. The historical unemployment rate is shown below.

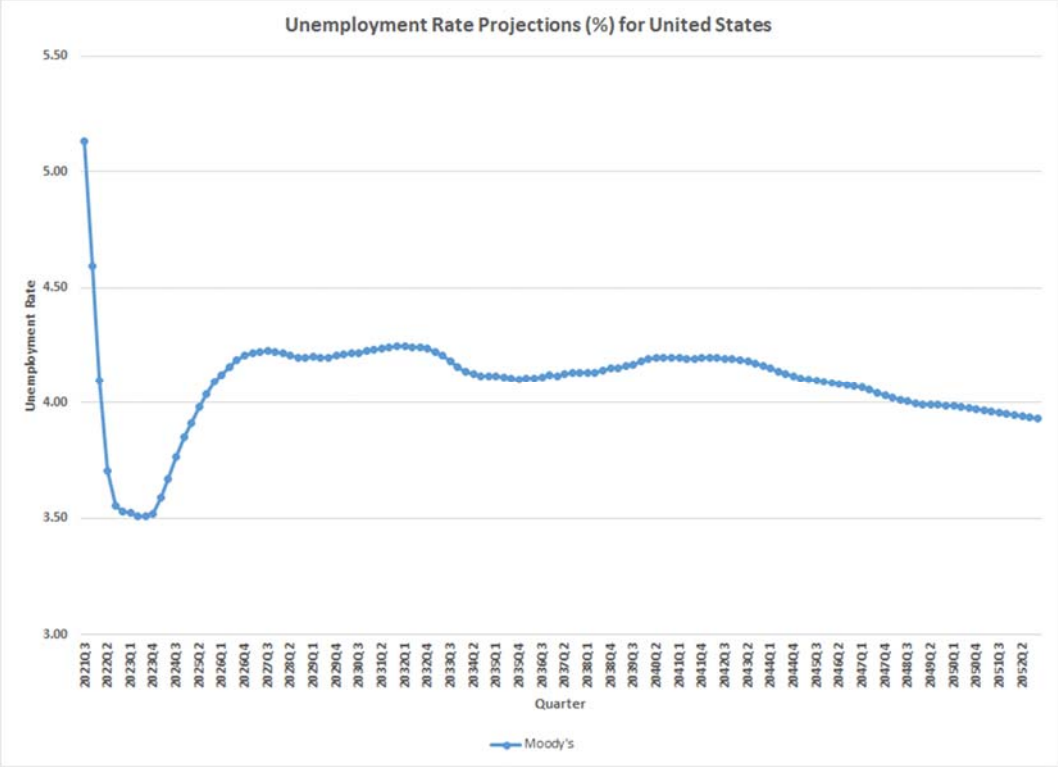
Figure 7: Historical Unemployment Rate



Beginning in 2008, as the economic downturn occurred, the seasonally adjusted unemployment rate nearly doubled from 5% to just under 10% by the end of 2009. Since 2009, the rate had decreased steadily to 3.5% by year-end 2019. In 2020, the economic issues associated with the COVID-19 pandemic resulted in an unemployment rate of 13.1% in the second quarter of 2020. The rate has recovered to 5.1% in the third quarter of 2021.

The projected unemployment rates from Moody's are shown in Figure 8.

Figure 8: Unemployment Rate Projection



Moody's projections show a significantly decreasing trend through 2023. The unemployment rate then continues to increase slowly through 2026 to 4.2%.

Mortgage Volume

The mortgage endorsement volume for FHA and the U.S. home market is shown in Table 5. The health and capacity of the private mortgage insurance market can impact the projected value of the MMI. If the private mortgage insurance market increases capacity and is successful in providing insurance to borrowers who are less likely to default, it could have a negative impact on the Cash Flow NPV of the MMI.

Table 5: FHA Share of Home Sales

	Volume of Home Sales ($ Billions)		
Calender Year	**FHA**	**Market**	**FHA Share (%)**
2001	89	959	9.2%
2002	82	1,097	7.5%
2003	71	1,274	5.6%
2004	53	1,306	4.1%
2005	37	1,506	2.5%
2006	36	1,402	2.5%
2007	39	1,144	3.5%
2008	129	743	17.4%
2009	185	652	28.3%
2010	167	540	31.0%
2011	129	503	25.7%
2012	127	594	21.3%
2013	119	728	16.4%
2014	107	758	14.1%
2015	154	897	17.1%
2016	176	1,051	16.7%
2017	174	1,141	15.2%
2018	158	1,207	13.1%
2019	170	1,222	13.9%
2020	193	1,437	13.5%
2021	150	1,254	12.0%

Sources: FHA Volume from FHA Data Warehouse, September 30, 2021 extract. Market volume from Mortgage Bankers Association.

FHA's share of the volume of home sales has increased significantly from its low of 2.5% in 2005 and 2006. From 2002 to 2006, FHA's share of the number and volume of home sales declined as the subprime mortgage market expanded from 2003 to 2007. The housing and economic crisis that occurred in 2008 decreased the availability of mortgages in general, and significantly impacted the availability of subprime mortgages. Private mortgage insurers were also facing significant losses and decreased the volume of insurance they were providing. As a result, FHA's market share began to increase significantly. The volume of FHA endorsed mortgages increased from 2.5% to 31.0% from 2006 to 2010. As the housing market has recovered, the percentage of loans endorsed by FHA had decreased steadily through 2018 to 13.1%. In 2019, the FHA share increased to 13.9%, but decreased to 13.5% in 2020. Through the first three calendar quarters of 2021, the FHA share of mortgage originations has decreased to 12.0%. This may be due to the increased demand in the housing market in 2021, the increased willingness or private mortgage insurers to support this increased demand, and the increase in demand for mortgages above the FHA mortgage limits.

Report Structure

The remainder of this report is divided into the following sections:

- **Section 2. Summary of Findings and Comparison with Fiscal Year 2020 Actuarial Review** – presents the MMI Economic Net Worth for Fiscal Year 2021 and the projected Cash Flow NPV by cohort and product. This section also provides a reconciliation and explanation of the major differences between the Fiscal Year 2020 and Fiscal Year 2021 reports.

- **Section 3. Cash Flow NPV Based on Alternative Scenarios** – presents estimates of the MMI Cash Flow NPV using a range of alternative economic assumptions.

- **Section 4. Characteristics of the Fiscal Year 2021 Insurance Portfolio** – describes the Fiscal Year 2021 insurance portfolio and compares the risk characteristics of the origination books of business across historical fiscal years.

- **Section 5. Summary of Methodology** – presents an overview of the data processing, transition, loss severity and cash flow models used in the analysis.

- **Appendix A: Data – Sources, Processing and Reconciliation** – provides a description of the data sources used for the analysis, the data processing required to prepare the data for analysis and the data reconciliation performed.

- **Appendix B: Transition Models** – provides a technical description of our predictive models of current and default transitions, the model parameters and model validation results.

- **Appendix C: Loss Severity Models** – provides a technical description of our predictive models of loss severity rates, the model parameters and model validation results.

- **Appendix D: Economic Scenarios** – describes the forecast of future values of economic factors that affect the performance of the MMI and presents the variation in estimated Cash Flow NPV based on the additional economic scenarios. Details of the stochastic analysis are also provided.

- **Appendix E: Cash Flow Analysis** – describes the process used to project future cash flows.

- **Appendix F: Review of HUD Analysis of Economic Net Worth, Comparison of HUD and Pinnacle Models, and Assessment of Vulnerabilities** – high-level review of HUD models

developed to project Economic Net Worth, comparison of the models developed by HUD with the models developed by Pinnacle, and assessment of the vulnerabilities of the models developed.

- **Appendix G: Summary of Historical and Projected Claim Rates, Non-Claim Termination Rates and Loss Severities** – historical and projected claim, non-claim termination and loss severity rates.

SECTION 2 - SUMMARY OF FINDINGS AND COMPARISON WITH FISCAL YEAR 2020 ACTUARIAL REVIEW

This section presents the Economic Net Worth and the details of the Cash Flow NPV of the MMI Forward Loan portfolio as of the end of Fiscal Year 2021, and also shows a comparison of the elements of the Economic Net Worth between the 2020 Actuarial Review and this review.

Economic Net Worth Estimate

The Economic Net Worth is defined as cash available to the Fund plus the Cash Flow NPV of all future cash outflows and inflows that are expected to result from the mortgages currently insured by the MMI. The 2021 Actuarial Review estimates the Cash Flow NPV of the MMI as of the end of Fiscal Year 2021 using data through September 30, 2021. We developed this estimate by analyzing historical loan performance using data provided by FHA, developing predictive models for loan transition and losses, and using these model results along with economic projections from the OMB and Moody's to project future cash flows of the MMI. The NPV of these cash flows along with the MMI's capital resources represent the economic value of the MMI.

The predictive models used in this report are similar structurally to the models developed in the 2020 Actuarial Review. We have developed binomial logistical models by product type to predict each transition type independently. The binomial model results are then combined in the final simulation to reflect the multiple possible transition outcomes.

Transition types are discussed in more detail in Appendix B.

Appendices A through G describe the individual models, the assumptions used and the detailed projection model results. Our main findings are as follows.

The Cash Flow NPV is computed from the projected cash flows occurring subsequent to Fiscal Year 2021 and subsequent. It is computed based on economic projections associated with the OMB Economic Assumptions. **As of the end of Fiscal Year 2021, Pinnacle estimates that the MMI Cash Flow NPV is $25.696 billion.** The Cash Flow NPV estimate provided by FHA to be used in FHA's Annual Report to Congress is $16.481 billion.

The capital resource available to the MMI is $78.500 billion, which results in an Economic Net Worth of $104.196 billion.

In addition to the overall estimate of the Cash Flow NPV, we have estimated the Cash Flow NPV by cohort. The Pinnacle estimate compared to the FHA estimate by cohort is shown below.

Table 6: Cash Flow NPV by Cohort ($ in billions)

Cohort	Pinnacle	FHA	Dollar Difference
1992	0.0	0.0	0.0
1993	0.0	0.0	0.0
1994	0.0	0.0	0.0
1995	0.0	0.0	0.0
1996	0.0	0.0	0.0
1997	0.0	0.0	0.0
1998	0.0	0.0	0.0
1999	0.0	0.0	0.0
2000	0.0	0.0	0.0
2001	0.0	0.0	0.0
2002	0.0	0.0	0.0
2003	-0.1	0.0	0.0
2004	-0.1	-0.1	0.0
2005	-0.1	-0.1	0.0
2006	-0.1	-0.1	0.0
2007	-0.2	-0.2	0.0
2008	-0.4	-0.3	-0.1
2009	-0.6	-0.4	-0.1
2010	-0.5	-0.3	-0.2
2011	-0.4	-0.2	-0.2
2012	-0.5	-0.2	-0.3
2013	-0.5	0.3	-0.8
2014	1.1	1.0	0.1
2015	1.8	1.7	0.1
2016	2.1	2.2	0.0
2017	1.5	2.1	-0.6
2018	0.1	0.8	-0.7
2019	0.0	0.2	-0.2
2020	7.4	3.7	3.7
2021	15.2	6.6	8.6
Total	25.7	16.5	9.2

The Pinnacle estimates by cohort are consistent with the FHA estimates for cohorts 1992 – 2012, 2014 – 2016 and 2019, slightly lower for cohorts 2013 and 2017 – 2018, and higher for the 2020 and 2021 cohorts. The total Pinnacle Cash Flow NPV estimate is $9.2 billion higher than the FHA estimate, which as a percentage of unamortized IIF is 0.70%. The current unamortized IIF is $1.324 trillion. The difference between the Pinnacle and FHA estimate as a percentage of amortized IIF is 0.82%. The current amortized IIF is $1.189 trillion.

Unamortized IIF is the original mortgage amounts of all active endorsements. The amortized IIF reflects the current outstanding loan balance of all active endorsements.

The housing and economic crisis that occurred in 2008 has resulted in higher claim rates for mortgages originated during Fiscal Years 2005 - 2010. Given that their upfront MIP has already been collected and is included as part of the current capital resources, and due to their large origination volume, the Fiscal Year 2008 - 2013 cohorts are estimated to experience larger negative Cash Flow NPVs than other cohorts. However, at the end of the housing recession, house prices bottomed out and then turned positive, and as a result, mortgages originated in Fiscal Years 2014 - 2021 have positive Cash Flow NPVs. The NPV is also being positively impacted for these more recent cohorts due to MIP now being collected over the life of the mortgage. In addition, the low mortgage interest rates in 2020 and 2021 are resulting in a lower likelihood of termination, thus resulting in projections of MIP being collected for a longer period of time in the simulation.

Also, the 2020 and 2021 Cash Flow NPV is influenced by the significant increase in new originations. There has been a significant increase in refinance activity. While this results in a decrease in Cash Flow NPV for older cohorts, it results in an increase in Cash Flow NPV for the 2020 and 2021 cohorts as these loans refinanced into the newer cohorts.

The table below shows Pinnacle's Cash Flow NPV estimates by cohort and product.

Table 7: Cash Flow NPV by Cohort and Product

Cohort	Fixed Rate 30	Fixed Rate 15	Adjustable Rate Mortgage	Total
1992	(80,556)	-	(4,647)	(85,203)
1993	(326,918)	-	(55,265)	(382,183)
1994	(849,643)	-	(105,422)	(955,064)
1995	(1,173,538)	-	(142,770)	(1,316,308)
1996	(2,958,156)	-	(398,264)	(3,356,419)
1997	(4,763,116)	-	(695,889)	(5,459,005)
1998	(11,852,538)	-	(473,949)	(12,326,487)
1999	(18,245,011)	-	(668,159)	(18,913,171)
2000	(14,878,489)	-	(1,226,386)	(16,104,875)
2001	(26,521,185)	-	(714,035)	(27,235,219)
2002	(38,431,766)	-	(2,760,032)	(41,191,798)
2003	(57,177,795)	-	(2,322,662)	(59,500,458)
2004	(91,996,213)	-	(8,838,227)	(100,834,440)
2005	(92,486,265)	(647)	(10,403,464)	(102,890,376)
2006	(106,872,111)	-	(3,548,090)	(110,420,201)
2007	(163,320,947)	(9,358)	(2,112,653)	(165,442,958)
2008	(424,600,463)	(247,178)	(6,052,560)	(430,900,201)
2009	(550,560,475)	(503,570)	(5,853,173)	(556,917,217)
2010	(502,664,102)	(1,438,757)	(18,720,094)	(522,822,953)
2011	(383,574,999)	(1,151,700)	(44,466,308)	(429,193,007)
2012	(481,129,855)	(2,207,026)	(7,095,699)	(490,432,580)
2013	(476,733,479)	(1,361,799)	(2,283,175)	(480,378,452)
2014	1,092,956,768	4,978,648	(1,696,751)	1,096,238,665
2015	1,785,860,358	7,908,735	(3,034,229)	1,790,734,864
2016	2,121,222,769	8,653,886	718,681	2,130,595,336
2017	1,509,270,339	9,994,132	(2,248)	1,519,262,223
2018	132,718,204	2,910,581	(3,795,566)	131,833,219
2019	42,605,853	1,737,525	(19,994,341)	24,349,037
2020	7,384,891,271	9,015,056	(296,226)	7,393,610,101
2021	15,157,248,909	28,386,945	751,905	15,186,387,759
Total	25,775,576,852	66,665,472	(146,289,699)	25,695,952,625

The value of the overall Cash Flow NPV is influenced primarily by the fixed rate 30-year mortgage (FRM30) product, which has the largest volume of mortgages. The total Cash Flow NPV is positive for the FRM30 and Fixed Rate 15 year (FRM15) products, and is negative for the ARM products.

Change in the Economic Net Worth

Table 8 shows the comparison of our estimate of the MMI's Cash Flow NPV and IIF at the end of Fiscal Year 2021 to the Cash Flow NPV estimate in the 2020 Review.

Table 8: Estimate of Cash Flow NPV as of the End of Fiscal Year 2021 ($ in millions)

Item	2020	2021	Dollar Differen	Percent Change
Cash Flow NPV	23,397	25,696	2,299	9.8%
Capital Resources	67,368	78,500	11,132	16.5%
Economic Net Worth	90,765	104,196	13,431	14.8%
Unamortized Insurance-In-Force	1,373,960	1,323,092	(50,868)	-3.7%

As seen in Table 8, the estimated Fiscal Year 2021 Cash Flow NPV of the MMI has increased by $2.299 billion from the level estimated in Fiscal Year 2020, from $23.397 billion to $25.696 billion. The capital resources available to the MMI have increased by 16.5%, from $67.368 billion to $78.500 billion. The unamortized IIF decreased by 3.7% from $1.374 trillion to $1.323 trillion. The change in the Cash Flow NPV represents the net impact of several significant factors, which are described in the next section.

Sources of Change in the Cash Flow NPV from the Fiscal Year 2020 Review

Table 9 provides a summary of the decomposition of changes in the Cash Flow NPV of the MMI as of the end of Fiscal Year 2021 as compared to the Cash Flow NPV in the Fiscal Year 2020 report. The overall net change in the Cash Flow NPV is positive.

Table 9: Changes in Projected Cash Flow NPV

	Change in NPV	Cash Flow NPV - 9/30/21
Baseline FY1992-FY2020		16,911,418,317
Impact of COVID		
Impact of assumption change	-6,404,353,354	10,507,064,963
Impact of model change	-676,330,690	9,830,734,273
Impact of book change	678,830,593	10,509,564,866
FY1992-FY2020	-6,401,853,451	
FY2021	15,186,387,759	25,695,952,625
Cumulative Change	8,784,534,308	

This section describes the sources of change in estimates of Cash Flow NPV between this year's review and last year's review. Separating out the specific impacts can be done only up to a certain degree of accuracy as the results can vary depending on the order in which the decomposition is done. The interdependency among the various components of the analysis prevents us from identifying and analyzing these as purely independent effects. Given this limitation, this section presents a description of the approximate differences in the Cash Flow NPV from that presented in the Fiscal Year 2020 Review by source of change.

Updated Economic Scenario Forecast

For this decomposition step, we updated the forecasts for the purchase-only HPI and the interest and unemployment rates from 2021 PEA forecast to the 2022 PEA forecast. This step also replaces the projection used in 2020 Actuarial Review with the actual economic experience for the fourth quarter of 2020 and the first two quarters of 2021.

The cumulative result of these economic assumption changes is a decrease of $6.404 billion in the projected Cash Flow NPV.

Updated Predictive Models

With this analysis, we have continued to refine the predictive models to better capture the termination behavior and projected claim amounts of loans in the MMI. We re-estimated the models using updated data and revised variable specifications, and the model assumptions have been adjusted to better reflect the expected ultimate projected claim rates. We have also adjusted our models for the impact of changes to forbearance rules and the economic impacts of COVID-19. For details about these model updates and refinements, refer to Appendices B, C and E.

These model changes led to a decrease in estimated economic value in the Cash Flow NPV of $676 million.

Actual Performance of Cohorts 2020 and Prior in Fiscal Year 2021

The actual performance of the MMI 2020 and prior cohorts realized during Fiscal Year 2021 affects the Cash Flow NPV of the MMI estimate of the in-force portfolio. The actual experience for this period was $679 million better than expected. This is driven in part by lower than expected rates of defaults and loss mitigations due to the impacts of COVID-19, and better than expected resolution for loans that entered forbearance.

Fiscal Year 2021 Origination Volume

The addition of the origination volume for the Fiscal Year 2021 book of business had a positive impact on the NPV. This additional origination volume increased the Cash Flow NPV projection by $15.186 billion.

SECTION 3 - CASH FLOW NPV BASED ON ALTERNATIVE SCENARIOS

The Cash Flow NPV of the MMI will vary from our estimates if the actual economic drivers of mortgage performance deviate from the baseline projections associated with the OMB Economic Assumptions. In this section, we develop additional estimates of the Cash Flow NPV based on the following approaches:

1. Moody's economic scenarios
2. Stochastic simulation of key economic variables
3. Sensitivity testing of key economic variables

We use these additional estimates of the Cash Flow NPV to develop a range of estimates. These alternative estimates are compared to the Cash Flow NPV resulting from the OMB Economic Assumptions to determine the sensitivity of the Cash Flow NPV estimate to alternative assumptions.

Each Moody's scenario produces an estimate of the Cash Flow NPV using future interest, unemployment and HPI rates as a deterministic path. We are including 10 Moody's scenarios in the analysis. These scenarios are consistent with the scenarios used in the 2020 Actuarial Review.

The Moody's scenarios are:

- Baseline
- Alternative 0 – Upside (4th Percentile)
- Alternative 1 – Upside (10th Percentile)
- Alternative 2 – Downside (75th Percentile)
- Alternative 3 – Downside (90th Percentile)
- Alternative 4 – Downside (96th Percentile)
- Slower Trend Growth
- Stagflation
- Next-Cycle Recession
- Low Oil Price

The resulting Cash Flow NPV associated with each alternative scenario is summarized in Table 10. Below, we discuss the characteristics of each Moody's scenario.

Baseline Scenario

In the Baseline scenario, the HPI increases throughout the entire projection period. The rate of increase is about 1.0% per year through 2028, and then increases to about 3.5% per year for the remainder of the projection period. The mortgage interest rate increases through 2027 to about 4.9%, and then levels off near this rate. The unemployment rate is projected to decrease through 2022 to approximately 3.5%, and then increases to 4.7% by 2026. The rate then remains steady at that level for the remainder of the projection period.

Alternative Scenario 0 – Upside (4th Percentile)

In the Alternative Scenario 0 – Upside (4th Percentile), the HPI increases throughout the entire projection period. The rate of increase decreases from over 15% to 1.0% by 2024, and then increases to about 3.5% per year for the remainder of the projection period. The mortgage interest rate increases through 2026, then levels off at approximately 4.7% for the remainder of the projection period. The unemployment rate is projected to decrease through 2023 to approximately 2.5%, and then increase gradually until it stabilizes at approximately 4.3%.

Alternative Scenario 1 – Upside (10th Percentile)

In Alternative Scenario 1 – Upside (10th Percentile), the HPI is projected to increase throughout the entire projection period. The rate of increases drops sharply from 14.1% per year in the fourth quarter of 2021 to 0.9% per year by the second quarter of 2024. The rate then increases to about 3.5% per year for the remainder of the projection period. The mortgage interest rate increases through 2027, leveling off at approximately 4.9%. The unemployment rate is projected to decrease through 2023 to approximately 3%, and then increases gradually until it stabilizes at approximately 4.1%.

Alternative Scenario 2 – Downside (75th Percentile)

In the Alternative Scenario 2 – Downside (75th Percentile), the HPI increases for the entire projection period, but only at a rate of about 1.2% beginning in 2023. The rate of increase then increases to approximately 3.5% by 2033. Mortgage interest rates are projected to increase through 2026, and then level off for the remainder of the projection period at approximately 4.7%. The unemployment rate is projected to increase to 6.6% by the first quarter of 2021, then decrease to just over 4% by 2025.

Alternative Scenario 3 – Downside (90th Percentile)

In the Alternative Scenario 3 – Downside (90th Percentile), the HPI increases through the second quarter of 2022, decreases through the first quarter of 2023, and then begins to increase. Mortgage

interest rates remain steady through the first quarter of 2023, and then begin to increase until they reach a long-term average of about 4.8% in 2028. The unemployment rate increases to 9.0% in the fourth quarter of 2022, then decreases to 4.3% by 2027.

Alternative Scenario 4 – Downside (96th Percentile)

In Alternative Scenario 4 – Downside (96th Percentile), the HPI increases in the fourth quarter of 2021, decreases through the third quarter of 2023, and then begins to increase. Mortgage interest rates are flat through the first quarter of 2022, decrease through the fourth quarter of 2022, and then begin to slowly increase until they reach the long-term average of 5.3% in 2030. The unemployment rate spikes to 10.3% by 2023, and then decreases to 4.4% by 2031.

Slower Trend Growth

In the Slower Trend Growth scenario, the HPI increases more slowly than in the Baseline scenario, increasing at a rate of less than 1% from 2023 through 2030. Mortgage interest rates increase for the projection period until they settle at a long-term average of 4.5%. The unemployment rate increases to 5.5% in the second quarter of 2022, then decreases slowly to 4.9% by 2025.

Stagflation

In the Stagflation scenario, the HPI increases through the second quarter of 2022, decreases through the third quarter of 2023, and then begins to increase. Mortgage interest rates increase to 4.1% by the first quarter of 2022, and then drop through the first quarter of 2023. Mortgage interest rates then begin to increase to the long-term average of 4.9%. The unemployment rate increases to 8.1% by the third quarter of 2022, and then decreases to a long-term average of 4.4% by 2027.

Next-Cycle Recession

In the Next-Cycle Recession scenario, the HPI increases through the fourth quarter of 2023, and then decreases through the third quarter of 2026. The HPI then increases for the remainder of the projection period. The mortgage interest rates increase through the second quarter of 2023, and then decrease through the first quarter of 2025. The rates then settle in at a long-term average of about 4.9%. The unemployment rate decreases to 3.0% by the fourth quarter of 2023, and then increases to 6.4% by the second quarter of 2025. The rate then decreases to 4.1% by 2028, where it remains for the remainder of the projection period.

Low Oil Price

In the Low Oil Price scenario, the HPI increases throughout the entire projection period, similar to the Baseline scenario. Mortgage interest rates increase through 2027 to a long-term average of to 5.1%. The unemployment rate decreases through the third quarter of 2022, and then increases gradually to a long-term average of 4.4%.

Summary of Alternative Scenarios

Table 10 shows the projected Cash Flow NPV from the 11 deterministic scenarios. The range of projected results is between negative $8.859 billion and positive $33.494 billion.

Table 10: Cash Flow NPV Summaries from Alternative Scenarios

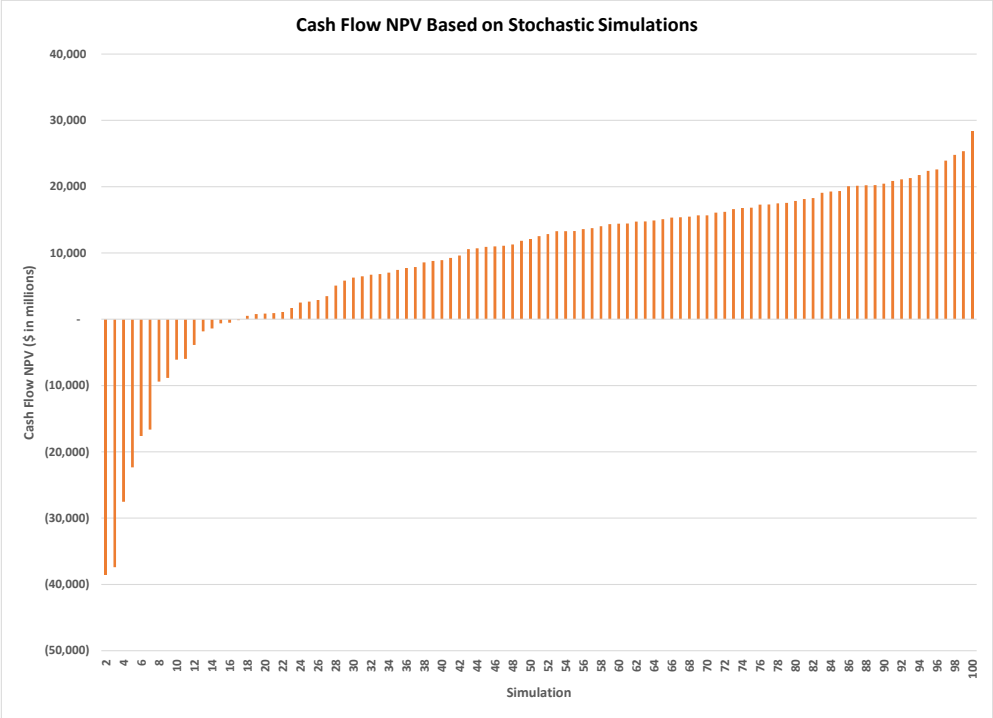
Cohort	Pinnacle ACE	Baseline	Alternative 0 – Upside (4th Percentile)	Alternative 1 – Upside (10th Percentile)	Alternative 2 – Downside (75th Percentile)	Alternative 3 – Downside (90th Percentile)	Alternative 4 – Downside (96th Percentile)	Slower-Trend Growth	Stagflation	Next-Cycle Recession	Low Oil Price
1992	-85,203	-61,488	-32,061	-50,871	-37,646	-29,779	-69,706	-57,326	-112,869	-38,390	-42,026
1993	-382,183	-248,539	-157,626	-315,603	-462,819	-672,962	-762,949	-473,740	-376,603	-365,470	-335,671
1994	-955,065	-889,335	-546,940	-740,515	-1,128,001	-1,951,645	-2,184,289	-1,044,615	-1,586,671	-869,823	-856,745
1995	-1,316,308	-1,202,556	-918,833	-719,604	-1,451,725	-2,471,537	-2,380,339	-1,659,813	-2,171,473	-1,600,950	-1,096,922
1996	-3,356,419	-2,875,978	-1,793,945	-2,040,062	-3,884,042	-6,206,873	-7,022,574	-4,381,371	-5,735,359	-3,771,769	-2,657,439
1997	-5,459,005	-4,734,544	-3,125,771	-3,551,554	-6,628,702	-9,291,246	-11,065,964	-6,956,176	-8,666,600	-5,979,266	-4,943,730
1998	-12,326,487	-9,069,245	-5,984,610	-6,952,159	-12,736,039	-21,675,718	-25,739,397	-14,242,333	-16,180,514	-12,808,973	-9,714,547
1999	-18,913,171	-17,177,996	-10,351,233	-12,207,373	-20,043,109	-33,020,827	-42,942,504	-23,374,454	-27,159,268	-20,134,606	-18,120,568
2000	-16,104,875	-14,290,084	-8,914,313	-11,939,783	-16,000,079	-25,790,497	-32,064,571	-20,363,044	-20,574,607	-18,093,808	-13,808,319
2001	-27,235,220	-23,712,962	-16,202,242	-18,895,022	-29,772,657	-46,592,100	-58,517,626	-32,175,581	-36,973,485	-28,525,442	-24,585,943
2002	-41,191,798	-37,935,083	-26,685,012	-30,523,267	-44,119,071	-64,858,465	-89,774,982	-49,303,858	-51,482,065	-41,811,665	-37,953,756
2003	-59,500,457	-58,420,205	-42,415,117	-47,612,782	-67,443,483	-99,982,505	-137,289,746	-71,914,358	-82,645,972	-64,941,714	-60,182,198
2004	-100,834,440	-98,818,887	-68,830,321	-78,110,759	-115,180,338	-167,054,341	-216,205,367	-124,250,591	-141,759,910	-106,948,037	-96,027,324
2005	-102,890,376	-99,553,557	-74,093,261	-82,942,110	-119,480,507	-171,369,888	-217,684,820	-128,310,002	-138,393,590	-110,289,279	-100,351,553
2006	-110,420,201	-99,687,271	-75,946,208	-88,478,755	-123,645,310	-172,370,158	-225,594,892	-135,222,058	-148,309,644	-114,507,275	-102,764,777
2007	-165,442,957	-155,969,065	-108,477,654	-129,692,374	-194,085,150	-262,465,634	-331,182,214	-210,048,894	-218,882,709	-175,187,868	-160,910,235
2008	-430,900,201	-399,655,431	-286,337,108	-334,770,402	-484,682,693	-668,348,324	-854,737,950	-505,405,947	-547,350,366	-426,233,088	-395,217,421
2009	-556,917,217	-449,555,002	-303,071,558	-354,754,466	-535,537,296	-791,887,228	-1,024,433,886	-537,715,160	-593,897,582	-485,941,850	-451,396,384
2010	-522,822,952	-429,305,719	-312,275,673	-346,141,502	-505,333,658	-726,635,740	-919,535,598	-515,434,680	-527,402,593	-455,750,235	-429,801,679
2011	-429,193,007	-360,465,753	-234,478,868	-291,445,791	-390,094,415	-573,053,494	-764,169,153	-434,255,907	-428,063,494	-361,836,957	-327,198,949
2012	-490,432,580	-385,774,877	-276,815,395	-319,865,341	-477,682,700	-728,876,077	-944,004,792	-478,431,411	-533,464,278	-424,993,373	-391,732,410
2013	-480,378,453	-374,561,679	-195,350,785	-264,261,001	-516,604,877	-901,385,268	-1,334,076,868	-575,486,482	-717,232,842	-479,060,248	-413,347,427
2014	1,096,238,664	1,179,603,592	1,243,100,510	1,251,130,177	1,043,077,043	686,868,206	376,432,141	965,413,197	1,039,506,014	1,083,631,228	1,124,071,597
2015	1,790,734,864	1,945,552,308	2,117,462,808	2,096,899,582	1,635,279,924	767,298,362	68,630,445	1,404,381,327	1,533,169,738	1,728,605,161	1,792,493,721
2016	2,130,595,336	2,459,975,911	2,759,818,908	2,759,804,591	1,763,718,570	410,417,014	-743,369,382	1,628,944,422	1,647,342,521	2,110,006,825	2,303,425,390
2017	1,519,262,223	2,053,854,982	2,687,694,882	2,540,105,841	1,224,186,784	-397,547,557	-1,843,387,564	875,721,901	787,569,638	1,425,383,983	1,908,928,333
2018	131,833,219	775,371,241	1,540,579,500	1,329,350,039	15,008,634	-1,677,264,228	-3,138,101,239	-677,226,700	-670,946,068	119,663,440	639,743,392
2019	24,349,037	519,672,877	1,448,976,946	1,188,457,104	-361,137,793	-2,098,653,650	-3,256,025,822	-866,444,826	-1,148,668,600	3,931,962	399,158,714
2020	7,393,610,101	7,337,212,687	8,115,185,114	7,960,846,010	5,984,817,563	3,500,756,115	1,433,804,613	5,509,669,149	5,850,290,926	6,712,123,694	6,750,731,897
2021	15,186,387,758	15,015,503,096	15,634,243,323	15,755,327,891	13,692,212,559	9,474,651,123	5,484,605,735	12,987,821,584	12,903,744,244	14,345,237,517	14,478,327,573
Total	25,695,952,627	28,262,781,438	33,494,257,457	32,455,910,139	21,331,128,967	5,190,535,079	-8,858,851,260	17,957,772,253	17,693,585,919	24,188,893,724	26,353,834,594

Stochastic Simulation

The stochastic simulation approach provides information about the probability distribution of the Cash Flow NPV of the MMI based on 100 different possible future economic conditions and the corresponding prepayments, claims and loss rates. The simulation provides the Cash Flow NPV associated with each one of the 100 future economic paths. The distribution of Cash Flow NPV based on these scenarios allows us to gain insights into the sensitivity of the MMI's Cash Flow NPV to different economic conditions.

Figure 9 below shows the range of Cash Flow NPV resulting from the 100 simulated scenarios.

Figure 9: Stochastic Simulation Results



Based on the stochastic simulation results, the range of Cash Flow NPV estimates is negative $38.612 billion to positive $28.298 billion.

The range of Cash Flow NPV estimates may not include all conceivable outcomes. For example, it would not include extreme events where the contribution of such events to an expected value is not reliably estimable.

The Cash Flow NPV estimate provided by FHA to be used in the FHA Annual Report to Congress is $16.481 billion. Based on Pinnacle's ACE and range estimates, we conclude that the FHA estimate of Cash Flow NPV is reasonable.

Sensitivity Tests of Economic Variables

The scenario analyses described above were conducted to estimate the distribution of the Cash Flow NPV of the MMI with different possible combinations of the interest rate and housing price movements in the future. It is also useful to understand the marginal impact of a change in each single economic factor on the Cash Flow NPV. Below, we show the sensitivity of the Cash Flow NPV with respect to the change of a single economic factor at a time. This sensitivity test is conducted for:

- Interest rates, including:
    - 10-year CMT rate
    - One-year CMT rate
    - Commitment rate on 30-year fixed-rate mortgages
- Unemployment rate
- HPA

The marginal impact is measured by the change in Cash Flow NPV from the OMB Economic Assumption scenario result. These simulations change each of these variables one at a time from the Baseline scenario. The changes are parallel shifts in the path of each variable in the OMB Economic Assumption scenario, where all three interest rates are shifted together and at the same magnitudes, but are kept from going negative.

Figure 10 shows the sensitivity of the Cash Flow NPV with respect to changes in future interest rates. Specifically, we applied parallel shift to the one-year CMT rate, 10-year CMT rate and the mortgage rates up and down from the Baseline scenario by 20, 50, 100 and 200 basis points. Interest rates are not allowed to be negative. The results show a positive slope through the positive 50 basis point change, indicating that the Cash Flow NPV of the MMI is positively related to future interest rates. Higher future interest rates benefit the MMI in two ways. First, a higher future interest rate means lower refinance incentive for existing borrowers. Thus, there would be fewer prepayments, which lead to a longer stream of annual MIP revenue. Second, higher future interest rates imply that the mortgage payments of existing borrowers would be lower than that of a new mortgage with the market interest rate. The below-market mortgage payment serves as an incentive for borrowers to keep their mortgages longer and thus is a disincentive to default in order to continue to benefit from their below-market payments.

In addition to this, an increase in interest rates also resulted in an increase in loss mitigation expenses. This may be due to the fact that if a customer has a low mortgage rate and rates increase, they have more of an incentive to keep their home, and thus will take advantage of options to stay in the home. This has an offsetting effect to the lower likelihood of refinance.

A 100 basis point fall in interest rates will incur a decrease in Cash Flow NPV of $5.316 billion, and a positive 100 basis point change in interest rates will result in a decrease in Cash Flow NPV of $6.085 billion. For the interest rate sensitivity, the range of Cash Flow NPV impacts are -1.01% to -0.01% of IIF, as shown in Figure 11.

Figure 10 also reports the sensitivity of the Cash Flow NPV with respect to the unemployment rate. The results show a negative slope, indicating that the Cash Flow NPV of the MMI is negatively related to

future unemployment rates. A negative 100 basis point change in the unemployment rates will produce an increase in Cash Flow NPV of $5.230 billion, and a positive 100 basis point change in the unemployment rate will result in a decrease in Cash Flow NPV of $8.087 billion. This results from the fact that as unemployment increases, the likelihood of defaults and claims increase, and the average net loss increases as well. For the unemployment rate sensitivity, the range of Cash Flow NPV impacts are -1.08% to +0.40% of IIF, as shown in Figure 11.

Figure 10 also reports the sensitivity of the Cash Flow NPV with respect to changes in the HPA forecast. Specifically, we applied a parallel shift to the annualized HPA rates from the Baseline scenario up and down by 20, 50, 100 and 200 basis points. The results show a downward trend. Generally, a large negative HPA shift results in lower recoveries on homes sold by HUD, and thus a lower Cash Flow NPV is realized. Conversely, the large positive HPA shift causes HPA recovery rates to increase on HUD disposed properties, and thus results in a higher Cash Flow NPV for the MMIF. This trend is present in our sensitivity analysis as losses decrease with an increase in the HPA.

However, there is a trend that runs counter to the decreasing loss trend, and it is due in part to the recent significant increases in home values. As HPA turns negative, the percentages of mortages that prepay decreases, and the decrease in home value is an incentive for homeowners to remain in the homes longer. Conversely, an increase in the home value increases the prepay percentage, as there is an incentive for homeowners to either sell the home or refinance to remove some of the equity in cash. The decrease in MIP as HPA increases is larger than the decrease in losses, thus resulting in a downward trend.

A negative 100 basis point change in the HPA will produce an increase in Cash Flow NPV of $903 million, and a positive 100 basis point change in the HPA rate will result in an decrease in Cash Flow NPV of $364 million. The range of Cash Flow NPV impacts are -0.03% to +0.12% of IIF, as shown in Figure 11.

These sensitivity analyses show that Cash Flow NPV of the MMI portfolio would be significantly affected by small changes in unemployment and interest rates, while a small change in HPA has a smaller impact.

Figure 10: Sensitivity Test of Selected Economic Variables

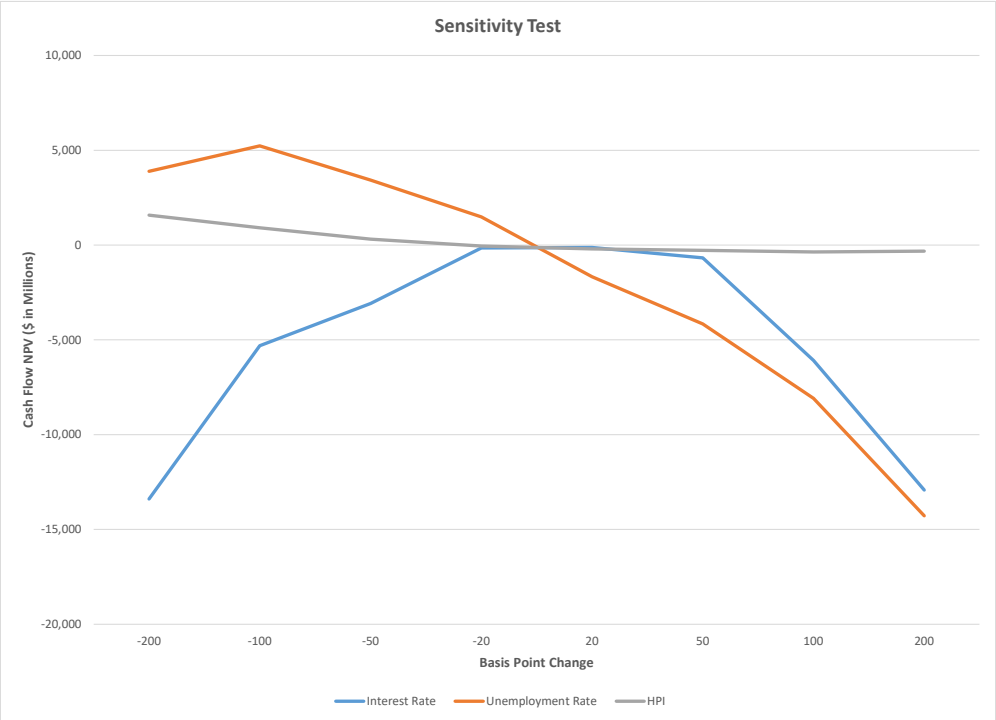
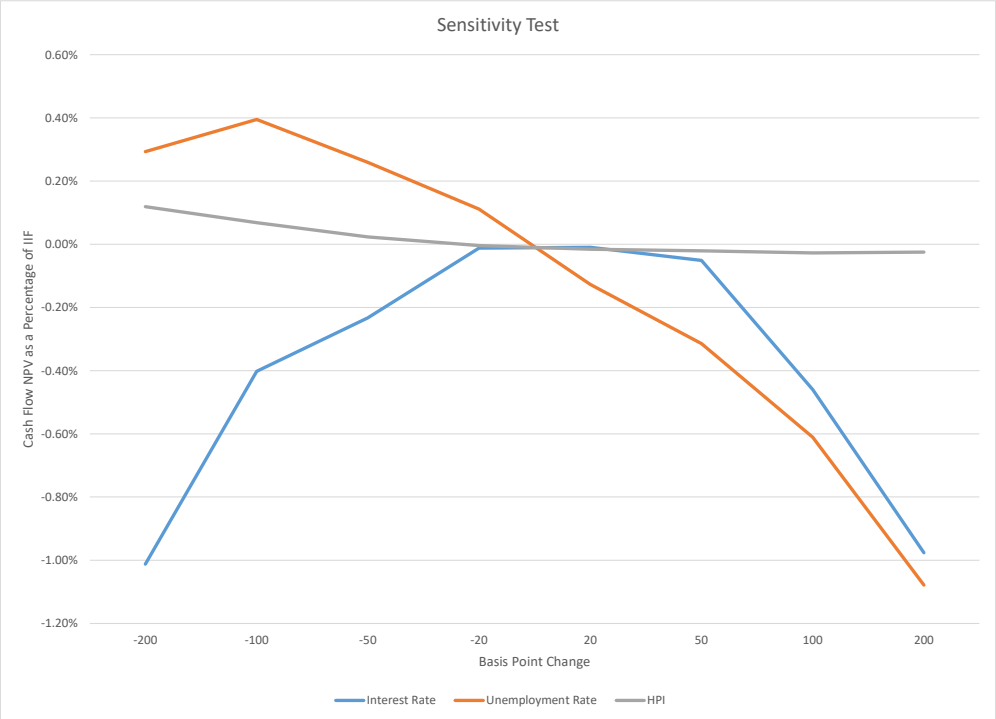


Figure 11: Sensitivity Test of Selected Economic Variables as a Percentage of IIF



SECTION 4 - CHARACTERISTICS OF THE FISCAL YEAR 2021 INSURANCE PORTFOLIO

This section analyzes the characteristics of the loan portfolio insured by the MMI as of Fiscal Year 2021. This discussion covers the following three areas:

1. analysis of the volume and composition of loan types,
2. comparison of new purchase loans versus refinances and
3. the distribution of loans by loan characteristics.

This section also examines and compares the 2021 cohort with previous cohorts in order to determine how the 2021 cohort is likely to influence the future performance of the MMI.

Volume and Share of Mortgage Originations

FHA insured $335 billion in single-family forward mortgages in the Fiscal Year 2021, bringing the MMI's total unamortized IIF to $1.324 trillion. This represents a decrease of 3.7% relative to the volume insured in Fiscal Year 2020.

Table 11 shows FHA's origination count and volume by cohort. The new purchase count dropped significantly from Fiscal Year 2002 to Fiscal Year 2007, increased dramatically through Fiscal Year 2010, then returned to levels similar to those in Fiscal Years 2000 - 2002. The decline and subsequent rise were due to the Government Sponsored Enterprise (GSE)[76] and non-conforming lenders aggressive marketing strategies during the subprime era and their capital limitations when the housing market crashed. The capital impairment of the private mortgage insurance companies also contributed to FHA's rising volume after the crash. As the private mortgage insurance industry faced severe capital constraints, the GSEs had been unable to purchase or guarantee loans with less than a 20% down payment. FHA became the primary source of high LTV loans after Fiscal Year 2008. Private mortgage insurance companies have begun underwriting more policies during the past eight years.

The new purchase volumes show a similar pattern, for the same reasons cited above, but the volumes subsequent to the housing crisis were much higher than volumes in the early 2000s. The loan size limits were increased due to the levels of the GSEs, making more loans eligible for FHA insurance. The private mortgage insurers and non-conforming lenders faced capital constraints, making FHA the only feasible channel for high LTV loans.

[76] Fannie Mae, Freddie Mac and the Federal Home Loan Banks

In Fiscal Year 2021, new purchase counts increased by 1.0%, fully underwritten refinances projected decreased by 8.1%, and streamline refinances increased by 23.0%. The new purchase volume increased by 8.8%, the fully underwritten refinance volume decreased by 8.3% and the streamline refinance volume increased by 14.6%. The drop in interest rates due to the economic crisis led in part to a substantial increase in refinance activity in 2020, and this activity has continued into 2021. Also, the implementation of shelter-in-place orders and the closing of physical offices led to a dramatic increase in the volume of streamline refinance activity in 2020, and this has also continued in 2021. This level of increase in refinance activity is similar to the refinance volume increase seen during the economic crisis of 2008 and 2009.

Table 11: Total Count and Volume of FHA-Insured Originations

	Count of Originations				Volume of Originations ($ Billions)		
Cohort	New Purchase	Fully Underwritten Refinance	Streamline Refinance		New Purchase	Fully Underwritten Refinance	Streamline Refinance
1985	340,286	7	45		20.19	0.00	0.00
1986	737,217	18	7,023		45.56	0.00	0.43
1987	1,119,343	21	143,403		69.83	0.00	9.08
1988	670,354	2	42,198		40.95	0.00	2.60
1989	557,895	3	16,287		34.85	0.00	0.97
1990	689,946	127	27,516		45.25	0.01	1.69
1991	629,189	464	27,063		42.87	0.03	1.74
1992	524,680	1,889	72,353		37.19	0.13	4.88
1993	537,869	12,250	300,984		39.99	0.89	21.78
1994	652,711	16,968	549,688		51.84	1.21	38.70
1995	476,712	4,298	41,917		38.08	0.32	2.83
1996	590,486	27,110	91,107		49.85	2.22	7.44
1997	629,615	28,624	43,590		54.82	2.44	3.82
1998	742,465	54,577	174,645		68.04	5.02	17.41
1999	831,805	73,511	258,376		80.86	7.17	25.14
2000	763,063	36,640	31,843		79.40	3.83	3.04
2001	730,105	59,782	172,664		79.71	6.85	20.99
2002	787,093	87,444	293,642		91.02	10.64	34.47
2003	602,451	94,268	522,213		73.03	12.12	62.17
2004	540,314	77,985	274,123		66.84	10.28	30.51
2005	328,543	42,858	106,952		40.20	5.87	11.91
2006	293,257	72,064	34,585		37.10	10.65	3.98
2007	261,166	120,291	20,887		35.00	18.51	3.00
2008	591,326	376,522	63,733		95.37	65.78	10.65
2009	995,101	506,822	329,395		171.67	92.90	65.82
2010	1,109,164	344,877	212,871		191.60	62.61	43.29
2011	777,100	239,344	180,227		134.36	44.36	38.92
2012	733,700	176,767	274,033		124.45	31.83	56.99
2013	702,415	130,588	511,842		124.93	24.07	91.11
2014	594,998	76,315	115,038		105.72	13.19	16.31
2015	753,387	130,032	232,811		140.26	24.75	48.11
2016	879,511	165,506	213,030		171.63	32.14	41.64
2017	882,077	200,259	164,099		178.62	40.54	31.79
2018	776,275	185,815	52,510		160.89	38.10	10.06
2019	743,278	189,213	57,934		159.37	40.54	14.72
2020	817,839	193,325	321,988		188.22	43.46	78.64
2021	826,135	177,594	395,920		204.84	39.84	90.13

Table 12 shows FHA's origination volume and market share in home purchase mortgages from Calendar Year 2001 through the third quarter of Calendar Year 2021.

Table 12: FHA's Market Share in the Home Purchase Mortgage Market

	Volume of Home Sales ($ Billions)		
Calender Year	**FHA**	**Market**	**FHA Share (%)**
2001	89	959	9.2%
2002	82	1,097	7.5%
2003	71	1,274	5.6%
2004	53	1,306	4.1%
2005	37	1,506	2.5%
2006	36	1,402	2.5%
2007	39	1,144	3.5%
2008	129	743	17.4%
2009	185	652	28.3%
2010	167	540	31.0%
2011	129	503	25.7%
2012	127	594	21.3%
2013	119	728	16.4%
2014	107	758	14.1%
2015	154	897	17.1%
2016	176	1,051	16.7%
2017	174	1,141	15.2%
2018	158	1,207	13.1%
2019	170	1,222	13.9%
2020	193	1,437	13.5%
2021	150	1,254	12.0%

Sources: FHA Volume from FHA Data Warehouse, September 30, 2021 extract. Market volume from Mortgage Bankers Association. Calendar year 2021 includes data through September 30, 2021.

FHA's market share declined to a low of 2.5% in 2005. This trend reversed during the next several years and by Fiscal Year 2010, FHA's market share was up to 31.0%. Subsequently, the market share decreased through 2018. The FHA share increased in 2019, and has decreased since then. As of the third quarter of 2021, the FHA share is 12.0%.

Originations by Location

FHA insures loans in all regions of the United States, but over half of FHA's total dollar volume is concentrated in ten states. Table 13 shows the percentage of FHA's total dollar volume originated in these ten states from Fiscal Year 2014 through Fiscal Year 2021. The states are ordered based on the dollar volume endorsed during Fiscal Year 2021.

Table 13: Percentage of Mortgage Origination Volume in the Top 10 States

	Fiscal Year							
State	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
California	16.3%	18.8%	17.5%	16.8%	14.7%	14.3%	14.4%	12.4%
Texas	8.9%	7.3%	7.5%	7.6%	8.0%	8.3%	9.4%	9.6%
Florida	6.0%	6.0%	6.8%	7.5%	8.5%	8.9%	8.9%	9.1%
Georgia	3.4%	3.2%	3.7%	3.7%	4.0%	4.0%	4.1%	4.2%
New Jersey	3.1%	3.5%	3.4%	3.5%	3.5%	3.5%	3.7%	4.0%
Maryland	3.1%	3.6%	3.6%	3.5%	3.3%	3.3%	3.5%	3.8%
Illinois	3.3%	3.1%	3.1%	3.2%	3.2%	3.0%	3.0%	3.3%
Virginia	3.4%	3.6%	3.5%	3.3%	3.1%	2.9%	3.0%	3.3%
Arizona	3.5%	3.7%	3.4%	3.2%	3.1%	3.2%	3.4%	3.2%
Colorado	3.2%	3.4%	3.3%	3.5%	3.5%	3.7%	3.5%	3.1%

Currently, loans in California comprise the largest percentage of all FHA loans based on dollar volume, making up 12.4% of the portfolio in 2021. The percentage of loan volume in California had been decreasing from 2015 – 2019, increased slightly in 2020, but has decreased again in 2021. Texas is still the second largest state in 2021, after taking over second place from Florida in 2020. Florida remains the third largest state.

Originations by Product

Table 14 shows that the fully underwritten 30-year FRM has comprised the majority of FHA's single-family business, representing a dollar-weighted average share of approximately 75.3% of the business over Fiscal Years 1986 - 2021. The share of total mortgages represented by 30-year FRMs began to change in the early 1990s when FHA started insuring ARMs and streamline refinancing mortgages (SRs). For the next few years, ARM and SR mortgages gradually assumed a larger share of annual loan originations and the 30-year FRM share decreased. The 1993 and 1994 cohorts recorded the lowest shares of 30-year FRMs. An opposite trend emerged from Fiscal Year 2003 through Fiscal Year 2007, in which 30-year FRM endorsements increased from 52.4% to 92.1%, while 30-year SR endorsements dropped from 36.0% to 5.1%. However, the share of 30-year FRMs in Fiscal Year 2009 through Fiscal Year 2013 dropped from 77.1% to 58.3%. From this point, the percentage increased to 93.6% in Fiscal Year 2018. In Fiscal Year 2021, the percentage of 30-year FRMs has dropped to 72.6%.

The ARM share of the portfolio, including SR ARMs, shrank dramatically from 12.0% in Fiscal Year 2005 to 1.1% in Fiscal Year 2009. It subsequently rose to 6.0% in Fiscal Year 2011, and then has decreased since then. ARMs account for only 0.018% of the endorsements in the 2021 cohort. The drop in the ARM share and the virtual non-existence in 2021 is related to the low mortgage interest rates. The 15-year FRMs increased from 1.2% in Fiscal Year 2007 to 6.4% in Fiscal Year 2012, but have declined in the

last seven years and are at 0.4% in Fiscal Year 2021. The 15-year SR continues to be a minor product type in the MMI.

Table 14: Percentage of Origination Volume by Mortgage Product

	Fully Underwritten Mortgages			Streamline Refinance		
Fiscal Year	30-Year FRM	15-Year FRM	ARMs	30-Year SRs	15-Year SRs	ARMs SRs
1986	89.88	8.30	0.88	0.80	0.15	0.00
1987	81.83	5.52	1.15	9.85	1.61	0.05
1988	85.55	3.99	4.50	5.27	0.66	0.03
1989	92.82	2.70	1.76	2.55	0.17	0.00
1990	92.91	2.79	0.70	3.33	0.26	0.00
1991	89.52	3.13	3.45	3.37	0.50	0.02
1992	70.24	2.62	15.57	8.75	1.71	1.11
1993	49.91	2.21	13.11	26.43	6.46	1.87
1994	40.92	1.83	15.07	30.66	8.75	2.77
1995	62.66	1.54	28.93	4.43	1.62	0.82
1996	62.29	1.32	23.89	8.98	1.74	1.77
1997	61.57	1.19	30.98	3.64	0.81	1.80
1998	60.20	1.09	19.46	15.35	1.21	2.68
1999	73.04	1.14	3.61	19.48	1.79	0.95
2000	84.29	0.73	11.45	2.50	0.35	0.67
2001	77.30	0.90	2.28	18.37	0.58	0.57
2002	68.13	1.19	5.36	21.11	1.48	2.73
2003	52.38	1.31	4.11	35.97	2.92	3.32
2004	62.19	1.37	8.10	21.49	2.60	4.26
2005	69.14	1.26	9.06	16.17	1.41	2.96
2006	88.10	1.36	2.85	6.96	0.48	0.25
2007	92.13	1.22	1.33	5.12	0.11	0.07
2008	90.78	1.61	1.42	5.91	0.14	0.15
2009	77.11	2.18	0.79	19.26	0.37	0.29
2010	78.99	3.63	2.83	13.16	0.36	1.02
2011	72.29	5.64	4.19	15.46	0.62	1.80
2012	65.41	6.38	1.49	24.54	1.18	1.00
2013	58.28	3.08	0.69	36.59	0.96	0.39
2014	82.47	2.51	2.96	11.01	0.37	0.68
2015	74.46	1.67	1.30	21.93	0.19	0.45
2016	81.14	1.34	0.55	16.66	0.25	0.06
2017	85.65	1.27	0.40	12.30	0.36	0.00
2018	93.58	1.13	0.48	4.66	0.14	0.01
2019	91.81	0.90	0.44	6.78	0.07	0.00
2020	74.18	0.44	0.04	25.21	0.13	0.00
2021	72.64	0.43	0.02	26.67	0.25	0.00
1986-2021	75.29	2.11	3.64	17.28	0.88	0.80

Initial Loan to Value Distributions

Based on studies of mortgage behavior, a borrower's equity position in the mortgaged house is one of the most important drivers of default behavior. The larger the equity position a borrower has, the greater the incentive to avoid default on the loan. The original LTV is the complement of the borrower's equity at origination. Table 15 shows the distribution of mortgage originations by original LTV categories.

Table 15: Percentage of Origination Volume by Original LTV Category

Cohort	Unknown	≤ 80%	> 80% ≤ 90%	> 90% ≤ 95%	> 95% < 97%	≥ 97
1986	0.42%	73.16%	10.07%	8.33%	6.65%	1.38%
1987	0.12%	84.23%	5.75%	5.35%	3.93%	0.63%
1988	0.06%	86.33%	3.41%	5.14%	4.27%	0.79%
1989	0.38%	85.50%	2.97%	5.49%	4.83%	0.83%
1990	1.40%	25.25%	14.77%	28.85%	25.64%	4.08%
1991	3.30%	6.12%	16.06%	30.32%	29.59%	14.61%
1992	10.79%	4.65%	13.29%	24.87%	33.23%	13.17%
1993	27.22%	3.75%	11.22%	19.57%	23.24%	15.00%
1994	34.39%	3.56%	9.67%	16.38%	19.79%	16.21%
1995	5.62%	3.16%	10.39%	22.94%	31.68%	26.22%
1996	9.47%	2.97%	10.55%	23.07%	30.84%	23.09%
1997	4.55%	3.42%	11.29%	24.94%	32.49%	23.31%
1998	13.33%	3.63%	11.76%	23.29%	29.09%	18.89%
1999	12.89%	4.00%	10.94%	14.77%	25.17%	32.23%
2000	1.43%	2.66%	6.86%	7.26%	31.89%	49.89%
2001	9.52%	3.61%	8.77%	8.63%	22.75%	46.71%
2002	0.27%	4.67%	11.08%	9.99%	23.74%	50.25%
2003	0.00%	6.03%	12.57%	11.73%	23.67%	45.99%
2004	0.00%	6.57%	11.70%	10.33%	22.46%	48.94%
2005	0.00%	6.39%	10.72%	9.06%	22.17%	51.65%
2006	0.00%	7.13%	10.72%	14.35%	19.89%	47.91%
2007	0.00%	7.39%	11.68%	21.24%	18.20%	41.50%
2008	0.13%	6.20%	12.18%	24.03%	14.11%	43.35%
2009	0.00%	5.00%	13.33%	18.82%	35.68%	27.17%
2010	0.00%	4.82%	14.53%	12.63%	58.79%	9.24%
2011	0.00%	4.87%	14.80%	14.07%	59.89%	6.37%
2012	0.00%	5.52%	13.45%	20.00%	57.17%	3.87%
2013	0.00%	5.67%	16.15%	27.25%	48.60%	2.34%
2014	0.00%	6.08%	14.09%	12.92%	65.04%	1.86%
2015	0.00%	6.07%	14.84%	12.95%	63.83%	2.30%
2016	0.00%	6.87%	16.11%	11.14%	64.12%	1.75%
2017	0.00%	7.85%	17.19%	10.08%	63.65%	1.23%
2018	0.00%	7.82%	16.81%	8.10%	66.16%	1.11%
2019	0.00%	7.59%	17.45%	7.77%	65.45%	1.74%
2020	0.00%	10.47%	12.12%	12.28%	62.66%	2.46%
2021	0.00%	12.34%	11.26%	14.53%	60.89%	0.98%

The distribution among original LTV categories shifted significantly after Fiscal Year 1998. Almost half of the loans insured from Fiscal Year 2000 to Fiscal Year 2006 had LTVs greater than or equal to 97%. This concentration in the highest risk category gradually declined during the next few years. In 2008, MMI placed a limit of 96.5% on original LTV, with no additional allowance for the financing of closing costs. During Fiscal Year 2009, 27.2% of mortgages had LTV ratios of 97% or more. In Fiscal Years 2010 - 2018, this concentration continued to decline, but increased in Fiscal Year 2020 to 2.5%. This percentage has decreased in Fiscal Year 2021 to 1.0%. Since Fiscal Year 2014, over 60% of mortgages have LTV ratios between 95 to 97%.

Over the last two Fiscal Years, the percentage of mortgages with an initial LTV of 90% to 95% has

increased by almost seven percentage points from 7.8% to 14.5%. This may be due in part to the significant increase in home values over the last two years.

The original LTV concentration of individual books of business affects the predictive models in two ways. First, it serves as the starting position for updating the current LTV. Holding everything else constant, loans with higher original LTVs will experience a higher current LTV in future years. Second, the original LTV itself is also included in the models to capture potential behavioral differences among borrowers who self-select into different original LTV categories. For SR loans, we use the original LTV of the prior fully underwritten mortgage, updated for the local house price index and amortization, as a proxy for this variable.

The LTV position of cash-out refinances has also been an issue of concern for HUD. The share of cash-out refinances had increased significantly through the mid-2000's. However, as the housing market weakened in the late 2000's, this was shown to have contributed to an increase in the number of foreclosures. In response, FHA decreased the LTV requirement for cash-out refinances from 95% to 85% in 2009. FHA data showed that the number of cash-out refinances were increasing significantly, and as a result in 2019 decreased the LTV requirement again from 85% to 80% effective September 1, 2019.[77]

Borrower Credit History Distribution

Credit score data has been collected from two different sources. The first source includes credit scores collected for a sample of FHA applications from Fiscal Years 1992, 1994, and 1996, and subsequently extended to loan applications during Fiscal Years 1997 - 2004. This credit score data is particularly useful because these loans have existed for many years and provide valuable historical delinquency, claim and prepayment performance information. The limitation of this data source is that it covers only a limited sample of FHA loans. In addition, the sample was originally collected for policy research purposes and represents a choice-based sample. For example, there was over-sampling of loans that defaulted early among applications over Fiscal Years 1997 - 2004.

Since May 2004, all lenders originating loans for FHA insurance have been required to report borrower credit scores directly to HUD if any credit scores were ordered as part of the underwriting process. All loans going through the FHA TOTAL scorecard have credit scores obtained electronically by the affiliated automated underwriting systems. This is the second source of credit score data. As there are no exceptions to this requirement, the credit scores collected from this source are considered to be

[77] Mortgagee Letter 2019-11, August 1, 2019: Maximum Loan-To-Value and Combined Loan-To-Value Percentages for Cash-out Refinance Mortgages.

comprehensive and unbiased. These loans have grown to be the dominant source of credit score information for our analysis.

Table 16 shows the distribution of fully underwritten FHA mortgage loans by borrower credit score categories and cohort. The distribution among credit score categories remained relatively stable for the 2005 - 2008 cohorts. For loans originated after Fiscal Year 2008, the credit score distribution showed significant improvement over the previous years. Approximately 40% of the Fiscal Year 2021 loans have credit scores above 680. Loans with credit scores below 600 are only 2.0% of the loans originated in Fiscal Year 2021, which is substantially lower than in the Fiscal Year 2007 book, where 32.8% of the loans had credit scores below 600. However, despite the distributions having improved since 2007, the trend in credit scores from 2012 through 2019 was concerning. The proportion of loans with credit scores below 600 had been increasing slowly from 2012 through 2019, rising from 0.6% to 5.2%. Also, the proportion of loans with credit scores above 680 had decreased from 2016 through 2019 from 46.0% to 34.5%. However, in Fiscal Year 2020, the percentage of loans with credit scores below 600 decreased to 3.4%, and the percentage with scores of 680 or higher increased to 38.6%. If the previous deterioration in credit scores continued, it could result in worse default and loss experience, and thus would contribute negatively to the economic value of the MMI for the more recent cohorts. The improvement in credit scores over the past two years is a positive sign, but the decrease in scores above 680 is concerning. HUD should continue to monitor this trend and consider action to mitigate the impacts of deteriorating credit scores if this materializes.

In the predictive models, we also controlled for missing and uncollected credit scores. In Table 16, the category “Missing” refers to loans with insufficient borrower credit history to generate a credit score, and the category “Not Collected” refers to loans where no attempt was made to obtain the credit score for some of the Fiscal Year 2004 and earlier loans. These categories have been combined in the table. Since credit scores became a requirement for fully underwritten loans, the Missing/Not Collected category has been a negligible percentage of the overall book.

Table 16: Percentage of Origination Volume by Credit Score for Fully Underwritten Loans

	Missing / Not Collected	300-499	500-559	560-599	600-639	640-679	680-850
1997	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1998	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1999	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2001	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2002	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2003	99.96%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%
2004	75.76%	0.20%	2.20%	4.19%	6.21%	5.23%	6.22%
2005	6.86%	0.90%	9.24%	16.70%	24.18%	19.89%	22.22%
2006	4.80%	0.94%	8.75%	16.62%	24.50%	20.71%	23.69%
2007	4.17%	1.53%	11.76%	19.47%	25.09%	18.94%	19.04%
2008	2.21%	0.83%	6.93%	14.09%	24.21%	22.71%	29.03%
2009	1.03%	0.05%	1.13%	5.10%	18.01%	24.83%	49.86%
2010	1.06%	0.01%	0.16%	0.86%	12.39%	25.01%	60.51%
2011	0.90%	0.00%	0.07%	0.48%	8.40%	27.10%	63.05%
2012	0.53%	0.00%	0.09%	0.52%	8.23%	30.76%	59.86%
2013	0.45%	0.00%	0.08%	0.43%	6.50%	36.41%	56.13%
2014	0.27%	0.00%	0.08%	0.96%	11.27%	41.52%	45.89%
2015	0.25%	0.00%	0.11%	1.58%	14.55%	37.88%	45.63%
2016	0.21%	0.00%	0.11%	1.81%	15.48%	36.41%	45.97%
2017	0.19%	0.00%	0.19%	2.52%	17.67%	36.11%	43.31%
2018	0.16%	0.00%	0.40%	3.90%	20.97%	36.88%	37.69%
2019	0.12%	0.00%	0.53%	4.72%	22.54%	37.64%	34.45%
2020	0.09%	0.00%	0.30%	3.10%	18.75%	39.20%	38.57%
2021	0.06%	0.00%	0.15%	1.85%	18.51%	42.41%	37.03%

Initial Relative Loan Size Distribution

The relative loan size variable is computed by comparing the mortgage origination amount with the average loan size of all FHA-insured loans originated within the same period and in the same state. Empirical results show that this variable is very significant in predicting prepayments.

FHA experience indicates that larger loans tend to perform better compared with smaller loans in the same geographical area, all else being equal. Larger loans incur claims at a lower probability and in those cases where a claim occurs, loss severity tends to be lower. Prior to the increase in FHA's loan limits in Fiscal Year 2008, houses securing larger FHA loans tended to fall into the average house price range within their surrounding areas. Since this market is relatively liquid and there are a relatively large number of similar-quality homes in the area, the house price volatility of these houses tends to be relatively low in comparison to the house price volatility of extremely low- and high-priced houses. With the increased FHA loan size limit, FHA started endorsements of higher-priced houses after Fiscal Year 2008.

Table 17 shows the percentage of new fully underwritten mortgage originations within each relative loan size category. The distribution has been reasonably stable over time with the largest share in the 75-100% and 100-125% of area average loan size categories. However, since Fiscal Year 2000, there has been a steady increase in the dispersion among loan size categories. The proportion in the highest loan size category increased from 11.1% in Fiscal Year 2001 to 26.2% in Fiscal Year 2013, but had decreased since then to 16.2% in 2020. The proportion in the highest loan size category has increased to 18.6% in 2021. On the other hand, the share in lowest loan size category also increased from 1.8% in Fiscal Year 2004 to 5.2% in Fiscal Year 2012, and has since decreased to 2.5% in Fiscal Year 2021. The increase in both the highest and lowest loan size categories demonstrated the penetration of FHA products into high-balance loans and the resurgence of the low-balance loan, but this penetration has decreased slightly since 2011. The increase in the highest category in 2021 may be due in part to the significant increase in home values in the last two years. This significant increase may impact the availability of MMIF mortgage insurance coverage to a smaller percentage of overall homes, which may require HUD to evaluate loan limits.

Table 17: Percentage of Origination Count by Relative Loan Size

Cohort	0-50% of Average Loan Size	50-75% of Average Loan Size	75-100% of Average Loan Size	100-125% of Average Loan Size	125-150% of Average Loan Size	>150% of Average Loan Size
1985	1.75%	10.64%	26.03%	34.72%	21.12%	5.75%
1986	1.37%	10.11%	27.00%	38.76%	18.86%	3.91%
1987	1.17%	9.80%	26.62%	38.84%	19.89%	3.67%
1988	1.49%	10.72%	25.59%	35.52%	20.45%	6.22%
1989	1.73%	11.18%	25.34%	32.46%	21.16%	8.12%
1990	1.76%	11.33%	25.08%	31.18%	21.08%	9.58%
1991	1.84%	11.42%	25.14%	30.04%	21.63%	9.93%
1992	1.72%	11.09%	25.35%	31.30%	21.60%	8.95%
1993	1.50%	10.62%	25.57%	31.92%	22.03%	8.37%
1994	1.19%	9.26%	22.81%	30.13%	24.62%	11.98%
1995	1.61%	11.45%	24.67%	30.38%	22.47%	9.41%
1996	1.61%	11.32%	24.71%	31.28%	22.93%	8.15%
1997	1.75%	11.89%	24.98%	31.66%	21.94%	7.78%
1998	1.64%	11.15%	24.54%	32.83%	22.18%	7.66%
1999	1.80%	11.37%	24.47%	30.74%	20.80%	10.83%
2000	2.02%	11.73%	24.44%	29.27%	20.36%	12.18%
2001	2.22%	12.12%	25.69%	29.52%	19.34%	11.11%
2002	2.06%	11.14%	24.59%	29.61%	19.97%	12.64%
2003	1.81%	10.35%	23.49%	29.85%	20.81%	13.69%
2004	1.79%	10.06%	22.41%	28.83%	21.57%	15.34%
2005	1.92%	10.94%	22.92%	28.28%	21.07%	14.89%
2006	2.17%	11.94%	23.10%	28.04%	20.11%	14.64%
2007	2.49%	12.58%	23.37%	27.55%	19.48%	14.52%
2008	2.80%	12.99%	24.33%	25.44%	17.01%	17.42%
2009	3.94%	14.58%	23.42%	21.70%	15.10%	21.25%
2010	4.39%	15.01%	22.50%	20.33%	14.25%	23.52%
2011	5.06%	15.39%	21.34%	19.31%	13.78%	25.12%
2012	5.18%	15.63%	21.81%	19.71%	13.85%	23.83%
2013	4.10%	13.80%	21.06%	20.10%	14.72%	26.23%
2014	3.59%	13.18%	21.48%	20.91%	15.50%	25.34%
2015	3.85%	13.88%	23.01%	21.74%	15.65%	21.87%
2016	3.39%	12.93%	22.76%	22.41%	16.66%	21.86%
2017	3.14%	12.46%	22.90%	23.32%	17.44%	20.74%
2018	3.11%	12.53%	23.33%	24.34%	17.10%	19.59%
2019	3.19%	12.75%	24.23%	24.97%	16.91%	17.94%
2020	2.83%	12.33%	24.90%	25.97%	17.74%	16.23%
2021	2.45%	10.79%	23.06%	26.29%	18.77%	18.64%

Initial Contract Interest Rate

Table 18 shows the average mortgage contract rate by mortgage type since Fiscal Year 1997. Prior to Fiscal Year 2020, average contract rates in Fiscal Year 2013 were the lowest of this entire time period. Rates had been higher since 2013, but decreased significantly in Fiscal Year 2020 by one full percentage point for the entire book of business. Interest rates for 30-year SRs are at the lowest level since 1997, which is one of the reasons for the significant surge in refinance activity in 2020 and 2021.

In general, an FRM with a lower initial contract rate tends to prepay at a slower speed. As interest rates are projected to rise, the prepayment rates of the recent originations are likely to remain low. As these loans will have longer durations, as reflected in our predictive models, more insurance premium income will be generated, thus tending to improve the economic value of these recent books with historically low contract rates.

Also, a mortgage with a contract rate lower than the market rate tends to experience a lower probability of default because the borrower has the incentive to keep the below-market rate mortgage longer even when experiencing some negative equity. This tendency is reflected in our predictive models. As mortgage rates rise in the future, the recent low-interest-rate books are projected to incur fewer defaults and claims. This also tends to improve the economic value.

Table 18: Average Contract Interest Rate by Loan Type (Percent)

Fiscal Year	30-Year FRM	15-Year FRM	ARM	30-Year SR	15-Year SR	ARM SR	Book of Business
1997	8.01	7.77	6.60	8.30	8.04	6.86	7.62
1998	7.42	7.23	6.25	7.62	7.24	6.54	7.22
1999	7.21	6.94	5.96	7.20	6.91	6.11	7.15
2000	8.22	7.95	6.87	8.07	7.81	6.15	8.07
2001	7.69	7.25	6.57	7.44	6.89	6.22	7.61
2002	7.07	6.60	5.37	7.02	6.46	5.38	6.92
2003	6.21	5.62	4.59	6.07	5.55	4.56	6.02
2004	6.08	5.52	4.41	5.92	5.46	4.34	5.84
2005	5.94	5.64	4.78	5.85	5.65	4.67	5.80
2006	6.29	6.14	5.36	6.10	6.02	5.03	6.25
2007	6.51	6.40	5.62	6.38	6.22	5.59	6.49
2008	6.33	5.95	5.39	6.09	5.64	5.33	6.30
2009	5.62	5.14	5.05	5.26	4.81	4.54	5.53
2010	5.14	4.62	3.98	5.13	4.65	4.28	5.08
2011	4.65	4.16	3.51	4.63	4.16	3.69	4.57
2012	3.98	3.46	3.14	3.98	3.53	3.38	3.93
2013	3.62	3.16	2.82	3.71	3.36	2.86	3.63
2014	4.30	3.71	3.31	4.51	3.91	3.39	4.28
2015	4.03	3.47	3.26	3.99	3.69	3.36	4.00
2016	3.91	3.40	3.23	3.87	3.53	3.35	3.89
2017	4.03	3.50	3.18	3.75	3.59	3.02	3.98
2018	4.54	3.87	3.51	4.08	4.03	3.49	4.50
2019	4.68	4.15	4.00	4.23	4.44	4.02	4.64
2020	3.63	3.49	3.47	3.50	3.42	3.50	3.60
2021	3.03	2.67	2.66	2.88	2.82	2.33	2.99

Source of Down Payment Assistance

Table 19 shows the distribution of annual loan endorsements by source of down payment assistance. Secondary loans provided by governments were included in the category of down payment assistance, and typically these were local government units.

Starting in Fiscal Year 2000, there was a rapid increase in the share of loans with gift letters from non-profit, religious, or community institutions. Home sellers contributed a large share of these funds to the non-profit organizations, which subsequently provided the gift to the buyers of the same properties to fulfill the down payment requirements. This concentration increased to over 20% in the 2005 - 2007 cohorts. FHA effectively terminated seller-financed down payment assistance on October 1, 2008 because of the high losses associated with these loans. The share of loans with this type of assistance declined to negligible amounts after Fiscal Year 2008.

From 2008 to 2018, the percentage of loans with down payment assistance from a relative had increased from 6.8% to 21.7%. Since 2019, this percentage has decreased to 16.0%. Also, the share of loans with government down payment assistance increased from 2013 to 2016, but has decreased since then.

Table 19: Percentage of Down Payment Assist Loan Counts by Source

Cohort	No Gift	Relative	Non-Profit, Religious or Community	Government
1998	76.81%	22.76%	0.20%	0.23%
1999	81.69%	17.11%	0.53%	0.68%
2000	77.56%	18.97%	1.69%	1.78%
2001	83.35%	11.72%	3.75%	1.17%
2002	83.21%	9.32%	6.29%	1.18%
2003	81.92%	7.61%	9.33%	1.13%
2004	71.69%	9.75%	16.95%	1.61%
2005	64.64%	9.91%	22.96%	2.48%
2006	64.13%	9.44%	23.04%	3.39%
2007	68.25%	7.66%	21.27%	2.81%
2008	74.46%	6.82%	17.38%	1.33%
2009	86.54%	10.34%	2.70%	0.42%
2010	83.99%	15.42%	0.09%	0.51%
2011	85.25%	13.91%	0.12%	0.72%
2012	85.76%	13.44%	0.13%	0.68%
2013	86.89%	12.33%	0.09%	0.70%
2014	77.73%	20.66%	0.29%	1.32%
2015	79.44%	17.88%	0.72%	1.95%
2016	77.31%	19.26%	0.91%	2.53%
2017	77.40%	19.70%	0.74%	2.16%
2018	76.34%	21.71%	0.41%	1.54%
2019	78.19%	20.58%	0.22%	1.01%
2020	82.91%	15.81%	0.19%	1.10%
2021	82.64%	15.99%	0.20%	1.16%

SECTION 5 – SUMMARY OF METHODOLOGY

This section provides an overview of the analytical approach used in this analysis.

Data Sources

In our analysis, we have relied on data from FHA, Moody's and the OMB.

From FHA, we have received the following data:

1. Claims_601_Case_Data: used for the cash entry from note sales
2. IDB: core case data; this table is derived based on fields from IDB_1, IDB_2, and the Decision_FICO_Score (one file each for 1975 – 2021)
3. Lossmit_Costs: derived table based on the Loss Mitigation table and IDB_1, used to obtain mitigation claim amounts
4. Sams_case_record: used to determine the status of the conveyances, the capital income/expense amounts, the sales and real estate owned (REO) expenses and sales proceeds to FHA, where applicable
5. SFDW_Default_History: used to create period information related to default histories
6. Fannie_FICO_pre2004: used for supplemental credit data
7. Current_Status: table displaying the current status of each loan
8. SFDW Dictionary for Pinnacle: data dictionary for the tables provided by FHA

From Moody's, we have received the following data elements:

1. Historical Economic Data
2. Baseline Economic Scenario Projections
3. Modified Economic Scenario Projections

From OMB, we have received the Economic Assumptions for the 2022 Budget.

The economic data that is included in the analysis is shown below:

1. HPI
2. Mortgage rates
3. Treasury rates
4. Unemployment rates
5. GDP
6. Consumer Confidence Index(CCI)
7. Small Business Optimism Index (SBOI)

Data Processing – Mortgage Level Modeling (Appendix A)

Starting with the raw data, Pinnacle processed the data to create datasets for developing the mortgage level transition and loss severity models. The first step in preparing the data for analysis was processing the economic data. Historical economic data was imported by quarter, additional data elements were derived, and data was joined to the FHA mortgage data.

Once the economic data was prepared, the core data processing occurred. We used mortgage-level data to reconstruct quarterly mortgage-event histories by relating mortgage origination information to other data reflecting events that occurred over the history of the mortgage. In the process of creating quarterly event histories, each mortgage contributed an observed transition for every quarter from origination up to and including the period of mortgage termination, or until the end of Fiscal Year 2021 if the mortgage remained active.

Data Reconciliation

To reconcile the data processed by Pinnacle with the data provided by FHA, Pinnacle compared summaries of key data elements with summaries provided by FHA. The summaries for the number of active mortgages, IIF, number of 90-day delinquencies, and the number of claims to date are shown in the following tables.

The following tables are based on data as of September 30, 2021.

Table 20: Data Reconciliation - Number of Active Loans

Number of Active Loans				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	7,577	7,500	(77)	-1%
1993	14,258	14,188	(70)	0%
1994	21,762	21,654	(108)	0%
1995	11,336	11,302	(34)	0%
1996	18,824	18,778	(46)	0%
1997	20,721	20,686	(35)	0%
1998	32,523	32,414	(109)	0%
1999	41,302	41,138	(164)	0%
2000	23,412	23,265	(147)	-1%
2001	40,265	39,894	(371)	-1%
2002	58,139	57,743	(396)	-1%
2003	82,546	81,813	(733)	-1%
2004	103,276	102,258	(1,018)	-1%
2005	75,109	74,429	(680)	-1%
2006	59,846	59,294	(552)	-1%
2007	58,065	58,014	(51)	0%
2008	133,586	133,575	(11)	0%
2009	276,204	276,191	(13)	0%
2010	337,246	337,231	(15)	0%
2011	269,265	269,257	(8)	0%
2012	339,159	339,159	0	0%
2013	476,934	476,934	0	0%
2014	212,268	212,268	0	0%
2015	362,698	362,698	0	0%
2016	514,287	514,287	0	0%
2017	573,148	573,148	0	0%
2018	475,018	475,018	0	0%
2019	483,932	483,932	0	0%
2020	939,264	939,264	0	0%
2021	1,357,154	1,357,154	0	0%
Total	7,419,124	7,414,486	(4,638)	0%

Table 21: Data Reconciliation - Insurance in Force

Insurance in Force ($M) = Original Loan Amount on Active Loans				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	480,740,853	475,498,933	(5,241,920)	-1%
1993	957,851,810	952,974,558	(4,877,252)	-1%
1994	1,480,542,356	1,472,796,259	(7,746,097)	-1%
1995	722,390,493	720,354,659	(2,035,834)	0%
1996	1,246,730,144	1,243,884,501	(2,845,643)	0%
1997	1,403,084,985	1,400,919,635	(2,165,350)	0%
1998	2,383,398,388	2,375,864,585	(7,533,803)	0%
1999	3,173,491,221	3,162,136,727	(11,354,494)	0%
2000	1,775,149,233	1,763,910,508	(11,238,725)	-1%
2001	3,442,258,548	3,411,945,325	(30,313,223)	-1%
2002	5,384,882,917	5,352,575,244	(32,307,673)	-1%
2003	8,617,990,435	8,552,806,744	(65,183,691)	-1%
2004	10,813,986,419	10,728,634,979	(85,351,440)	-1%
2005	8,054,635,897	7,996,466,461	(58,169,436)	-1%
2006	6,767,780,781	6,714,840,154	(52,940,627)	-1%
2007	7,063,468,892	7,058,491,354	(4,977,538)	0%
2008	18,533,878,749	18,532,767,082	(1,111,667)	0%
2009	41,319,066,963	41,317,620,682	(1,446,281)	0%
2010	48,767,405,347	48,765,829,878	(1,575,469)	0%
2011	39,818,213,728	39,817,576,266	(637,462)	0%
2012	51,710,421,423	51,710,421,423	0	0%
2013	75,010,734,202	75,010,734,202	0	0%
2014	28,541,534,785	28,541,534,785	0	0%
2015	57,189,947,280	57,189,947,280	0	0%
2016	87,069,651,634	87,069,651,634	0	0%
2017	102,112,523,356	102,112,523,356	0	0%
2018	85,724,601,745	85,724,601,745	0	0%
2019	92,459,442,752	92,459,442,752	0	0%
2020	207,857,431,166	207,857,431,166	0	0%
2021	323,597,870,773	323,597,870,773	0	0%
Total	1,323,481,107,275	1,323,092,053,650	(389,053,625)	0%

Table 22: Data Reconciliation - Number of 90 Day Delinquencies

Number of 90 Day Delinquencies = Current Number of 90 Day Delinquencies				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	449	449	0	0%
1993	725	726	1	0%
1994	1,158	1,162	4	0%
1995	871	871	0	0%
1996	1,555	1,556	1	0%
1997	1,710	1,710	0	0%
1998	2,705	2,708	3	0%
1999	3,721	3,725	4	0%
2000	2,551	2,553	2	0%
2001	3,947	3,949	2	0%
2002	5,390	5,395	5	0%
2003	7,289	7,299	10	0%
2004	10,038	10,053	15	0%
2005	8,150	8,156	6	0%
2006	7,170	7,178	8	0%
2007	7,911	7,922	11	0%
2008	18,963	18,982	19	0%
2009	29,893	29,925	32	0%
2010	30,842	30,864	22	0%
2011	22,045	22,056	11	0%
2012	24,110	24,125	15	0%
2013	30,375	30,396	21	0%
2014	21,810	21,825	15	0%
2015	38,547	38,565	18	0%
2016	56,186	56,226	40	0%
2017	67,989	68,058	69	0%
2018	68,814	68,862	48	0%
2019	70,457	70,522	65	0%
2020	75,480	75,550	70	0%
2021	15,447	15,494	47	0%
Total	636,298	636,862	564	0%

Table 23: Data Reconciliation - Number of Claims to Date

Number of Claims To Date				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	36,787	36,787	0	0%
1993	52,297	52,294	(3)	0%
1994	65,946	65,945	(1)	0%
1995	44,700	44,700	0	0%
1996	63,518	63,511	(7)	0%
1997	59,932	59,923	(9)	0%
1998	67,580	67,568	(12)	0%
1999	84,341	84,327	(14)	0%
2000	71,426	71,417	(9)	0%
2001	85,508	85,498	(10)	0%
2002	90,705	90,680	(25)	0%
2003	91,419	91,404	(15)	0%
2004	116,183	116,160	(23)	0%
2005	92,423	92,409	(14)	0%
2006	94,669	94,667	(2)	0%
2007	106,822	106,822	0	0%
2008	224,969	224,968	(1)	0%
2009	227,148	227,148	0	0%
2010	116,332	116,332	0	0%
2011	47,882	47,881	(1)	0%
2012	29,876	29,876	0	0%
2013	27,650	27,650	0	0%
2014	16,178	16,178	0	0%
2015	15,838	15,838	0	0%
2016	13,710	13,710	0	0%
2017	9,932	9,932	0	0%
2018	5,382	5,382	0	0%
2019	1,425	1,425	0	0%
2020	122	122	0	0%
2021	1	1	0	0%
Total	1,960,578	1,960,432	(146)	0%

Specification of Mortgage Transition Models (Appendix B)

The purpose of the transition predictive models is to estimate the likelihood of future occurrences of claim and prepayment terminations for FHA forward mortgages in the MMI portfolio. The models are used to project future outstanding balances, cash flows, and ultimately the Cash Flow NPV.

The predictive models reflect the fact that mortgage borrowers possess two mutually exclusive options to terminate the mortgage: one to prepay the mortgage and the other to default by permanently ceasing payment. From FHA's point of view, prepayment and claim events are the corresponding outcomes of "competing risks" in the sense that they are mutually exclusive, and realization of one of these events precludes the other. Prepayment means cessation of cash inflows from MIP, but at the same time eliminates any chance of incurring claim losses. Conversely, termination through foreclosure

means claim costs are incurred and MIP inflows cease, but uncertainty about the possibility and timing of prepayment is eliminated.

The models developed for this analysis also include additional transitions. These include the transition from current to 90 days or more delinquent (Default), cures from Default separated into cures by mortgage modification, and self-cures with no modification or with "light" modifications. We track the post-cure behavior of modified mortgages and self-cured mortgages separately with modification-related variables, namely a modification flag and the payment reduction ratio. We also track the status of mortgages post-default by including a prior default flag and the time since the most recent default.

We model five possible transitions from a mortgage in current status: remain current, default (become 90 or more days delinquent), prepay by SR, other prepayments or self-cure. (There is also one additional transition possible – cure with a modification. This transition rarely occurs for a mortgage in current status, but most often occurs with a mortgage in default status. Therefore, we have included these transitions in the default transition model development.) Given that these are mutually exclusive outcomes, the sum of the probabilities for all possible transitions is 100%. For a mortgage in default status at the beginning of a particular time period, the five possible transitions are that it may be prepaid, transition into a claim, self-cure, cure with a mortgage modification, or remain in default.

For this Actuarial Review, we have separately identified claims in default and in COVID-19 forbearance. Borrowers who experienced an adverse impact on their ability to make on-time mortgage payments due to the COVID-19 pandemic were eligible for forbearance for an initial period of six months, and this initial period could be extended by up to six additional months. All borrowers were eligible for COVID-19 forbearance; therefore, if a borrower was granted this forbearance, it would likely delay the transition of the mortgage in default to a subsequent status. Therefore, we developed additional transition assumptions for COVID-19 forbearances to reflect the potential slow-down in resolution over the next twelve months. Over the projected period that loans can be in a COVID-19 forbearance, Pinnacle projects that a portion of the loans eligible for loss mitigation will exit forbearance as either a loss mitigation claim, a loan still in default or a payoff. For loans that are in COVID-19 forbearance but not eligible for loss mitigation, Pinnacle projects that a portion of these loans will exit forbearance as a default loan. As loans could enter COVID-19 forbearance through September 30, 2021, this adjustment will persist into Fiscal Year 2022.

In the 2017 and 2018 Actuarial Reviews, Pinnacle used multinomial logistic models to estimate the probability of transition for current and default mortgages. In the 2019 and 2020 Actuarial Reviews, we used binomial logistic models to predict each transition separately, and once all the binomial models were completed, we adjusted the binomial probabilities to reflect the multinomial nature of the

transitions. The primary reason for making this change was that it allowed us to better model each transition using the independent variables that were significant for that transition. The multinomial structure used in the 2017 and 2018 Actuarial Reviews did not allow for the use of variables just for individual transitions (i.e., if a variable was included in the model, it applied to all transitions). This resulted in over-specification of the transition models, as there are some independent variables that were not significant for some transitions. To address this, Pinnacle used binomial models for each transition and applied an adjustment to reflect the multinomial nature of the process. Pinnacle has continued the use of binomial models for this Actuarial Review.

Pinnacle investigated the use of Multinomial Discrete Choice (MDC) models for this analysis process. MDC models allow all transitions to be modeled simultaneously, and allow for the use of independent variables only for specific transitions. Pinnacle compared the MDC approach to the binomial logistic approach, and concluded that the two approaches produce identical results. We also observed that the MDC approach took significantly longer to complete as it was more computationally intensive. Because the results of the two methods were identical and the binomial logistic models ran more efficiently, we decided to continue with the binomial logistic approach with the multinomial adjustment.

There are several benefits to using a multinomial logistic model structure. First, it ensures that the event probabilities sum to unity. This means that, at any point in time, a mortgage must experience only one of the possible transitions over the next period. Second, the possible values of each probability are constrained to be between zero and one. Third, as the probability of one transition type increases, the probabilities of the others are automatically reduced, reflecting the competing-risk nature among the transition events. Finally, it allows the conditional termination rates using mortgage-level data to be estimated. With mortgage-level observations, the possible outcomes at each point in time are either 0 (the event did not happen) or 1 (the event happened).

We developed the transition models with the initial condition of C for the FRM30 non-SR product using a random sample of 50% of the data. For all other products, we used 100% of the data in the model development. For Default transition models, we used 100% of the data in the model development for all products.

Loss Severity Model (Appendix C)

FHA incurs a loss from a mortgage claim event. This loss amount depends on many factors, including the disposition channel. In practice, foreclosed properties generally have higher severity compared to pre-foreclosure-sales (PFS). Foreclosure mortgages can be further separated into REO and Claims Without Conveyance of Title (CWCOT). We have developed multiple models to predict loss severity: models to predict whether the property is disposed by PFS, REO or CWCOT, and separate loss severity

models for PFS, REO and CWCOT cases. The loss severity models capture characteristics of the mortgage, the collateral, the borrower, and the housing market environment when a claim occurs. The claim disposition selection model was estimated using multinomial logistic regression, while Generalized Linear Models (GLM) were developed for loss severity models.

In addition to the loss severity models, we have also developed separate models to project the frequency of loss mitigation claims and the severity associated with these claims.

All loans granted a COVID-19 forbearance must be evaluated for eligibility for a partial claim and/or loan modification. When the COVID-19 forbearance program began, borrowers who were current or less than 30 days past due as of March 1, 2020 were to be evaluated for COVID-19 loss mitigation options. In 2021, eligibility for COVID-19 forbearance was extended to loans that were more than 30 days past due as of March 31, 2020. Once a loan is projected to exit COVID-19 forbearance, Pinnacle estimated the transition path of the loan based on the percentages estimated from forbearance exits that have occurred since the forbearance program began. If the loan is projected to be a COVID-19 loss mitigation claim, the severity will be estimated based on the loss mitigation severity model.

Cash Flow Projections (Appendix E)

After developing the transition and severity predictive models, we use this information to project future cash flows. The cash flow model includes the calculation of five types of cash flows:

1. Upfront MIP
2. Annual MIP
3. Claim payments
4. Loss mitigation related expenses
5. Premium refunds

The federal credit subsidy present value conversion factors provided by OMB are used to discount future cash flows to determine their present value as of the end of Fiscal Year 2021.

FHA executed note sales in November 2015, September 2016 and April 2021. Based on information provided by HUD, there are no current planned or pending note sales. Therefore, we have not projected any future note sales in our analysis.

We have calculated the Cash Flow NPV based on multiple deterministic economic scenario paths. The ACE projection is based on the OMB Economic Assumptions, and the variation in the estimate is calculated in part by using 10 alternative economic projection scenarios from Moody's. These scenarios

include both more favorable than expected and less favorable than expected economic assumptions. The resulting Cash Flow NPV is then calculated based on these varying assumptions. The following are the economic variables that drive the variation in the MMI Cash Flow NPV:

- One-year CMT rates
- Three-year CMT rates
- Five-year CMT rates
- 10-year CMT rates
- 30-year CMT rates
- 30-year FRM rates
- FHFA national purchase-only HPI
- Unemployment rates by state
- Change in unemployment rate
- One-year GDP ratio
- CCI
- SBOI

APPENDICES

A. Data - Sources, Processing and Reconciliation
B. Transition Models
C. Loss Severity Models
D. Economic Scenarios
E. Cash Flow Analysis
F. Review of HUD Analysis of Economic Net Worth, Comparison of HUD and Pinnacle Models, and Assessment of Vulnerabilities
G. Summary of Historical and Projected Claim Rates, Non-Claim Termination Rates and Loss Severities

APPENDIX A: DATA – SOURCES, PROCESSING AND RECONCILIATION

Data Sources

In our analysis, we have relied on data from FHA, Moody's and the OMB.

From FHA, we have received the following data:

1. Claims_601_Case_Data: used for the cash entry from note sales
2. IDB: core case data; this table is derived based on fields from IDB_1, IDB_2, and the Decision_FICO_Score (one file each for 1975 – 2021)
3. Lossmit_Costs: derived table based on the Loss Mitigation table and IDB_1, used to obtain mitigation claim amounts
4. Sams_case_record: used to determine the status of the conveyances, the capital income/expense amounts, the sales and REO expenses, and sales proceeds to FHA, where applicable
5. SFDW_Default_History: used to create period information related to default histories
6. Fannie_FICO_pre2004: used for supplemental credit data
7. Current_Status: table displaying the current status of each loan
8. SFDW Dictionary for Pinnacle: data dictionary for the tables provided by FHA

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1. Historical Economic Data
2. Baseline Economic Scenario Projections
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From OMB, we have received the Economic Assumptions for the 2022 Budget.

The economic data that is included in the analysis is shown below:

1. HPI
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3. Treasury rates
4. Unemployment rates
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7. SBOI

Data Processing – Mortgage Level Modeling

Starting with the raw data, Pinnacle processed the data to create datasets for developing the mortgage level transition and loss severity models. The first step in preparing the data for analysis was the processing of the economic data. Historical economic data was imported by quarter, additional data elements were derived, and data was joined to the FHA mortgage data.

Once the economic data was prepared, the core data processing occurred. We used mortgage-level data to reconstruct quarterly mortgage-event histories by relating mortgage origination information to other data reflecting events that occurred over the history of the mortgage. In the process of creating quarterly event histories, each mortgage contributed an observed transition for every quarter from origination up to and including the period of mortgage termination, or until the end of Fiscal Year 2021, if the mortgage remained active.

Data Reconciliation

To reconcile the data processed by Pinnacle with the data provided by FHA, Pinnacle compared summaries of key data elements with summaries provided by FHA. The summaries for the number of active mortgages, IIF, number of 90-day delinquencies, and the number of claims to date are shown in the following tables.

The following tables are based on data as of September 30, 2021, as this was the data used to develop the transition and net loss models.

Table 24: Data Reconciliation - Number of Active Loans

Number of Active Loans				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	7,577	7,500	(77)	-1%
1993	14,258	14,188	(70)	0%
1994	21,762	21,654	(108)	0%
1995	11,336	11,302	(34)	0%
1996	18,824	18,778	(46)	0%
1997	20,721	20,686	(35)	0%
1998	32,523	32,414	(109)	0%
1999	41,302	41,138	(164)	0%
2000	23,412	23,265	(147)	-1%
2001	40,265	39,894	(371)	-1%
2002	58,139	57,743	(396)	-1%
2003	82,546	81,813	(733)	-1%
2004	103,276	102,258	(1,018)	-1%
2005	75,109	74,429	(680)	-1%
2006	59,846	59,294	(552)	-1%
2007	58,065	58,014	(51)	0%
2008	133,586	133,575	(11)	0%
2009	276,204	276,191	(13)	0%
2010	337,246	337,231	(15)	0%
2011	269,265	269,257	(8)	0%
2012	339,159	339,159	0	0%
2013	476,934	476,934	0	0%
2014	212,268	212,268	0	0%
2015	362,698	362,698	0	0%
2016	514,287	514,287	0	0%
2017	573,148	573,148	0	0%
2018	475,018	475,018	0	0%
2019	483,932	483,932	0	0%
2020	939,264	939,264	0	0%
2021	1,357,154	1,357,154	0	0%
Total	7,419,124	7,414,486	(4,638)	0%

Table 25: Data Reconciliation - Insurance in Force

Insurance in Force ($M) = Original Loan Amount on Active Loans				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	480,740,853	475,498,933	(5,241,920)	-1%
1993	957,851,810	952,974,558	(4,877,252)	-1%
1994	1,480,542,356	1,472,796,259	(7,746,097)	-1%
1995	722,390,493	720,354,659	(2,035,834)	0%
1996	1,246,730,144	1,243,884,501	(2,845,643)	0%
1997	1,403,084,985	1,400,919,635	(2,165,350)	0%
1998	2,383,398,388	2,375,864,585	(7,533,803)	0%
1999	3,173,491,221	3,162,136,727	(11,354,494)	0%
2000	1,775,149,233	1,763,910,508	(11,238,725)	-1%
2001	3,442,258,548	3,411,945,325	(30,313,223)	-1%
2002	5,384,882,917	5,352,575,244	(32,307,673)	-1%
2003	8,617,990,435	8,552,806,744	(65,183,691)	-1%
2004	10,813,986,419	10,728,634,979	(85,351,440)	-1%
2005	8,054,635,897	7,996,466,461	(58,169,436)	-1%
2006	6,767,780,781	6,714,840,154	(52,940,627)	-1%
2007	7,063,468,892	7,058,491,354	(4,977,538)	0%
2008	18,533,878,749	18,532,767,082	(1,111,667)	0%
2009	41,319,066,963	41,317,620,682	(1,446,281)	0%
2010	48,767,405,347	48,765,829,878	(1,575,469)	0%
2011	39,818,213,728	39,817,576,266	(637,462)	0%
2012	51,710,421,423	51,710,421,423	0	0%
2013	75,010,734,202	75,010,734,202	0	0%
2014	28,541,534,785	28,541,534,785	0	0%
2015	57,189,947,280	57,189,947,280	0	0%
2016	87,069,651,634	87,069,651,634	0	0%
2017	102,112,523,356	102,112,523,356	0	0%
2018	85,724,601,745	85,724,601,745	0	0%
2019	92,459,442,752	92,459,442,752	0	0%
2020	207,857,431,166	207,857,431,166	0	0%
2021	323,597,870,773	323,597,870,773	0	0%
Total	1,323,481,107,275	1,323,092,053,650	(389,053,625)	0%

Table 26: Data Reconciliation - Number of 90 Day Delinquencies

Number of 90 Day Delinquencies = Current Number of 90 Day Delinquencies				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	449	449	0	0%
1993	725	726	1	0%
1994	1,158	1,162	4	0%
1995	871	871	0	0%
1996	1,555	1,556	1	0%
1997	1,710	1,710	0	0%
1998	2,705	2,708	3	0%
1999	3,721	3,725	4	0%
2000	2,551	2,553	2	0%
2001	3,947	3,949	2	0%
2002	5,390	5,395	5	0%
2003	7,289	7,299	10	0%
2004	10,038	10,053	15	0%
2005	8,150	8,156	6	0%
2006	7,170	7,178	8	0%
2007	7,911	7,922	11	0%
2008	18,963	18,982	19	0%
2009	29,893	29,925	32	0%
2010	30,842	30,864	22	0%
2011	22,045	22,056	11	0%
2012	24,110	24,125	15	0%
2013	30,375	30,396	21	0%
2014	21,810	21,825	15	0%
2015	38,547	38,565	18	0%
2016	56,186	56,226	40	0%
2017	67,989	68,058	69	0%
2018	68,814	68,862	48	0%
2019	70,457	70,522	65	0%
2020	75,480	75,550	70	0%
2021	15,447	15,494	47	0%
Total	636,298	636,862	564	0%

Table 27: Data Reconciliation - Number of Claims to Date

Number of Claims To Date				
Credit Subsidy Cohort	Federal Housing Administration (Data as of September 2021)	Independent Actuary (Data as of September 2021)	Absolute Difference (Actuary - FHA)	Percent Difference (Actuary - FHA) / FHA
1992	36,787	36,787	0	0%
1993	52,297	52,294	(3)	0%
1994	65,946	65,945	(1)	0%
1995	44,700	44,700	0	0%
1996	63,518	63,511	(7)	0%
1997	59,932	59,923	(9)	0%
1998	67,580	67,568	(12)	0%
1999	84,341	84,327	(14)	0%
2000	71,426	71,417	(9)	0%
2001	85,508	85,498	(10)	0%
2002	90,705	90,680	(25)	0%
2003	91,419	91,404	(15)	0%
2004	116,183	116,160	(23)	0%
2005	92,423	92,409	(14)	0%
2006	94,669	94,667	(2)	0%
2007	106,822	106,822	0	0%
2008	224,969	224,968	(1)	0%
2009	227,148	227,148	0	0%
2010	116,332	116,332	0	0%
2011	47,882	47,881	(1)	0%
2012	29,876	29,876	0	0%
2013	27,650	27,650	0	0%
2014	16,178	16,178	0	0%
2015	15,838	15,838	0	0%
2016	13,710	13,710	0	0%
2017	9,932	9,932	0	0%
2018	5,382	5,382	0	0%
2019	1,425	1,425	0	0%
2020	122	122	0	0%
2021	1	1	0	0%
Total	1,960,578	1,960,432	(146)	0%

APPENDIX B – TRANSITION MODELS

This appendix describes the technical details of the predictive models used to estimate the transition behavior of forward mortgages.

Section 1 summarizes the model specifications used to analyze FHA mortgage status transitions and the subsequent ultimate claim and prepayment rates. This section also presents the statistical theory behind multinomial logistic models.

Section 2 describes the explanatory variables used in the models.

Section 3 shows the model parameters.

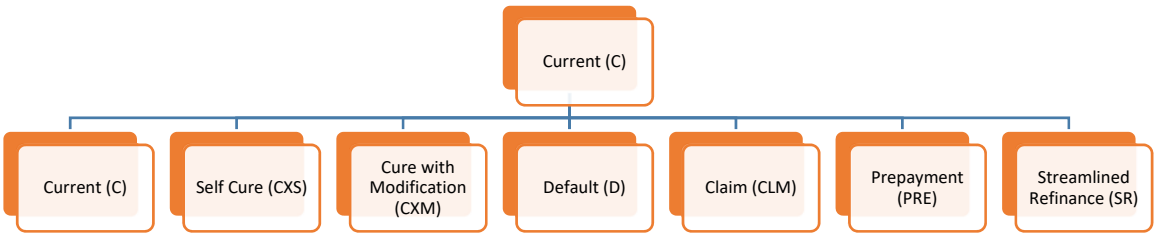
Section 4 shows the model validation of the binomial logistic models.

Section 1: Model Specification

Models are specified by a competing-risk framework based on multinomial logistic models for quarterly conditional probabilities of prepayment, claim terminations and 90-day delinquency (or default). The date from which a mortgage is first reported to be 90 or more days late is used to identify the start of a default episode, and this episode continues until ended by cure or the mortgage terminates through claim or prepayment. Active mortgages that are not in a 90-day default episode at the beginning of the quarter are classified as current.

Figure 12 below shows the possible “current” status transitions that have been modeled using the multinomial framework.

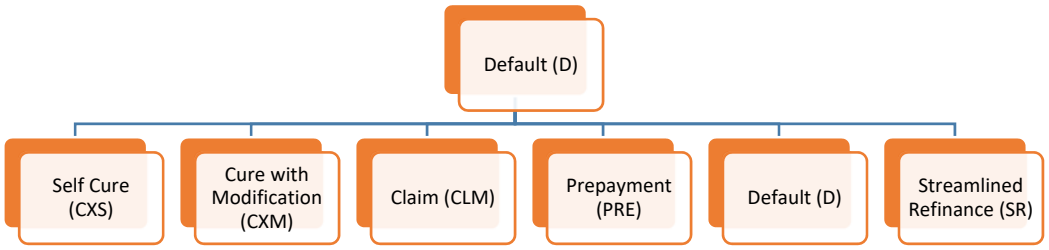
Figure 12: Transition Models – Initial Current Status



Mortgages in current status (C) at the beginning of the quarter can default and cure in the same quarter (CXS and CXM), transition to default status (D) at the start of the next quarter, result in a claim (CLM) or terminate as a prepayment due to an FHA Streamlined Refinance (SR) or as a prepayment (PRE) for any reason other than SR. There are two types of cures, a self-cure (CXS) and a cure that includes a mortgage modification (CXM). Also, due to the very low likelihood of a current mortgage transitioning into to a CLM in one quarter, we have combined D and CLM into one category (DCLM).

The figure below shows the possible default status transitions that have been modeled using the multinomial framework.

Figure 13: Transition Models – Initial Default Status



For mortgages that begin the quarter in default, they can cure either by the borrower becoming current on their own (CXS), or they can cure with a modification in the terms of the mortgage (CXM). The mortgage can also terminate as a prepayment due to an SR or as a prepayment (PRE) for any reason other than SR, turn into a claim (CLM) or remain in default (D). For the development of the transition models, we have combined PRE and SR into one category (END).

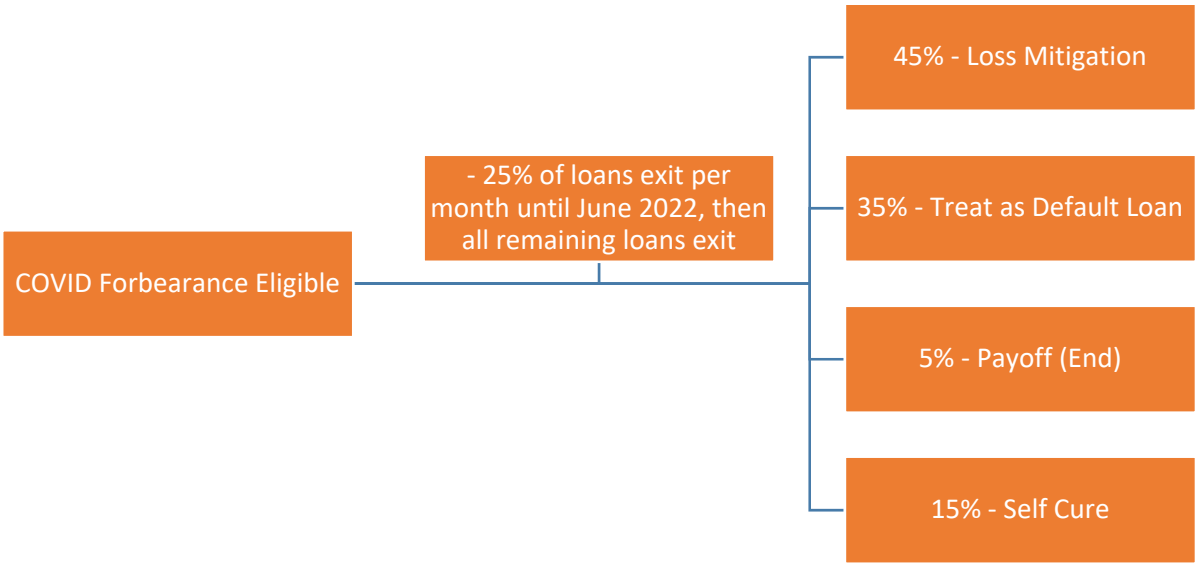
As the mortgage transitions through multiple stages, the historical status of the mortgage is retained. At any point in the life of the mortgage, we track both the number of prior times the mortgage was either in default or modified as well as the length of time since the mortgage was in the prior stage.

As a result of the COVID-19 pandemic, borrowers who experienced an adverse impact on their ability to make on-time mortgage payments are eligible for forbearance for an initial period of six months, and this initial period can be extended by up to six additional months. Borrowers were eligible to apply for COVID-19 forbearance through September 30, 2021. For loans that entered forbearance through June 30, 2021, they are eligible for up to one year of forbearance, while loans that entered between July 1, 2021 and September 30, 2021 are eligible for six months of forbearance. This may result in loans being in forbearance through June 30, 2022.

While a loan is in forbearance, the borrower does not have to make mortgage payments, which technically means the loan is in default. As no action can be taken on these loans by the lender while the loan is in forbearance, the path of these loans cannot be projected by the normal default models.

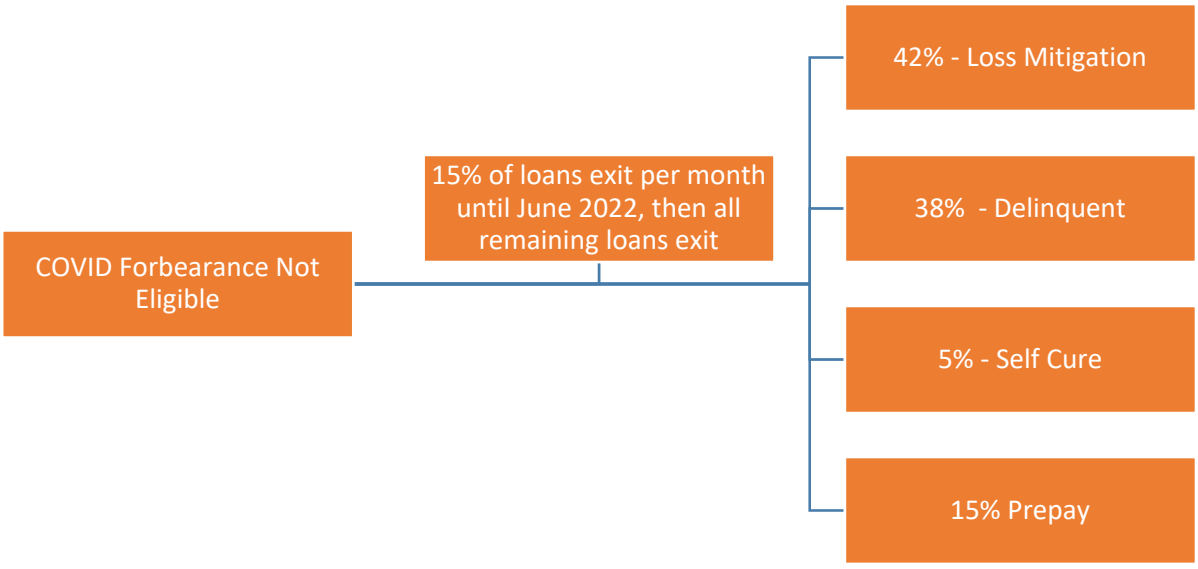
For loans in forbearance, some may be eligible for a partial claim or loan modification if they meet certain criteria. Based on the forbearance criteria, Pinnacle has developed an adjustment to the simulation process to handle these COVID-19 forbearance loans. Loans in COVID-19 forbearance as of September 30, 2021 that are eligible for a loan modification or partial claim were simulated as follows:

Figure 14: COVID-19 Forbearance Simulation – Loans Eligible for Partial Claim or Loan Modification



Loans in COVID-19 forbearance as of September 30, 2021 that are not eligible for a loan modification or partial claim will be simulated as follows:

Figure 15: COVID-19 Forbearance Simulation – Loans Not Eligible for Partial Claim or Loan Modification



These projections were developed based on data from HUD and Black Knight.

Multinomial Logistic Regression Theory and Model Specification

Multinomial logistic regression is used to model the relationship between a collection of predictor variables and the distributional behavior of a polytomous response variable. It is a likelihood-based methodology and may be viewed as the generalization of logistic regression for a response variable with more than two levels.

To formalize its description, let the response variable Y take m possible levels, denoted for simplicity as 1,…,m, and assume there is a collection of g predictors $X_1,\ldots,X_g$, that are used to model Y's distribution. We assume that Y and $X_1,\ldots,X_g$ are jointly observed n times with the i[th] random observation being labeled as

$$Y_i,\ X_{1i},\ldots,X_{gi} \text{ and its realized value } y_i,\ x_{1i},\ldots,x_{gi}.$$

In a multinomial logistic regression, the mathematical structure of the model is set by the following two assumptions:

1. The g+1 length random vectors $<Y_i, X_{1i},\ldots,X_{gi}>$ are jointly independent across all i
2. Given that $X_{1i},\ldots,X_{gi}$ have been observed at $x_{1i},\ldots,x_{gi}$, Y_i's distribution is assumed to be multinomial with

$$P(Y_i = l) = \exp(\mu^l+\sum_{k=1}^{g}\beta_k^l\cdot x_{ki})/(\sum_{j=1}^{m}\exp(\mu^j+\sum_{k=1}^{g}\beta_k^j\cdot x_{ki}))\ ,$$

where the β_k^j are unknown regression parameters and the μ^j are unknown intercept parameters. [Note: To prevent over-specification of the model due to the constraint that the above probabilities sum to 1 over l=1,…,m, a base level j is chosen such that β_k^j and μ^j are set equal to zero.] Thus, if j = 1, then

$$P(Y_i=1) = 1/(1+\sum_{j=2}^{g}\exp(\mu^j+\sum_{k=1}^{g}\beta_k^j\cdot x_{ki}))\ .$$

It now follows the likelihood equation for this model is given by

$$\prod_{i=1}^{n} P(Y_i=y_i) = \prod_{i=1}^{n} \exp(\mu^{y_i}+\sum_{k=1}^{g}\beta_k^{y_i}\cdot x_{ki})/(\sum_{j=1}^{m}\exp(\mu^j+\sum_{k=1}^{g}\beta_k^j\cdot x_{ki})).$$

The multinomial logistic regression procedure optimizes the above likelihood over the unknown parameters in order to find those parameters that are most likely to have given rise to the data.

In the 2017 and 2018 Actuarial Reviews, we used multinomial logistic models to estimate the probability of transition for current and default mortgages. For the Actuarial Reviews since 2017, we are using binomial logistic models to predict each transition separately, and once all the binomial models are completed, we compute multinomial probabilities from the binomial models. The primary reason for making this change is that it allows us to better model each transition with the variables that impact that transition, whereas the multinomial model structure requires us to include a variable for all transitions even if it is only predictive of one of the transitions.

The multinomial structure used in the 2017 and 2018 reports did not allow for the use of variables just for individual transitions, if a variable was included in the model it applied to all transitions. This can result in model over-specification, as there are some independent variables that are not significant for some transitions. To address this, Pinnacle used binomial models for each transitions and applied an adjustment to reflect the multinomial nature of the process.

Pinnacle investigated the use of Multinomial Discrete Choice (MDC) models for this analysis. MDC models allow all transitions to be modeled simultaneously, and also allows for the use of independent variables only for specific transitions. Pinnacle compared the MDC approach to the binomial logistic approach, and concluded that the two approaches produce identical model results. We also observed that the MDC approach took significantly longer to complete as it was more computationally intensive. Because the results of the two methods were identical and the binomial logistic models ran more efficiently, we decided to continue with the binomial logistic approach with the multinomial adjustment.

The target variables for the current and default transition models are shown above in Figure 12 and Figure 13. The independent variables used in the models are described in the following section. 31 models were built, 15 for the current (C) transitions and 16 for the Default (D) transitions. Four product groups are modeled: non-SR fixed rate 30-year term (FRM30NSR), SR fixed rate 30-year term (FRM30SR), fixed rate 15-year term (FRM15) and adjustable rate mortgages (ARM). The model development was completed using a train/validate approach. A random sample of the data is used to train the model, to determine inclusion and exclusion of explanatory variables, and to calculate model parameters. The remaining sample, the validation, is used as a final validation step to confirm the predictive power of the final model.

To generate the random sample, random numbers were added to the dataset at the case level using a random number generator. The random numbers were drawn from a uniform distribution between 0 and 1. Based on these random numbers, 60% of the cases were assigned to the train dataset and 40% were assigned to the validation dataset.

There have been over 38 million single-family mortgages insured by FHA originated between the first quarter of Fiscal Year 1975 and the fourth quarter of Fiscal Year 2021. For the transition models with the initial condition of C for the FRM30NSR, we used a random sample of 50% of the data. For all other products, we used 100% of the data in the model development.

For transition models with the initial condition of D we used 100% of the data for all ending condition models for all products.

Computation of Multinomial Logistic Probabilities from Binomial Models

As stated above, we compute multinomial probabilities from the binomial models described developed. To arrive at the multinomial logit model for *K* possible outcomes, *K*-1 independent binary logistic regression models are run and the *Kth* outcome is derived from the *K-1* models. The linear predictor (*lp*) is formulated by a binomial logistic regression for all transitions except for the transition representing remaining in the same state (C_C or D_D), which is the *Kth* outcome. This is consistent with the approach developed by Begg and Gray (1984)[78], in which separate binomial logistic models for each possible transition type are developed, and then the estimates are recombined to derive the multinomial logistic probabilities.

For the C transitions:

$$lp(C\_D) = e^{\alpha^{C\_D} + X^{C\_D}(t)\beta^{C\_D}}$$

$$lp(C\_CXS) = e^{\alpha^{C\_CXS} + X^{C\_CXS}(t)\beta^{C\_CXS}}$$

$$lp(C\_SR) = e^{\alpha^{C\_SR} + X^{C\_SR}(t)\beta^{C\_SR}}$$

$$lp(C\_PRE) = e^{\alpha^{C\_PRE} + X^{C\_PRE}(t)\beta^{C\_PRE}}$$

The probabilities can then be derived for each of the *K-1* transitions:

$$Prob(C\_D) = lp(C\_D) / [1+lp(C\_D)+lp(C\_CXS)+lp(C\_SR)+lp(C\_PRE)]$$

[78] Begg, C.B. and R. Gray, "Calculation of Polychotomous Logistic Regression Parameters Using Individualized Regressions," Biometrika, 71(1):11-18, 1984.

$$Prob(C\_CXS) = lp(C\_CXS) / [1+lp(C\_D)+lp(C\_CXS)+lp(C\_SR)+lp(C\_PRE)]$$

$$Prob(C\_SR) = lp(C\_D) / [1+lp(C\_D)+lp(C\_CXS)+lp(C\_SR)+lp(C\_PRE)]$$

$$Prob(C\_PRE) = lp(C\_D) / [1+lp(C\_D)+lp(C\_CXS)+lp(C\_SR)+lp(C\_PRE)]$$

The *Kth* probability is

$$Prob(C\_C) = 1- Prob(C\_D)- Prob(C\_CXS)- Prob(C\_SR)- Prob(C\_PRE)$$

For the D transitions:

$$lp(D\_CLM) = e^{\alpha^{D\_CLM} + X^{D\_CLM}(t)\beta^{D\_CLM}}$$

$$lp(D\_CXS) = e^{\alpha^{D\_CXS} + X^{D\_CXS}(t)\beta^{D\_CXS}}$$

$$lp(D\_CXM) = e^{\alpha^{D\_CXM} + X^{D\_CXM}(t)\beta^{D\_CXM}}$$

$$lp(D\_END) = e^{\alpha^{D\_END} + X^{D\_END}(t)\beta^{D\_END}}$$

The probabilities can then be derived for each of the K-1 transitions:

$$Prob(D\_CLM)= lp(D\_CLM) / [1+lp(D\_CLM)+lp(D\_CXS)+lp(D\_CXM)+lp(D\_END)]$$

$$Prob(D\_CXS) = lp(D\_CXS) / [1+lp(D\_CLM)+lp(D\_CXS)+lp(D\_CXM)+lp(D\_END)]$$

$$Prob(D\_CXM)\ l=p(D\_CXM) / [1+lp(D\_CLM)+lp(D\_CXS)+lp(D\_CXM)+lp(D\_END)]$$

$$Prob(D\_END) = lp(D\_END) / [1+lp(D\_CLM)+lp(D\_CXS)+lp(D\_CXM)+lp(D\_END)]$$

The *Kth* probability is

$$Prob(D\_D) = 1- Prob(D\_CLM)- Prob(D\_CXS)- Prob(D\_CXM)- Prob(D\_END)$$

Finally, a check is built into the simulation to assure the sum of all transition probabilities does not exceed 1.0.

Section 2: Transition Model Explanatory Variables

Multiple categories of explanatory variables were considered in development of the transition models.

- Fixed initial mortgage characteristics: market rate, initial mortgage size, spread at origination, refinance indicator
- Fixed initial borrower characteristics: down payment assistance, first-time home buyer, credit score, cohort year
- Property characteristics: the number of living units, initial home values
- Dynamic variables based on mortgage information: prior default indicator, number of prior default episodes, prior mortgage modification, number of prior modifications, LTV ratio, interest rate spread, TEI (expense to income ratio), mortgage period, duration of default episode, time since last default episode
- Dynamic variables derived by combining mortgage information and external economic data: spread, season
- Dynamic macroeconomic variables: average unemployment rate over multiple time periods, change in the unemployment rate, HPI, change in HPI, treasury rates, GDP measures, slope of yield curve. Consumer Confidence Index, Small Business Confidence Index
- Geographic variables: judicial state, collateral state

The following explanatory variables are used in the transition models. A general description of the variable is provided below, and more specific detail is included in the Model Parameters section.

- **Periodnbr**: the number of quarters since the inception of the mortgage. This variable is incorporated as a piecewise variate and a grouped categorical variable.
- **Refiincent**: refinance incentive - the ratio of the difference in the initial mortgage rate to the current market mortgage rate. This variable is calculated as *(100*mortgage interest rate)/(market FRM30 rate)*. This variable is incorporated as a piecewise variate.
- **Priordef**: number of prior default episodes. This variable is incorporated as a grouped categorical variable and a piecewise variate.
- **Timesinced**: time since most recent default. This variable is incorporated as a grouped categorical variable.
- **Credit**: credit score. This variable is incorporated as a piecewise variate.
- **Ratiotmptei**: front end ratio, the portion of an individual's income allocated to mortgage payments. This variable is incorporated as a piecewise variate.
- **Deltaue**: change in unemployment rate from mortgage inception to current. This variable is incorporated as a piecewise variate.

- **Deltauepr3**: change in unemployment rate from three quarters prior to current. This variable is incorporated as a piecewise variate.
- **Hpa2yb**: house price appreciation over the past two years. This variable is calculated as (*current hpi_index /hpi_index 8 quarters prior)*. This variable is incorporated as a piecewise variate.
- **LTV**: ratio of the amortized loan balance to the current home value. This variable is incorporated as a piecewise variate.
- **Loanraw**: the initial mortgage amount. This variable is incorporated as a piecewise variate.
- **Frst_tm_by**: first time home buyer. This variable is incorporated as a categorical variable.
- **Season**: the quarter of the year. Possible values are 1 – January through March, 2 – April through June, 3 – July through September, and 4 – October through December. This variable is incorporated as a grouped categorical variable.
- **Rfnc_ind**: an indicator of whether the mortgage was a refinance. This variable is incorporated as a categorical variable.
- **Dpa**: down payment assistance. This variable is incorporated as a categorical variable.
- **Ueblend**: current unemployment rate. This variable is incorporated as a piecewise variate.
- **Ycslope**: yield curve. This variable is incorporated as a grouped categorical variable.
- **Sato**: spread at origination. This variable is calculated as the difference between the prevailing interest rate and the mortgage interest rate at time of origination. This variable is incorporated as a piecewise variate.
- **Calperiod**: calendar year and quarter. This variable is incorporated as a grouped categorical variable.
- **Judicial**: whether the property is in a judicial state. This variable is incorporated as a categorical variable.
- **Cred_subs_coht**: credit subsidy cohort. This variable is incorporated as a grouped categorical variable.
- **Treasury_yr30**: 30-year CMT rate. This variable is incorporated as a grouped categorical variable.
- **Deltaty1**: change in one-year CMT rate from policy inception to current. This variable is incorporated as a piecewise variate.
- **Deltaty10init**: 10-year CMT rate at policy inception. This variable is incorporated as a grouped categorical variable.
- **Durdefep**: duration of default episode. This variable is incorporated as a grouped categorical variable.

For variables that are incorporated as a piecewise variate, further information is provided on how these variates are specified in the Model Parameter section.

The overall percentage of records in each final condition category for the initial condition of Current is shown in the table below.

Table 28: Distribution of Final Condition – Current Transition Models

Final Condition	Percentage
CXS	0.46%
DCLM	2.50%
CXM	0.01%
SR	0.80%
PRE	2.37%
C	93.86%

The overall percentage of records in each final condition category for the initial condition of Default is shown in the table below.

Table 29: Distribution of Final Condition - Default Transition Models

Final Condition	Percentage
CLM	3.38%
CXM	2.85%
CXS	18.28%
END	1.82%
D	73.66%

Section 3: Binomial Model Results[79, 80]

Current Transition Model Parameters – FRM30NSR C_SR

The model parameters for the FRM30NSR current to streamlined refinance transition are shown below.

Table 30: Current to Streamlined Refinance Transition FRM30NSR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-6.7502	0.0534	<.0001
mjudicial	**1**		Categorical of judicial (judicial state)	Categorical of judicial (judicial state)	-0.1747	0.0014	<.0001
mperiodnbr_CSR	**L03**			period_number <= 3	-0.4988	0.0032	<.0001

[79] For categorical variable, only non_base levels are listed.
[80] The tables' footnotes are consistent among the tables. They are listed at the end of the section.

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mperiodnbr_CSR	L04		Categorical of period_number	period_number = 4	0.3113	0.0029	<.0001
mperiodnbr_CSR	L05			period_number = 5	0.3218	0.0028	<.0001
mperiodnbr_CSR	L06			period_number = 6	0.2215	0.0029	<.0001
mperiodnbr_CSR	L07			period_number = 7	0.1027	0.0029	<.0001
vperiodnbr_CSR_pw1			Variate piecewise of period_number	median(0,period_number-8,22-8)	-0.0582	0.0003	<.0001
vperiodnbr_CSR_pw2				median(0,period_number-22,39-22)	-0.0682	0.0003	<.0001
vperiodnbr_CSR_pw3				median(0,period_number-39,56-39)	-0.0518	0.0007	<.0001
vperiodnbr_CSR_pw4				median(0,period_number-56,70-56)	-0.0370	0.0016	<.0001
vperiodnbr_CSR_pw5				median(0,period_number-70,88-70)	-0.0586	0.0025	<.0001
vrefiincent_CSR_pw1			Variate piecewise of refi_incent2_r[13] (refinance incentive)	median(0,refi_incent2_r-0,93-0)	-0.0021	0.0005	<.0001
vrefiincent_CSR_pw2				median(0,refi_incent2_r-93,113-93)	0.1095	0.0002	<.0001
vrefiincent_CSR_pw3				median(0,refi_incent2_r-113,130-113)	0.0657	0.0001	<.0001
vrefiincent_CSR_pw4				median(0,refi_incent2_r-130,180-130)	0.0173	0.0001	<.0001
vrefiincent_CSR_pw5				median(0,refi_incent2_r-180,250-180)	-0.0041	0.0003	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	-1.0611	0.0080	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L02		prior_default_cnt = 1; cx_time = 2	-0.8267	0.0085	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L03		prior_default_cnt = 1; cx_time = 3	-0.5966	0.0089	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L04		prior_default_cnt = 1; cx_time = 4	-0.2433	0.0087	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L05		prior_default_cnt = 1; cx_time = 5	-0.2021	0.0096	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L06		prior_default_cnt = 1; cx_time = 6	-0.2601	0.0108	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L07		prior_default_cnt = 1; 7 <= cx_time <= 9	-0.1839	0.0071	<.0001
mpriordef_csr* mtimesinceD_CSR	L01	L09		prior_default_cnt = 1; cx_time >9	-0.0519	0.0068	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L01		prior_default_cnt = 2; cx_time <= 1	-1.5752	0.0154	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L02		prior_default_cnt = 2; cx_time = 2	-1.3067	0.0166	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L03		prior_default_cnt = 2; cx_time = 3	-0.8747	0.0160	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L04		prior_default_cnt = 2; cx_time = 4	-0.2765	0.0139	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L05		prior_default_cnt = 2; cx_time = 5	-0.1861	0.0152	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L06		prior_default_cnt = 2; cx_time = 6	-0.2491	0.0175	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L07		prior_default_cnt = 2; 7 <= cx_time <= 9	-0.1854	0.0118	<.0001
mpriordef_csr* mtimesinceD_CSR	L02	L09		prior_default_cnt = 2; cx_time >9	-0.0863	0.0099	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_csr* mtimesinceD_CSR	**L03**	**L01**		prior_default_cnt >= 3; cx_time <= 1	-1.8577	0.0144	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L02**		prior_default_cnt >= 3; cx_time = 2	-1.4092	0.0146	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L03**		prior_default_cnt >= 3; cx_time = 3	-0.8946	0.0138	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L04**		prior_default_cnt >= 3; cx_time = 4	-0.1797	0.0117	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L05**		prior_default_cnt >= 3; cx_time = 5	-0.0345	0.0125	0.0058
mpriordef_csr* mtimesinceD_CSR	**L03**	**L06**		prior_default_cnt >= 3; cx_time = 6	-0.0978	0.0145	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L07**		prior_default_cnt >= 3; 7 <= cx_time <= 9	-0.1138	0.0107	<.0001
mpriordef_csr* mtimesinceD_CSR	**L03**	**L09**		prior_default_cnt >= 3; cx_time >9	-0.1336	0.0099	<.0001
vpriordef_CSR_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.0806	0.0022	<.0001
vcredit_CSR_pw1			Variate piecewise of credit_score	median(0,credit_score-500,650-500)	-0.0038	0.0000	<.0001
vcredit_CSR_pw2				median(0,credit_score-650,680-650)	0.0020	0.0001	<.0001
vcredit_CSR_pw3				median(0,credit_score-680,720-680)	-0.0026	0.0001	<.0001
vcredit_CSR_pw4				median(0,credit_score-720,800-720)	-0.0019	0.0001	<.0001
mRatioTmpTei_CSR	**L00**		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.8632	0.0050	<.0001
vratiotmptei_CSR_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-11,18-11)	0.0222	0.0006	<.0001
vratiotmptei_CSR_pw2				median(0,ratio_tmp_tei-18,22-18)	0.0132	0.0006	<.0001
vratiotmptei_CSR_pw4				median(0,ratio_tmp_tei-29,37-29)	-0.0031	0.0002	<.0001
vtimesinced_CSR_pw1			Variate piecwise of cx_time[1]	median(0,cx_time-9,40-9)	0.0040	0.0006	<.0001
vdeltaUEinit_CSR_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-0,60-0)	-0.0047	0.0003	<.0001
vdeltaUEinit_CSR_pw2				median(0,deltaUEinit_r-60,77-60)	0.0200	0.0002	<.0001
vdeltaUEinit_CSR_pw4				median(0,deltaUEinit_r-100,105-100)	0.0664	0.0005	<.0001
vdeltaUEinit_CSR_pw5				median(0,deltaUEinit_r-105,145-105)	0.0072	0.0001	<.0001
vdeltaUEinit_CSR_pw6				median(0,deltaUEinit_r-145,225-145)	-0.0008	0.0001	<.0001
vhpa2yb_CSR_pw2			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,100-85)	-0.0009	0.0003	0.0002
vhpa2yb_CSR_pw3				median(0,hpa2y_blended_r-100,106-100)	0.1119	0.0005	<.0001
vhpa2yb_CSR_pw4				median(0,hpa2y_blended_r-106,111-106)	-0.0157	0.0005	<.0001
vhpa2yb_CSR_pw5				median(0,hpa2y_blended_r-111,122-111)	0.0053	0.0003	<.0001
vhpa2yb_CSR_pw6				median(0,hpa2y_blended_r-122,160-122)	-0.0241	0.0003	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vltv_CSR_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	-0.0029	0.0003	<.0001
vltv_CSR_pw2				median(0,ltv_i_r-70,80-70)	0.0297	0.0005	<.0001
vltv_CSR_pw3				median(0,ltv_i_r-80,89-80)	0.0026	0.0004	<.0001
vltv_CSR_pw4				median(0,ltv_i_r-89,93-89)	-0.0316	0.0008	<.0001
vltv_CSR_pw5				median(0,ltv_i_r-93,95-93)	0.0413	0.0013	<.0001
vltv_CSR_pw6				median(0,ltv_i_r-95,97-95)	0.1306	0.0016	<.0001
vltv_CSR_pw7				median(0,ltv_i_r-97,100-97)	-0.1676	0.0049	<.0001
vloanraw_CSR_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-47000,74000-47000)	5.E-05	2.E-07	<.0001
vloanraw_CSR_pw2				median(0,loansize_raw-74000,159000-74000)	1.E-05	3.E-08	<.0001
vloanraw_CSR_pw3				median(0,loansize_raw-159000,345000-159000)	5.E-06	2.E-08	<.0001
vloanraw_CSR_pw4				median(0,loansize_raw-345000,600000-345000)	2.E-07	3.E-08	<.0001
mfrst_tm_by	**1**		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.2247	0.0015	<.0001
mDeltaTY1Init_CSR	**L01**		Categorical of DeltaTy1Init (Change in 1 yr Treasury policy inception to current)	DeltaTY1Init > 1.15	0.3432	0.0021	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.6418	0.0033	<.0001
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.5253	0.0027	<.0001
v_UE_CW_growthQ_lag2_pw1				max(0.4,UE_CW_growthQ_lag2)	-0.4741	0.0026	<.0001
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	4.0875	0.0385	<.0001
v_CCI_growthQ_CSR_pw1			Variate piecewise of CCI quarterly growth	min(CCI_growthQ,0)	-1.3970	0.0129	<.0001
v_CCI_growthQ_CSR_pw2				median(0,CCI_growthQ,0.2)	0.6111	0.0129	<.0001
v_CCI_growthQ_CSR_pw3				max(CCI_growthQ,0.2)	1.6329	0.0119	<.0001

Current Transition Model Parameters – FRM30NSR C_PRE

The model parameters for the FRM30NSR current to prepayment transition are shown below.

Table 31: Current to Prepayment Transition FRM30NSR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-7.4266	0.0196	<.0001
mseason	**1**		Categorical of season	season = "winter"	-0.1585	0.0014	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mseason	2			season = "spring"	0.1305	0.0013	<.0001
mseason	3			season = "summer"	0.0717	0.0013	<.0001
mfrst_tm_by	1		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.1446	0.0011	<.0001
mrfnc_ind	2		Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind = "N"	-0.0846	0.0036	<.0001
mdpa_govt	LGovt		Categorical of dpa (down payment assistance)	dpa = "govt"	-0.0783	0.0038	<.0001
mdpa_rel	LRela			dpa = "Relative"	0.0564	0.0013	<.0001
mperiodnbr_CPre	L02		Categorical of period_number	period_number = 2	-2.7622	0.0079	<.0001
mperiodnbr_CPre	L03			period_number = 3	-1.7222	0.0050	<.0001
mperiodnbr_CPre	L04			period_number = 4	-1.1488	0.0039	<.0001
mperiodnbr_CPre	L05			period_number = 5	-0.6518	0.0032	<.0001
mperiodnbr_CPre	L06			period_number = 6	-0.3952	0.0029	<.0001
mperiodnbr_CPre	L07			period_number = 7	-0.2575	0.0028	<.0001
vperiodnbr_CPre_pw1			Variate piecewise of period_number	median(0,period_number-8,22-8)	0.0155	0.0002	<.0001
vperiodnbr_CPre_pw2				median(0,period_number-22,35-22)	-0.0151	0.0002	<.0001
vperiodnbr_CPre_pw3				median(0,period_number-35, 42-35)	0.0057	0.0004	<.0001
vperiodnbr_CPre_pw4				median(0,period_number-42, 70-42)	-0.0224	0.0002	<.0001
vperiodnbr_CPre_pw5				median(0,period_number-70, 108-70)	0.0080	0.0003	<.0001
mperiodnbr_CPre* mrfnc_ind	L02	2	Interaction of categorical of period_number and categorical of rfnc_ind	period_number = 2; rfnc_ind = "N"	1.0246	0.0131	<.0001
mperiodnbr_CPre* mrfnc_ind	L03	2		period_number = 3; rfnc_ind = "N"	1.0030	0.0086	<.0001
mperiodnbr_CPre* mrfnc_ind	L04	2		period_number = 4; rfnc_ind = "N"	0.8078	0.0074	<.0001
mperiodnbr_CPre* mrfnc_ind	L05	2		period_number = 5; rfnc_ind = "N"	0.4556	0.0070	<.0001
mperiodnbr_CPre* mrfnc_ind	L06	2		period_number = 6; rfnc_ind = "N"	0.2807	0.0070	<.0001
mperiodnbr_CPre* mrfnc_ind	L07	2		period_number = 7; rfnc_ind = "N"	0.1737	0.0071	<.0001
vperiodnbr_CPre_pw1* mrfnc_ind	2		Interaction of variate of period_number and categorical of rfnc_ind	median(0,period_number-8,22-8); rfnc_ind = "N"	-0.0287	0.0004	<.0001
vperiodnbr_CPre_pw2* mrfnc_ind	2			median(0,period_number-22,35-22); rfnc_ind = "N"	-0.0062	0.0004	<.0001
vperiodnbr_CPre_pw4* mrfnc_ind	2			median(0,period_number-42, 70-42); rfnc_ind = "N"	0.0164	0.0005	<.0001
vcredit_CPre_pw1			Variate piecewise of credit_score	median(0,credit_score-450,530-450)	-0.0102	0.0001	<.0001
vcredit_CPre_pw2				median(0,credit_score-530,630-530)	0.0030	0.0001	<.0001
vcredit_CPre_pw3				median(0,credit_score-630,680-630)	0.0055	0.0001	<.0001
vcredit_CPre_pw4				median(0,credit_score-680,720-680)	0.0033	0.0001	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vcredit_CPre_pw5				median(0,credit_score-720,760-720)	0.0011	0.0001	<.0001
vcredit_CPre_pw6				median(0,credit_score-760,800-760)	-0.0009	0.0001	<.0001
vhpa2yb_CPre_pw1			Variate piecewise of hpa2y_blended_r[6] (2 year house price appreciation)	median(0,hpa2y_blended_r-85,100-85)	0.0381	0.0003	<.0001
vhpa2yb_CPre_pw2				median(0,hpa2y_blended_r-100,106-100)	0.1148	0.0005	<.0001
vhpa2yb_CPre_pw3				median(0,hpa2y_blended_r-106,111-106)	0.0333	0.0004	<.0001
vhpa2yb_CPre_pw4				median(0,hpa2y_blended_r-111,122-111)	0.0361	0.0002	<.0001
vhpa2yb_CPre_pw5				median(0,hpa2y_blended_r-122,150-122)	0.0308	0.0001	<.0001
vltv_CPRE_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,78-0)	-0.0069	0.0001	<.0001
vltv_CPRE_pw2				median(0,ltv_i_r-78,85-78)	0.0040	0.0003	<.0001
vltv_CPRE_pw3				median(0,ltv_i_r-85,87-85)	-0.0155	0.0011	<.0001
vltv_CPRE_pw4				median(0,ltv_i_r-87,91-87)	-0.0332	0.0005	<.0001
vltv_CPRE_pw5				median(0,ltv_i_r-91,94-91)	-0.0703	0.0007	<.0001
vltv_CPRE_pw6				median(0,ltv_i_r-94,100-94)	-0.0086	0.0009	<.0001
vueblend_CPre_pw1			Variate piecewise of ue_blended_r[8] (unemployment rate)	(0,ue_blended_r-0,450-0)	-0.0007	0.0000	<.0001
vueblend_CPre_pw3				(0,ue_blended_r-700,730-700)	-0.0054	0.0001	<.0001
vueblend_CPre_pw4				(0,ue_blended_r-730, 1000-730)	-0.0009	0.0000	<.0001
vrefiincent_CPre_pw1			Variate piecewise of refi_incent2_r[13] (refinance incentive)	median(0,refi_incent_r-0,115-0)	0.0256	0.0001	<.0001
vrefiincent_CPre_pw2				median(115,refi_incent_r-115,150-115)	0.0079	0.0001	<.0001
vrefiincent_CPre_pw3				median(150,refi_incent_r-150,200-150)	-0.0048	0.0001	<.0001
vratiotmptei_CPre_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,5-0)	0.0224	0.0007	<.0001
vratiotmptei_CPre_pw2				median(0,ratio_tmp_tei-5,18-5)	-0.0161	0.0002	<.0001
vratiotmptei_CPre_pw3				median(0,ratio_tmp_tei-18,47-18)	-0.0110	0.0001	<.0001
vratiotmptei_CPre_pw4				median(0,ratio_tmp_tei-47,100-47)	0.0050	0.0004	<.0001
vdeltaUEinit_CPre_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-0,88-0)	0.0027	0.0001	<.0001
vdeltaUEinit_CPre_pw2				median(0,deltaUEinit_r-88,96-88)	0.0121	0.0002	<.0001
vdeltaUEinit_CPre_pw4				median(0,deltaUEinit_r-100,126-100)	0.0074	0.0001	<.0001
vdeltaUEinit_CPre_pw5				median(0,deltaUEinit_r-126,200-126)	0.0028	0.0000	<.0001
mpriordef_cpre* mtimesinceD_CPRE	**L01**	**L01**	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	-0.3899	0.0049	<.0001
mpriordef_cpre* mtimesinceD_CPRE	**L01**	**L02**		prior_default_cnt = 1; cx_time = 2	-0.4209	0.0056	<.0001
mpriordef_cpre* mtimesinceD_CPRE	**L01**	**L03**		prior_default_cnt = 1; cx_time = 3	-0.4253	0.0062	<.0001
mpriordef_cpre* mtimesinceD_CPRE	**L01**	**L04**		prior_default_cnt = 1; cx_time = 4	-0.3705	0.0067	<.0001
mpriordef_cpre* mtimesinceD_CPRE	**L01**	**L05**		prior_default_cnt = 1; cx_time = 5	-0.3494	0.0070	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_cpre* mtimesinceD_CPRE	L01	L06		prior_default_cnt = 1; cx_time = 6	-0.3419	0.0075	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L01	L07		prior_default_cnt = 1; cx_time >= 7	-0.3145	0.0037	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L01		prior_default_cnt = 2; cx_time <= 1	-0.6128	0.0075	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L02		prior_default_cnt = 2; cx_time = 2	-0.6581	0.0089	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L03		prior_default_cnt = 2; cx_time = 3	-0.6288	0.0101	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L04		prior_default_cnt = 2; cx_time = 4	-0.5174	0.0107	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L05		prior_default_cnt = 2; cx_time = 5	-0.4645	0.0114	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L06		prior_default_cnt = 2; cx_time = 6	-0.4693	0.0124	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L02	L07		prior_default_cnt = 2; cx_time >= 7	-0.4348	0.0050	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L01		prior_default_cnt >= 3; cx_time <= 1	-0.7624	0.0055	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L02		prior_default_cnt >= 3; cx_time = 2	-0.8177	0.0069	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L03		prior_default_cnt >= 3; cx_time = 3	-0.7400	0.0077	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L04		prior_default_cnt >= 3; cx_time = 4	-0.5810	0.0082	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L05		prior_default_cnt >= 3; cx_time = 5	-0.5200	0.0088	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L06		prior_default_cnt >= 3; cx_time = 6	-0.5085	0.0097	<.0001
mpriordef_cpre* mtimesinceD_CPRE	L03	L07		prior_default_cnt >= 3; cx_time >= 7	-0.4509	0.0045	<.0001
vtimesinced_CPre_pw1			Variate piecewise of prior_default_cnt	median(0,cx_time-7,19-7)	0.0068	0.0005	<.0001
vtimesinced_CPre_pw2				median(0,cx_time-19,35-19)	0.0082	0.0005	<.0001
vloanraw_CPRE_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,57000-0)	1.E-05	1.E-07	<.0001
vloanraw_CPRE_pw2				median(0,loansize_raw-57000,159000-57000)	6.E-06	2.E-08	<.0001
vloanraw_CPRE_pw3				median(0,loansize_raw-159000,345000-159000)	3.E-06	1.E-08	<.0001
vloanraw_CPRE_pw4				median(0,loansize_raw-345000,600000-345000)	2.E-06	2.E-08	<.0001
mDeltaTY1Init_CPRE	L01		Categorical of DeltaTy1Init (Change in 1 yr Treasury policy inception to current)	DeltaTy1Init < 0.17	-0.2235	0.0019	<.0001
mDeltaTY1Init_CPRE	L02			DeltaTY1Init > 2.30	0.1934	0.0015	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.1014	0.0020	<.0001
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.1580	0.0017	<.0001
v_UE_CW_growthQ_lag2_pw1				max(0.4,UE_CW_growthQ_lag2)	0.1666	0.0016	<.0001
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	-4.2270	0.0267	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
v_MTG_RATE30Y_lag4_CPRE_pw1			Variate piecewise of 30 year mortgate rate with 4Q lag	min(MTG_RATE30Y_lag4,5.5)	0.1650	0.0014	<.0001
v_MTG_RATE30Y_lag4_CPRE_pw2				median(0,MTG_RATE30Y_lag4 - 5.5, 6.5-5.5)	0.3294	0.0024	<.0001
v_MTG_RATE30Y_lag4_CPRE_pw3				max(MTG_RATE30Y_lag4,6.5)	-0.2013	0.0013	<.0001

Current Transition Model Parameters – FRM30NSR C_CXS

The model parameters for the FRM30NSR current to self-cure transition are shown below.

Table 32: Current to Self-Cure Transition FRM30NSR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-3.6020	0.0178	<.0001
mseason	1		Categorical of season	season = "winter"	0.3818	0.0023	<.0001
mseason	2			season = "spring"	-0.2350	0.0025	<.0001
mseason	3			season = "summer"	-0.0114	0.0024	<.0001
mfrst_tm_by	1		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.0600	0.0018	<.0001
mdpa_govt	LGovt		Categorical of dpa (down payment assistance)	dpa = "govt"	0.0811	0.0051	<.0001
mdpa_rel	LRela			dpa = "Relative"	0.0866	0.0021	<.0001
mcalperiod_CCXS	L200604		Categorical of Calendar Period	if period < 200604 then mcalperiod_CCXS = "L200604"	-2.6242	0.0053	<.0001
vpriordef_CCXS_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.1012	0.0006	<.0001
mperiodnbr_cCXS	L02		Categorical of period_number	period_number = 2	-0.1488	0.0054	<.0001
mperiodnbr_cCXS	L03			period_number = 3	0.1062	0.0048	<.0001
mperiodnbr_cCXS	L04			period_number = 4	0.1619	0.0047	<.0001
mperiodnbr_cCXS	L05			period_number = 5	0.1686	0.0046	<.0001
mperiodnbr_cCXS	L06			period_number = 6	0.1839	0.0045	<.0001
mperiodnbr_cCXS	L07			period_number = 7	0.1175	0.0046	<.0001
vperiodnbr_CCXS_pw1			Variate piecewise of period_number	median(0,period_number-8,36-8)	-0.0248	0.0001	<.0001
vperiodnbr_CCXS_pw2				median(0,period_number-36,53-36)	-0.0118	0.0003	<.0001
vperiodnbr_CCXS_pw3				median(0,period_number-53,76-53)	-0.0128	0.0003	<.0001
vperiodnbr_CCXS_pw4				median(0,period_number-76,86-76)	-0.0166	0.0010	<.0001
vcredit_CCXS_pw1			Variate piecewise of credit_score	median(0,credit_score-450,500-450)	-0.0011	0.0001	<.0001
vcredit_CCXS_pw3				median(0,credit_score-630,680-630)	-0.0063	0.0001	<.0001
vcredit_CCXS_pw4				median(0,credit_score-680,800-680)	-0.0081	0.0001	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mRatioTmpTei_CCXS	L00		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.1134	0.0101	<.0001
vratiotmptei_CCXS_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-5,30-5)	0.0079	0.0002	<.0001
vratiotmptei_CCXS_pw2				median(0,ratio_tmp_tei-30,45-30)	0.0036	0.0003	<.0001
vratiotmptei_CCXS_pw3				median(0,ratio_tmp_tei-45,57-45)	-0.0097	0.0020	<.0001
vhpa2yb_CCXS_pw2			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-105,117-105)	-0.0046	0.0002	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	2.3765	0.0035	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L02		prior_default_cnt = 1; cx_time = 2	2.1108	0.0044	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L03		prior_default_cnt = 1; cx_time = 3	1.8450	0.0056	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L04		prior_default_cnt = 1; cx_time = 4	1.7241	0.0065	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L05		prior_default_cnt = 1; cx_time = 5	1.4119	0.0084	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L06		prior_default_cnt = 1; cx_time = 6	1.2412	0.0098	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L07		prior_default_cnt = 1; cx_time = 7	1.2042	0.0108	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L01	L08		prior_default_cnt = 1; cx_time >=8	1.1829	0.0069	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L01		prior_default_cnt = 2; cx_time <= 1	2.8528	0.0040	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L02		prior_default_cnt = 2; cx_time = 2	2.5680	0.0053	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L03		prior_default_cnt = 2; cx_time = 3	2.2609	0.0070	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L04		prior_default_cnt = 2; cx_time = 4	2.1255	0.0084	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L05		prior_default_cnt = 2; cx_time = 5	1.7719	0.0111	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L06		prior_default_cnt = 2; cx_time = 6	1.6147	0.0130	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L07		prior_default_cnt = 2; cx_time = 7	1.5356	0.0148	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L02	L08		prior_default_cnt = 2; cx_time >=8	1.3982	0.0086	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L01		prior_default_cnt >= 3; cx_time <= 1	3.1586	0.0032	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L02		prior_default_cnt >= 3; cx_time = 2	2.7966	0.0039	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L03		prior_default_cnt >= 3; cx_time = 3	2.4450	0.0049	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L04		prior_default_cnt >= 3; cx_time = 4	2.2811	0.0058	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L05		prior_default_cnt >= 3; cx_time = 5	1.8730	0.0077	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L06		prior_default_cnt >= 3; cx_time = 6	1.6779	0.0092	<.0001
mpriordef_ccxs* mtimesinceD_CCXS	L03	L07		prior_default_cnt >= 3; cx_time = 7	1.5902	0.0104	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_ccxs* mtimesinceD_CCXS	**L03**	**L08**		prior_default_cnt >= 3; cx_time >=8	1.3933	0.0074	<.0001
vtimesinced_CCXS_pw1			Variate piecwise of cx_time[1]	median(0,cx_time-8,13-8)	-0.0895	0.0018	<.0001
vtimesinced_CCXS_pw2				median(0,cx_time-13,40-13)	-0.0219	0.0007	<.0001
vloanraw_CCXS_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,57000-0)	-9.E-06	2.E-07	<.0001
vloanraw_CCXS_pw2				median(0,loansize_raw-57000,159000-57000)	-2.E-06	3.E-08	<.0001
vdeltaUEinit_CCXS_pw2			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-100,200-100)	0.0011	0.0000	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.2428	0.0029	<.0001
v_UE_CW_growthQ_lag2_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0919	0.0034	<.0001
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	5.3610	0.0577	<.0001
v_TR1Q_lag1_CCXS_pw1			Variate piecewise of quarterly treature rate with 1Q lag	min(TR1Q_lag1,2.5)	0.0703	0.0011	<.0001
v_TR1Q_lag1_CCXS_pw2				max(TR1Q_lag1,2.5)	0.0943	0.0019	<.0001
v_TR1Q_growthY_lag1_CCXS_pw2			Variate piecewise of quarterly treature rate yearly growth with 1Q lag	max(TR1Q_growthY_lag1,5)	0.1193	0.0005	<.0001

Current Transition Model Parameters – FRM30NSR C_D

The model parameters for the FRM30NSR current to default transition are shown below.

Table 33: Current to Default Transition FRM30NSR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-3.4348	0.0109	<.0001
mseason	**1**		Categorical of season	season = "winter"	-0.2488	0.0011	<.0001
mseason	**2**			season = "spring"	-0.3947	0.0012	<.0001
mseason	**3**			season = "summer"	-0.1946	0.0011	<.0001
mjudicial	**1**		Categorical of judicial (judicial state)	judicial = 1 (yes)	0.0356	0.0008	<.0001
mycslope_CD	**L01**		Categorical of ycslope_r9 (Yield Curve Slope)	100<=ycslope_r9<=200	-0.2209	0.0014	<.0001
mfrst_tm_by	**1**		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.0603	0.0011	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mrfnc_ind	**2**		Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind = "N"	0.0639	0.0016	<.0001
mcalperiod_CD	**L200604**		Categorical of Calendar Period	period < 200604	-1.0918	0.0019	<.0001
mperiodnbr_CD	**L02**		Categorical of period_number	period_number = 2	-0.4017	0.0026	<.0001
mperiodnbr_CD	**L03**			period_number = 3	-0.0146	0.0023	<.0001
mperiodnbr_CD	**L04**			period_number = 4	0.0684	0.0023	<.0001
mperiodnbr_CD	**L05**			period_number = 5	0.0956	0.0024	<.0001
mperiodnbr_CD	**L06**			period_number = 6	0.1072	0.0024	<.0001
mperiodnbr_CD	**L07**			period_number = 7	0.0704	0.0026	<.0001
vperiodnbr_CD_pw1			Variate piecewise of period_number	median(0,period_number-8,40-8)	-0.0194	0.0001	<.0001
vperiodnbr_CD_pw2				median(0,period_number-40,53-40)	-0.0128	0.0002	<.0001
vperiodnbr_CD_pw3				median(0,period_number-53,68-53)	-0.0218	0.0007	<.0001
vperiodnbr_CD_pw4				median(0,period_number-68,108-68)	-0.0115	0.0007	<.0001
vcredit_CD_pw1			Variate piecewise of credit_score	median(0,credit_score-450,530-450)	0.0028	0.0000	<.0001
vcredit_CD_pw2				median(0,credit_score-530,630-530)	-0.0027	0.0000	<.0001
vcredit_CD_pw3				median(0,credit_score-630,680-630)	-0.0083	0.0000	<.0001
vcredit_CD_pw4				median(0,credit_score-680,720-680)	-0.0093	0.0001	<.0001
vcredit_CD_pw5				median(0,credit_score-720,760-720)	-0.0080	0.0001	<.0001
vcredit_CD_pw6				median(0,credit_score-760,800-760)	-0.0107	0.0002	<.0001
vdeltaUEinit_CD_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-50,100-50)	0.0029	0.0000	<.0001
vdeltaUEinit_CD_pw2				median(0,deltaUEinit_r-100,200-100)	0.0033	0.0000	<.0001
mRatioTmpTei_cd	**L00**		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.4075	0.0044	<.0001
vratiotmptei_CD_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0172	0.0001	<.0001
vratiotmptei_CD_pw2				median(0,ratio_tmp_tei-24,36-24)	0.0125	0.0001	<.0001
vpriordef_CD_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.0602	0.0004	<.0001
mperiodnbr_CD* mpriordef_ind	**L02**	**L01**	Interaction of categorical period number and categorical prior default count	period number =2; prior_default_cnt NE 0	-0.7536	0.1796	<.0001
mperiodnbr_CD* mpriordef_ind	**L03**	**L01**		period number =3; prior_default_cnt NE 0	-0.5158	0.0113	<.0001
mperiodnbr_CD* mpriordef_ind	**L04**	**L01**		period number =4; prior_default_cnt NE 0	-0.2632	0.0068	<.0001
mperiodnbr_CD* mpriordef_ind	**L05**	**L01**		period number =5; prior_default_cnt NE 0	-0.1463	0.0054	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mperiodnbr_CD* mpriordef_ind	**L06**	**L01**		period number =6; prior_default_cnt NE 0	-0.0803	0.0049	<.0001
mperiodnbr_CD* mpriordef_ind	**L07**	**L01**		period number =7; prior_default_cnt NE 0	-0.0355	0.0047	<.0001
vperiodnbr_CD_pw1* mpriordef_ind	**L01**		Interaction of variate of piecewise of period_number and categorical of prior_default_cnt	period number piecewise; prior_default_cnt NE 0	0.0057	0.0001	<.0001
vperiodnbr_CD_pw1* mpriordef_ind	**L01**			period number piecewise; prior_default_cnt NE 0	0.0169	0.0007	<.0001
vperiodnbr_CD_pw1* mpriordef_ind	**L01**			period number piecewise; prior_default_cnt NE 0	0.0097	0.0007	<.0001
vsato_cd_pw2			Variate piecewise of sato (spread at origination)	median(0,sato-(-.1),.7-(-.1))	0.2841	0.0015	<.0001
vsato_cd_pw3				median(0,sato-.7,2.5-.7)	0.2582	0.0028	<.0001
vltv_CD_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-25,70-25)	0.0049	0.0001	<.0001
vltv_CD_pw2				median(0,ltv_i_r-70,88-70)	0.0068	0.0001	<.0001
vltv_CD_pw3				median(0,ltv_i_r-88,97-88)	0.0222	0.0002	<.0001
mhpa2yb_CD	**L00**		Categorical of hpa2y_blended_r6	hpa2y_blended_r = 0	-1.4365	0.0108	<.0001
vhpa2yb_CD_pw1			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-50,85-50)	-0.0085	0.0002	<.0001
vhpa2yb_CD_pw2				median(0,hpa2y_blended_r-85,100-85)	-0.0087	0.0001	<.0001
vhpa2yb_CD_pw3				median(0,hpa2y_blended_r-100,125-100)	-0.0049	0.0001	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L01**	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	2.4098	0.0023	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L02**		prior_default_cnt = 1; cx_time = 2	2.1746	0.0025	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L03**		prior_default_cnt = 1; cx_time = 3	1.9590	0.0029	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L04**		prior_default_cnt = 1; cx_time = 4	1.6576	0.0035	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L05**		prior_default_cnt = 1; cx_time = 5	1.4673	0.0040	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L06**		prior_default_cnt = 1; cx_time = 6	1.3073	0.0046	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L07**		prior_default_cnt = 1; cx_time = 7	1.2320	0.0051	<.0001
mpriordef_CD* mtimesinceD_CD	**L01**	**L08**		prior_default_cnt = 1; cx_time >=8	1.0623	0.0032	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L01**		prior_default_cnt = 2; cx_time <= 1	2.8151	0.0025	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L02**		prior_default_cnt = 2; cx_time = 2	2.5581	0.0031	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L03**		prior_default_cnt = 2; cx_time = 3	2.3429	0.0037	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L04**		prior_default_cnt = 2; cx_time = 4	2.0177	0.0046	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L05**		prior_default_cnt = 2; cx_time = 5	1.7957	0.0055	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L06**		prior_default_cnt = 2; cx_time = 6	1.6263	0.0063	<.0001
mpriordef_CD* mtimesinceD_CD	**L02**	**L07**		prior_default_cnt = 2; cx_time = 7	1.5118	0.0072	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CD* mtimesinceD_CD	**L02**	**L08**		prior_default_cnt = 2; cx_time >=8	1.2440	0.0042	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L01**		prior_default_cnt >= 3; cx_time <= 1	3.0741	0.0023	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L02**		prior_default_cnt >= 3; cx_time = 2	2.7834	0.0026	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L03**		prior_default_cnt >= 3; cx_time = 3	2.5263	0.0030	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L04**		prior_default_cnt >= 3; cx_time = 4	2.1582	0.0036	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L05**		prior_default_cnt >= 3; cx_time = 5	1.9161	0.0042	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L06**		prior_default_cnt >= 3; cx_time = 6	1.7202	0.0048	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L07**		prior_default_cnt >= 3; cx_time = 7	1.5907	0.0054	<.0001
mpriordef_CD* mtimesinceD_CD	**L03**	**L08**		prior_default_cnt >= 3; cx_time >=8	1.2356	0.0036	<.0001
vtimesinced_CD_pw1			Variate piecewise of cx_time[1]	median(0,cx_time-8,24-8)	-0.0558	0.0003	<.0001
vtimesinced_CD_pw2				median(0,cx_time-24,40-24)	-0.0069	0.0007	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.4565	0.0014	<.0001
v_UE_CW_growthQ_lag1 _pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.2087	0.0014	<.0001
v_UE_CW_growthQ_lag2 _pw1			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0130	0.0015	<.0001
v_UE_CW_growthQ_lag2 _pw2				min(UE_CW_growthQ_lag2, -0.2)	-0.8848	0.0263	<.0001
v_TR1Q_CD_pw1			Variate piecewise quarterly treature rate	min(TR1Q,3)	0.1878	0.0008	<.0001
v_TR1Q_CD_pw2				max(TR1Q,3)	-0.0645	0.0010	<.0001

Current Transition Model Parameters – FRM30SR C_CXS

The model parameters for the FRM30SR current to self-cure transition are shown below.

Table 34: Current to Self-Cure Transition FRM30SR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-5.8778	0.0604	<.0001
mseason	**1**		Categorical of season	season = "winter"	0.2842	0.0054	<.0001
mseason	**2**			season = "spring"	-0.2306	0.0059	<.0001
mseason	**3**			season = "summer"	0.0292	0.0057	<.0001
mcalperiod_CCXS	**L199501**			period < 199501	-4.1205	0.0615	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mcalperiod_CCXS	L200104		Categorical of Calendar Period	period < 200104	-3.6068	0.0225	<.0001
mcalperiod_CCXS	L200604			period < 200604	-2.0271	0.0149	<.0001
mltv	L00		Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r=.	0.1621	0.0125	<.0001
mperiodnbr_CCXS	L03		Categorical of period_number	period_number = 3	0.0865	0.0114	<.0001
mperiodnbr_CCXS	L04			period_number = 4	0.1091	0.0111	<.0001
mperiodnbr_CCXS	L05			period_number = 5	0.0914	0.0111	<.0001
mperiodnbr_CCXS	L06			period_number = 6	0.0762	0.0110	<.0001
vperiodnbr_CCXS_pw1			Variate piecewise of period_number	median(0,period_number-8,30-8)	-0.0222	0.0004	<.0001
vperiodnbr_CCXS_pw2				median(0,period_number-30,54-30)	-0.0091	0.0005	<.0001
vperiodnbr_CCXS_pw3				median(0,period_number-54,70-54)	-0.0123	0.0011	<.0001
vperiodnbr_CCXS_pw4				median(0,period_number-70,100-70)	-0.0103	0.0012	<.0001
mcredit_score_CCXS	L00		Categorical of credit_score	credit_score=0	-0.2941	0.0175	<.0001
vcredit_CCXS_pw1			Variate piecewise of credit_score	median(0,credit_score-525,680-525)	-0.0018	0.0002	<.0001
vcredit_CCXS_pw2				median(0,credit_score-680,745-680)	-0.0084	0.0004	<.0001
vcredit_CCXS_pw3				median(0,credit_score-745,800-745)	-0.0109	0.0011	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	2.4020	0.0082	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L02		prior_default_cnt = 1; cx_time = 2	2.1163	0.0105	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L03		prior_default_cnt = 1; cx_time = 3	1.8815	0.0132	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L04		prior_default_cnt = 1; cx_time = 4	1.7751	0.0152	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L05		prior_default_cnt = 1; cx_time = 5	1.5090	0.0189	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L06		prior_default_cnt = 1; cx_time = 6	1.3580	0.0216	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L07		prior_default_cnt = 1; cx_time = 7	1.3356	0.0236	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L08		prior_default_cnt = 1; cx_time = 8	1.2131	0.0263	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L09		prior_default_cnt = 1; cx_time = 9	1.0888	0.0301	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L10		prior_default_cnt = 1; cx_time = 10	1.0413	0.0325	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L11		prior_default_cnt = 1; cx_time = 11	1.0860	0.0341	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L12		prior_default_cnt = 1; cx_time = 12	0.9934	0.0375	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L13		prior_default_cnt = 1; cx_time >= 13	0.7441	0.0157	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L01		prior_default_cnt = 2; cx_time <= 1	2.9881	0.0094	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L02		prior_default_cnt = 2; cx_time = 2	2.7213	0.0123	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CCXS* mtimesinceD_CCXS	L02	L03		prior_default_cnt = 2; cx_time = 3	2.4072	0.0164	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L04		prior_default_cnt = 2; cx_time = 4	2.2829	0.0194	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L05		prior_default_cnt = 2; cx_time = 5	1.9128	0.0257	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L06		prior_default_cnt = 2; cx_time = 6	1.8070	0.0293	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L07		prior_default_cnt = 2; cx_time = 7	1.7613	0.0328	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L08		prior_default_cnt = 2; cx_time = 8	1.5985	0.0381	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L09		prior_default_cnt = 2; cx_time = 9	1.3980	0.0453	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L10		prior_default_cnt = 2; cx_time = 10	1.5018	0.0460	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L11		prior_default_cnt = 2; cx_time = 11	1.4676	0.0500	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L12		prior_default_cnt = 2; cx_time = 12	1.2292	0.0594	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L13		prior_default_cnt = 2; cx_time >= 13	1.0021	0.0239	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L01		prior_default_cnt >= 3; cx_time <= 1	3.2638	0.0085	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L02		prior_default_cnt >= 3; cx_time = 2	2.8980	0.0100	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L03		prior_default_cnt >= 3; cx_time = 3	2.5512	0.0123	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L04		prior_default_cnt >= 3; cx_time = 4	2.3794	0.0144	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L05		prior_default_cnt >= 3; cx_time = 5	2.0096	0.0184	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L06		prior_default_cnt >= 3; cx_time = 6	1.8373	0.0215	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L07		prior_default_cnt >= 3; cx_time = 7	1.7609	0.0244	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L08		prior_default_cnt >= 3; cx_time = 8	1.6259	0.0278	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L09		prior_default_cnt >= 3; cx_time = 9	1.4709	0.0323	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L10		prior_default_cnt >= 3; cx_time = 10	1.3955	0.0357	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L11		prior_default_cnt >= 3; cx_time = 11	1.2949	0.0403	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L12		prior_default_cnt >= 3; cx_time = 12	1.1494	0.0458	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L13		prior_default_cnt >= 3; cx_time >= 13	0.9120	0.0203	<.0001
vpriordef_CCXS_pw1			Variate of prior_default_cnt	median(0,prior_default_cnt-2,10-2)	0.1104	0.0019	<.0001
vpriordef_CCXS_pw2				median(0,prior_default_cnt-10,15-10)	0.0973	0.0054	<.0001
vhpa2yb_CCXS_pw1			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r6-85,130-85)	-0.0056	0.0003	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vratiotmptei_CCXS_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-5,30-5)	-0.0032	0.0003	<.0001
vltv_CCXS_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-78,85-78)	0.0073	0.0009	<.0001
vltv_CCXS_pw3				median(0,ltv_i_r-88,92-88)	-0.0092	0.0020	<.0001
vltv_CCXS_pw4				median(0,ltv_i_r-92,95-92)	0.0710	0.0031	<.0001
vloanraw_ccxs_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,57000-0)	-4.E-06	8.E-07	<.0001
vloanraw_ccxs_pw2				median(0,loansize_raw-57000,159000-57000)	-2.E-06	7.E-08	<.0001
vdeltaUEinit_CCXS_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-20,95-20)	0.0034	0.0001	<.0001
vSBOI_CCXS_pw1			Variate piecewise of small business optimism index	median(0,mSBOI-85,100-85)	-0.0239	0.0008	<.0001
vSBOI_CCXS_pw2				median(0,mSBOI-100,108-100)	0.0364	0.0015	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of SBOI (small business optimism index)	median(0,mSBOI-85,100-85)	0.3022	0.0068	<.0001
v_UE_CW_growthQ_lag2_pw2			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	min(UE_CW_growthQ_lag2, -0.2)	3.6813	0.1410	<.0001
v_TR1Q_lag1_CCXS_pw1			Variate piecewise of quarterly treature rate with 1 quarter lag	min(TR1Q_lag1,2.5)	0.0539	0.0037	<.0001
v_TR1Q_lag1_CCXS_pw2				max(TR1Q_lag1,2.5)	0.3610	0.0053	<.0001
v_TR1Q_growthY_lag1_CCXS_pw1			Variate piecewise of quarterly treature rate yearly growth with 1 quarter lag	min(TR1Q_growthY_lag1,5)	-0.0153	0.0015	<.0001
v_TR1Q_growthY_lag1_CCXS_pw2				max(TR1Q_growthY_lag1,5)	0.1671	0.0014	<.0001

Current Transition Model Parameters – FRM30SR C_D

The model parameters for the FRM30SR current to default transition are shown below.

Table 35: Current to Default Transition FRM30SR Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-5.4973	0.0420	<.0001
mseason	**1**		Categorical of season	season = "winter"	-0.2065	0.0026	<.0001
mseason	**2**			season = "spring"	-0.3399	0.0026	<.0001
mseason	**3**			season = "summer"	-0.1498	0.0026	<.0001
mjudicial	**1**		Categorical of judicial (judicial state)	judicial = 1 (yes)	0.0273	0.0019	<.0001
mcalperiod_CD	**L199504**			period < 199504	-2.3470	0.0117	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mcalperiod_CD	L200104		Categorical of Calendar Period	period < 200104	-1.8532	0.0075	<.0001
mcalperiod_CD	L200604			period < 200604	-0.5894	0.0046	<.0001
mperiodnbr_CD	L02		Categorical of period_number	period_number = 2	-0.2448	0.0053	<.0001
mperiodnbr_CD	L03			period_number = 3	0.0182	0.0048	0.0001
vperiodnbr_CD_pw1			Variate piecewise of period_number	median(0,period_number-3,45-3)	-0.0176	0.0001	<.0001
vperiodnbr_CD_pw2				median(0,period_number-45,70-45)	-0.0070	0.0003	<.0001
vperiodnbr_CD_pw3				median(0,period_number-70,108-70)	-0.0108	0.0005	<.0001
Mcredit_score_CD	L00		Categorical of credit_score	credit_score=0	-0.2831	0.0068	<.0001
vcredit_CD_pw1			Variate piecewise of credit_score	median(0,credit_score-600,630-600)	-0.0013	0.0003	<.0001
vcredit_CD_pw2				median(0,credit_score-630,680-630)	-0.0060	0.0002	<.0001
vcredit_CD_pw3				median(0,credit_score-680,745-680)	-0.0078	0.0002	<.0001
vcredit_CD_pw4				median(0,credit_score-745,800-745)	-0.0129	0.0005	<.0001
vratiotmptei_CD_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	-0.0081	0.0002	<.0001
vratiotmptei_CD_pw2				median(0,ratio_tmp_tei-24,36-24)	0.0187	0.0005	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	2.4586	0.0040	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L02		prior_default_cnt = 1; cx_time = 2	2.2222	0.0049	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L03		prior_default_cnt = 1; cx_time = 3	2.0345	0.0059	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L04		prior_default_cnt = 1; cx_time = 4	1.7733	0.0073	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L05		prior_default_cnt = 1; cx_time = 5	1.5982	0.0086	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L06		prior_default_cnt = 1; cx_time = 6	1.4603	0.0099	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L07		prior_default_cnt = 1; cx_time = 7	1.3768	0.0109	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L08		prior_default_cnt = 1; cx_time = 8	1.2473	0.0124	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L09		prior_default_cnt = 1; cx_time = 9	1.1633	0.0137	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L10		prior_default_cnt = 1; cx_time = 10	1.0917	0.0151	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L11		prior_default_cnt = 1; cx_time = 11	1.0302	0.0166	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L12		prior_default_cnt = 1; cx_time = 12	0.9772	0.0181	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L13		prior_default_cnt = 1; cx_time >= 13	0.9462	0.0110	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L01		prior_default_cnt = 2; cx_time <= 1	2.9968	0.0048	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L02		prior_default_cnt = 2; cx_time = 2	2.7478	0.0061	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L03		prior_default_cnt = 2; cx_time = 3	2.5593	0.0076	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CD* mtimesinceD_CD	L02	L04		prior_default_cnt = 2; cx_time = 4	2.2495	0.0097	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L05		prior_default_cnt = 2; cx_time = 5	2.0780	0.0115	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L06		prior_default_cnt = 2; cx_time = 6	1.8845	0.0137	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L07		prior_default_cnt = 2; cx_time = 7	1.8257	0.0153	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L08		prior_default_cnt = 2; cx_time = 8	1.6468	0.0180	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L09		prior_default_cnt = 2; cx_time = 9	1.5342	0.0204	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L10		prior_default_cnt = 2; cx_time = 10	1.4677	0.0226	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L11		prior_default_cnt = 2; cx_time = 11	1.3641	0.0254	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L12		prior_default_cnt = 2; cx_time = 12	1.2940	0.0280	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L13		prior_default_cnt = 2; cx_time >= 13	1.2146	0.0141	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L01		prior_default_cnt >= 3; cx_time <= 1	3.2273	0.0044	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L02		prior_default_cnt >= 3; cx_time = 2	2.9464	0.0051	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L03		prior_default_cnt >= 3; cx_time = 3	2.7189	0.0059	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L04		prior_default_cnt >= 3; cx_time = 4	2.3721	0.0073	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L05		prior_default_cnt >= 3; cx_time = 5	2.1546	0.0088	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L06		prior_default_cnt >= 3; cx_time = 6	1.9764	0.0103	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L07		prior_default_cnt >= 3; cx_time = 7	1.8600	0.0117	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L08		prior_default_cnt >= 3; cx_time = 8	1.6610	0.0139	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L09		prior_default_cnt >= 3; cx_time = 9	1.5314	0.0158	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L10		prior_default_cnt >= 3; cx_time = 10	1.4216	0.0178	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L11		prior_default_cnt >= 3; cx_time = 11	1.3977	0.0193	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L12		prior_default_cnt >= 3; cx_time = 12	1.2544	0.0221	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L13		prior_default_cnt >= 3; cx_time >= 13	1.1364	0.0127	<.0001
vtimesinced_CD_pw1			Variate piecwise of cx_time[1]	median(0,cx_time-12,24-12)	-0.0245	0.0015	<.0001
vtimesinced_CD_pw2				median(0,cx_time-24,40-24)	-0.0108	0.0017	<.0001
vpriordef_CD_pw1			Variate of prior_default_cnt	median(0,prior_default_cnt-2,10-2)	0.1178	0.0009	<.0001
vsato_cd_pw1			Variate piecewise of sato (spread at origination)	median(-2,sato,0)	-0.0184	0.0048	0.0001
vsato_cd_pw2				median(sato,0,2)	0.2717	0.0033	<.0001
vdeltaUEinit_CD_pw1			Variate piecewise of DeltaUEInit_r[4]	median(0,deltaUEinit_r-100,200-100)	0.0033	0.0000	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
			(change in unemployment rate from policy inception to current)				
vUEblend_CD_pw1			Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r-400,1000-400)	0.0003	0.0000	<.0001
mltv	**L00**		Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r=.	0.0827	0.0056	<.0001
vltv_CD_pw2			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-62,84-62)	0.0037	0.0002	<.0001
vltv_CD_pw3				median(0,ltv_i_r-86,92-86)	0.0210	0.0006	<.0001
vltv_CD_pw4				median(0,ltv_i_r-92,95-92)	0.0767	0.0015	<.0001
vltv_CD_pw5				median(0,ltv_i_r-95,97-95)	0.0765	0.0031	<.0001
vltv_CD_pw6				median(0,ltv_i_r-97,100-97)	0.0382	0.0053	<.0001
vhpa2yb_CD_pw1			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-0,85-0)	0.0034	0.0003	<.0001
vhpa2yb_CD_pw2				median(0,hpa2y_blended_r-85,95-85)	-0.0167	0.0005	<.0001
vhpa2yb_CD_pw3				median(0,hpa2y_blended_r-95,113-95)	-0.0098	0.0003	<.0001
vhpa2yb_CD_pw4				median(0,hpa2y_blended_r-113,118-113)	-0.0103	0.0008	<.0001
vhpa2yb_CD_pw5				median(0,hpa2y_blended_r-118,130-118)	-0.0114	0.0005	<.0001
vSBOI_CD_pw1			Variate piecewise of SBOI (small business optimism index)	median(0,mSBOI-85,100-85)	0.0017	0.0006	0.0059
vSBOI_cd_pw2				median(0,mSBOI-100,108-100)	0.0030	0.0007	<.0001
vCCI_CD_pw1			Variate piecewise of CCI (consumer confidence index)	median(0,mCCI-50,100-50)	-0.0046	0.0002	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.4022	0.0037	<.0001
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.2083	0.0036	<.0001
v_UE_CW_growthQ_lag2_pw1				max(0.4,UE_CW_growthQ_lag2)	0.0125	0.0039	0.0012
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	-1.5431	0.0635	<.0001
v_TR1Q_lag2_CD_pw1			Variate piecewise of quarterly treature rate with 2 quarter lag	min(TR1Q_lag2,3)	0.0600	0.0016	<.0001
v_TR1Q_lag2_CD_pw2				median(0,TR1Q_lag2 - 3, 4-3)	0.4353	0.0075	<.0001
v_TR1Q_lag2_CD_pw3				max(TR1Q_lag2,4)	0.3259	0.0069	<.0001

Current Transition Model Parameters – FRM30SR C_END

The model parameters for the FRM30SR current to end (refinance or payoff) transition are shown below.

Table 36: Current to End Transition FRM30SR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-7.4383	0.0378	<.0001
mseason	**1**	Categorical of season	season = "winter"	-0.1789	0.0022	<.0001
mseason	**2**		season = "spring"	0.0618	0.0021	<.0001
mseason	**3**		season = "summer"	0.0260	0.0021	<.0001
mcalperiod_CEND	**L200104**	Categorical of Calendar Period	period < 200104	0.2035	0.0034	<.0001
mcalperiod_CEND	**L200604**		period < 200604	0.6384	0.0029	<.0001
mycslope_CEND	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope>=9	-0.5225	0.0027	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.1898	0.0167	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.1136	0.0016	<.0001
mperiodnbr_cend	**L02**	Categorical of period_number	period_number <= 2	-1.0864	0.0053	<.0001
mperiodnbr_cend	**L03**		period_number = 3	-0.3004	0.0041	<.0001
mperiodnbr_cend	**L04**		period_number = 4	0.1144	0.0037	<.0001
mperiodnbr_cend	**L05**		period_number = 5	0.0972	0.0038	<.0001
mperiodnbr_cend	**L06**		period_number = 6	0.0440	0.0039	<.0001
mperiodnbr_cend	**L07**		period_number = 7	0.0446	0.0040	<.0001
vperiodnbr_cend_pw1		Variate piecewise of period_number	median(0,period_number-8,19-8)	0.0052	0.0003	<.0001
vperiodnbr_cend_pw2			median(0,period_number-19,31-19)	-0.0248	0.0003	<.0001
vperiodnbr_cend_pw3			median(0,period_number-31,40-31)	0.0146	0.0006	<.0001
vperiodnbr_cend_pw4			median(0,period_number-40,49-40)	-0.0599	0.0007	<.0001
vperiodnbr_cend_pw5			median(0,period_number-49,108-49)	-0.0029	0.0003	<.0001
vrefiincent_cend_pw1		Variate piecewise of refi_incent2_r[13] (refinance incentive)	median(0,refi_incent2_r-0,100-0)	0.0134	0.0002	<.0001
vrefiincent_cend_pw2			median(0,refi_incent2_r-100,120-100)	0.0451	0.0001	<.0001
vrefiincent_cend_pw3			median(0,refi_incent2_r-120,135-120)	0.0093	0.0002	<.0001
vrefiincent_cend_pw4			median(0,refi_incent2_r-135,155-135)	0.0075	0.0002	<.0001
vrefiincent_cend_pw5			median(0,refi_incent2_r-155,200-155)	-0.0024	0.0002	<.0001
mcredit_score_CEND	**L00**	Categorical of credit_score	credit_score=0	0.2548	0.0182	<.0001
vcredit_cend_pw2		Variate piecewise of credit_score	median(0,credit_score-500,630-500)	0.0016	0.0002	<.0001
vcredit_cend_pw3			median(0,credit_score-630,680-630)	0.0014	0.0002	<.0001
mtimesinceD_CEND	**L00**	Categorical of cx_time[1](time since default)	prior_default_cnt=0	0.3002	0.0058	<.0001
mtimesinceD_CEND	**L01**		cx_time <= 1	-0.4224	0.0087	<.0001
mtimesinceD_CEND	**L02**		cx_time = 2	-0.3737	0.0094	<.0001
mtimesinceD_CEND	**L03**		cx_time = 3	-0.2854	0.0099	<.0001
mtimesinceD_CEND	**L04**		cx_time <= 16	-0.0331	0.0064	<.0001
vhpa2yb_cend_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-0,90-0)	-0.0109	0.0001	<.0001
vhpa2yb_cend_pw2			median(0,hpa2y_blended_r-90,106-90)	0.0352	0.0003	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vhpa2yb_cend_pw3			median(0,hpa2y_blended_r-106,111-106)	0.0336	0.0007	<.0001
vhpa2yb_cend_pw4			median(0,hpa2y_blended_r-111,114-111)	0.0473	0.0011	<.0001
vhpa2yb_cend_pw5			median(0,hpa2y_blended_r-114,119-114)	0.0108	0.0007	<.0001
vhpa2yb_cend_pw6			median(0,hpa2y_blended_r-119,130-119)	0.0274	0.0003	<.0001
mRatioTmpTei_CEND	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.0713	0.0183	<.0001
vratiotmptei_cend_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,12-0)	-0.0145	0.0016	<.0001
vratiotmptei_cend_pw2			median(0,ratio_tmp_tei-12,35-12)	-0.0055	0.0003	<.0001
vdeltaUEinit_cend_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-65,78-65)	-0.0006	0.0002	0.0163
vdeltaUEinit_cend_pw2			median(0,deltaUEinit_r-78,90-78)	-0.0045	0.0003	<.0001
vdeltaUEinit_cend_pw3			median(0,deltaUEinit_r-90,97-90)	0.0218	0.0005	<.0001
vdeltaUEinit_cend_pw4			median(0,deltaUEinit_r-97,126-97)	0.0066	0.0001	<.0001
vdeltaUEinit_cend_pw5			median(0,deltaUEinit_r-126,150-126)	0.0054	0.0002	<.0001
vloanraw_cend_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,57000-0)	1.E-05	3.E-07	<.0001
vloanraw_cend_pw2			median(0,loansize_raw-57000,159000-57000)	7.E-06	3.E-08	<.0001
vloanraw_cend_pw3			median(0,loansize_raw-159000,345000-159000)	3.E-06	2.E-08	<.0001
vltv_cend_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,78-0)	-0.0035	0.0000	<.0001
vltv_cend_pw2			median(0,ltv_i_r-78,89-78)	0.0168	0.0003	<.0001
vltv_cend_pw3			median(0,ltv_i_r-89,92-89)	0.0068	0.0011	<.0001
vltv_cend_pw4			median(0,ltv_i_r-92,97-92)	0.0227	0.0009	<.0001
vltv_cend_pw5			median(0,ltv_i_r-97,100-97)	-0.0555	0.0045	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.1714	0.0032	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.0914	0.0029	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0454	0.0028	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-7.2020	0.0433	<.0001

Current Transition Model Parameters – FRM15 C_SR

The model parameters for the FRM15 current to streamlined refinance transition are shown below.

Table 37: Current to Streamlined Refinance Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-7.3977	0.1011	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (judicial state)	0.0250	0.0082	0.0023
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.4614	0.0186	<.0001
mdpa_comb13_CSR	**2**	Categorical of dpa (down payment assistance)	dpa= "nonprof"	0.7230	0.0397	<.0001
mdpa_comb13_CSR	**3**		dpa = "govt" or dpa = "relative"	-0.1056	0.0332	0.0015
mpriordef_CSR	**L01**	Categorical of prior default count	prior_default_cnt = 1	-0.1029	0.0185	<.0001
mpriordef_CSR	**L02**		prior_default_cnt = 2	-0.1723	0.0340	<.0001
mperiodnbr_CSR	**L02**	Categorical of period_number	period_number = 2	-0.9635	0.0354	<.0001
mperiodnbr_CSR	**L03**		period_number = 3	0.0659	0.0255	0.0097
mperiodnbr_CSR	**L04**		period_number = 4	0.5805	0.0221	<.0001
mperiodnbr_CSR	**L05**		period_number = 5	0.5868	0.0212	<.0001
mperiodnbr_CSR	**L06**		period_number = 6	0.5552	0.0213	<.0001
mperiodnbr_CSR	**L07**		period_number = 7	0.4836	0.0213	<.0001
mperiodnbr_CSR	**L08**		period_number = 8	0.3914	0.0216	<.0001
mperiodnbr_CSR	**L09**		period_number = 9	0.4087	0.0216	<.0001
mperiodnbr_CSR	**L10**		period_number = 10	0.3607	0.0222	<.0001
mperiodnbr_CSR	**L11**		period_number = 11	0.2479	0.0232	<.0001
mperiodnbr_CSR	**L12**		period_number = 12	0.1369	0.0239	<.0001
vperiodnbr_CSR_pw1		Variate piecewise of period_number	median(0,period_number-13,24-13)	-0.0574	0.0021	<.0001
vperiodnbr_CSR_pw2			median(0,period_number-24,43-24)	-0.1091	0.0021	<.0001
mcredit_score_CSR	**L00**	Categorical of credit_score	credit_score = 0	-0.4815	0.0341	<.0001
vcredit_CSR_pw1		Variate piecewise of credit_score	median(0,credit_score-500,650-500)	-0.0008	0.0002	0.0005
vcredit_CSR_pw2			median(0,credit_score-650,770-650)	-0.0024	0.0001	<.0001
vcredit_CSR_pw3			median(0,credit_score-770,800-770)	-0.0066	0.0009	<.0001
vdeltaUEinit_CSR_pw2		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-63,91-63)	0.0046	0.0007	<.0001
vdeltaUEinit_CSR_pw3			median(0,DeltaUEInit_R-91,99-91)	-0.0284	0.0025	<.0001
vdeltaUEinit_CSR_pw4			median(0,DeltaUEInit_R-99,104-99)	0.0940	0.0039	<.0001
vdeltaUEinit_CSR_pw6			median(0,DeltaUEInit_R-200,300-200)	-0.0022	0.0006	0.0002
vratiotmptei_CSR_pw2		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-11,16-11)	0.0209	0.0031	<.0001
vratiotmptei_CSR_pw3			median(0,ratio_tmp_tei-16,43-16)	0.0101	0.0007	<.0001
vratiotmptei_CSR_pw4			median(0,ratio_tmp_tei-43,50-43)	-0.0659	0.0101	<.0001
vltv_CSR_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,39-0)	-0.0042	0.0008	<.0001
vltv_CSR_pw2			median(0,ltv_i_R-39,93-39)	0.0062	0.0004	<.0001
vltv_CSR_pw3			median(0,ltv_i_R-93,100-93)	0.0854	0.0105	<.0001
vloanraw_CSR_pw1			median(0,loansize_raw-0,62400-0)	3.E-05	1.E-06	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vloanraw_CSR_pw2		Variate piecewise of loansize_raw	median(0,loansize_raw-62400,124000-62400)	1.E-05	3.E-07	<.0001
vloanraw_CSR_pw3			median(0,loansize_raw-124000,250000-124000)	5.E-06	1.E-07	<.0001
vloanraw_CSR_pw4			median(0,loansize_raw-250000,425000-250000)	6.E-07	2.E-07	0.0008
vhpa2yb_CSR_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-88,105-88)	-0.0067	0.0009	<.0001
vhpa2yb_CSR_pw3			median(0,hpa2y_blended_R-112,117-112)	-0.0079	0.0016	<.0001
vsato_csr_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-.4)	0.9340	0.0117	<.0001
vsato_csr_pw2			max(sato-.4,0)	0.1358	0.0386	0.0004
vDeltaTY1_CSR_pw1		Variate piecewise of DeltaTy1Init_r[3] (change in 1-year Treasury rate from policy inception to current)	median(0,DeltaTy1Init_R-0,73-0)	-0.0126	0.0003	<.0001
vDeltaTY1_CSR_pw2			median(0,DeltaTy1Init_R-73,150-73)	0.0013	0.0002	<.0001
mdeltaTy10Init_csr	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r >109	-0.9246	0.0135	<.0001
mycslope_CSR	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=218	-0.2393	0.0179	<.0001
vCCI_CSR_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0092	0.0009	<.0001
vCCI_CSR_pw2			median(0,CCI_r-75,110-75)	-0.0257	0.0008	<.0001
vCCI_CSR_pw3			median(0,CCI_r-110,134-110)	0.0344	0.0014	<.0001
vSBOI_CSR_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	0.0529	0.0032	<.0001
vSBOI_CSR_pw2			median(0,SBOI_r-95,100-95)	0.0707	0.0028	<.0001
m_product	**FRM15SR**	Categorical of product	product = "FRM15SR"	0.1638	0.0164	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.2588	0.0298	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.4195	0.0240	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.1740	0.0207	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-4.3920	0.3059	<.0001
v_CCI_growthQ_CSR_pw3		Variate piecewise of CCI quarterly growth	max(CCI_growthQ,0.2)	1.8783	0.0704	<.0001

Current Transition Model Parameters – FRM15 C_D

The model parameters for the FRM15 current to default transition are shown below.

Table 38: Current to Default Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-3.5433	0.0570	<.0001
mdpa	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	0.1682	0.0454	0.0002
mdpa	**2**		dpa= "nonprof"	0.2655	0.0139	<.0001
mdpa	**3**		dpa = "relative"	0.1120	0.0118	<.0001
mpriordef_CD	**L01**	Categorical of prior default count	prior_default_cnt = 1	2.0644	0.0061	<.0001
mpriordef_CD	**L02**		prior_default_cnt = 2	2.7447	0.0074	<.0001
mpriordef_CD	**L03**		prior_default_cnt >= 3	3.1191	0.0073	<.0001
vpriordef_CD_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.1654	0.0019	<.0001
mperiodnbr_CD	**L02**	Categorical of period_number	period_number = 2	-0.6521	0.0187	<.0001
mperiodnbr_CD	**L03**		period_number = 3	-0.3618	0.0165	<.0001
mperiodnbr_CD	**L04**		period_number = 4	-0.2369	0.0154	<.0001
vperiodnbr_CD_pw1		Variate piecewise of period_number	median(0,period_number-4,24-4)	-0.0319	0.0011	<.0001
vperiodnbr_CD_pw2			median(0,period_number-24,50-24)	-0.0254	0.0004	<.0001
vperiodnbr_CD_pw3			median(0,period_number-50,57-50)	0.0402	0.0024	<.0001
mcredit_score_CD	**L00**	Categorical of credit_score	credit_score = 0	-0.2755	0.0130	<.0001
vcredit_CD_pw1		Variate piecewise of credit_score	median(0,credit_score-500,650-500)	-0.0029	0.0001	<.0001
vcredit_CD_pw2			median(0,credit_score-650,800-650)	-0.0096	0.0001	<.0001
vloanraw_CD_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,62400-0)	-5.E-06	3.E-07	<.0001
vloanraw_CD_pw2			median(0,loansize_raw-62400,124000-62400)	-2.E-06	1.E-07	<.0001
vloanraw_CD_pw3			median(0,loansize_raw-124000,250000-124000)	-1.E-06	8.E-08	<.0001
vdeltaUEinit_CD_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-0,63-0)	0.0072	0.0005	<.0001
vdeltaUEinit_CD_pw2			median(0,DeltaUEInit_R-63,97-63)	0.0009	0.0003	0.0003
vdeltaUEinit_CD_pw3			median(0,DeltaUEInit_R-97,200-97)	0.0019	0.0001	<.0001
vdeltaUEinit_CD_pw4			median(0,DeltaUEInit_R-200,300-200)	0.0010	0.0002	<.0001
mratio_tmp_tei_CD	**L00**	Categorical of ratio_tmp_tei	ratio_tmp_tei = 0	0.3354	0.0113	<.0001
vratiotmptei_CD_pw1		Variate piecewise of ratio_tmp_tei	median(0,ratio_tmp_tei-0,37-0)	0.0134	0.0003	<.0001
vsato_cd_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-.4)	0.0840	0.0054	<.0001
vsato_cd_pw2			max(sato-.4,0)	0.1048	0.0158	<.0001
mltv_CD	**Miss**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	0.4893	0.0210	<.0001
vltv_CD_pw1			median(0,ltv_i_R-0,39-0)	0.0083	0.0005	<.0001
vltv_CD_pw2			median(0,ltv_i_R-39,90-39)	0.0100	0.0002	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vltv_CD_pw3		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-90,100-90)	0.0513	0.0032	<.0001
vhpa2yb_CD_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-88,105-88)	-0.0104	0.0006	<.0001
vhpa2yb_CD_pw2			median(0,hpa2y_blended_R-105,112-105)	-0.0225	0.0010	<.0001
vhpa2yb_CD_pw4			median(0,hpa2y_blended_R-123,140-123)	-0.0298	0.0014	<.0001
mseason	**1**	Categorical of season	season = "winter"	-0.2730	0.0060	<.0001
mseason	**2**		season = "spring"	-0.3721	0.0061	<.0001
mseason	**3**		season = "summer"	-0.2531	0.0060	<.0001
vCCI_CD_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	-0.0083	0.0006	<.0001
vCCI_CD_pw2			median(0,CCI_r-75,110-75)	0.0203	0.0004	<.0001
vCCI_CD_pw3			median(0,CCI_r-110,134-110)	0.0193	0.0007	<.0001
vSBOI_CD_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0290	0.0022	<.0001
vSBOI_CD_pw2			median(0,SBOI_r-95,100-95)	-0.1147	0.0023	<.0001
vSBOI_CD_pw3			median(0,SBOI_r-100,108-100)	-0.0660	0.0022	<.0001
m_product	**FRM15SR**	Categorical of product	product = "FRM15SR"	-0.2770	0.0094	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.3590	0.0085	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.4847	0.0094	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	0.1708	0.0104	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	1.8454	0.1747	<.0001

Current Transition Model Parameters – FRM15 C_CXS

The model parameters for the FRM15 current to self-cure transition are shown below.

Table 39: Current to Self-Cure Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-3.2112	0.1069	<.0001
mrfnc_ind	**1**	Categorical of rfnc_ind (refinanced loan indicator)	refinanced, non-streamlined	-0.0610	0.0126	<.0001
mrfnc_ind	**2**		streamlined refinanced	-0.2825	0.0204	<.0001
mperiodnbr_CCXS	**L02**	Categorical of period_number	period_number = 2	-0.3233	0.0329	<.0001
mperiodnbr_CCXS	**L03**		period_number = 3	-0.2720	0.0322	<.0001
vperiodnbr_CCXS_pw1			median(0,period_number-3,16-3)	-0.0205	0.0018	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vperiodnbr_CCXS_pw2		Variate piecewise of period_number	median(0,period_number-16,30-16)	-0.0313	0.0014	<.0001
vperiodnbr_CCXS_pw3			median(0,period_number-30,41-30)	-0.0375	0.0025	<.0001
vperiodnbr_CCXS_pw4			median(0,period_number-41,60-41)	-0.0186	0.0024	<.0001
mcredit_score_CCXS	L00	Categorical of credit_score	credit_score = 0	0.1284	0.0156	<.0001
vcredit_CCXS_pw2		Variate piecewise of credit_score	median(0,credit_score-643,800-643)	-0.0078	0.0001	<.0001
vloanraw_CCXS_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,40000-0)	-1.E-05	2.E-06	<.0001
vloanraw_CCXS_pw2			median(0,loansize_raw-40000,150000-40000)	-3.E-06	1.E-07	<.0001
vdeltaUEinit_CCXS_pw2		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-45,150-45)	0.0012	0.0002	<.0001
vdeltaUEinit_CCXS_pw3			median(0,DeltaUEInit_R-150,200-150)	0.0018	0.0004	<.0001
mratio_tmp_tei_CCXS	L00	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei = 0	0.1091	0.0241	<.0001
vratiotmptei_CCXS_pw2		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-9,16-9)	0.0112	0.0031	0.0003
vratiotmptei_CCXS_pw3			median(0,ratio_tmp_tei-16,36-16)	0.0084	0.0008	<.0001
mpriordef_CCXS	L01	Categorical of prior default count	prior_default_cnt = 1	1.9326	0.0119	<.0001
mpriordef_CCXS	L02		prior_default_cnt = 2	2.6067	0.0143	<.0001
mpriordef_CCXS	L10		prior_default_cnt >= 10	2.8872	0.0449	<.0001
mpriordef_CCXS	PW1		else	2.7281	0.0170	<.0001
vpriordef_CCXS_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-2,10-2)	0.2069	0.0045	<.0001
vhpa2yb_CCXS_pw2		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-100,106-100)	-0.0237	0.0026	<.0001
vhpa2yb_CCXS_pw3			median(0,hpa2y_blended_R-106,115-106)	-0.0079	0.0015	<.0001
mperiod_CCXS	L01	Categorical version of period	period < 200604	-2.0421	0.0341	<.0001
mseason_grp_CCXS	L02	Categorical of season	season = "spring"	-0.1946	0.0100	<.0001
vCCI_CCXS_pw2		Variate piecewise of consumer confidence index	median(0,CCI_r-75,110-75)	0.0295	0.0007	<.0001
vCCI_CCXS_pw3			median(0,CCI_r-110,134-110)	-0.0107	0.0011	<.0001
vSBOI_CCXS_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0533	0.0025	<.0001
vSBOI_CCXS_pw2			median(0,SBOI_r-95,100-95)	-0.1294	0.0046	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.1001	0.0172	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.1179	0.0205	<.0001
v_UE_CW_growthQ_lag2_pw2		Variate piecewise of country wide unemployment rate	min(UE_CW_growthQ_lag2, -0.2)	7.1059	0.3694	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		quarterly growth with 2Q lag				
mltv_CCXS	**Miss**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	0.7837	0.0425	<.0001
vltv_CCXS_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,40-0)	0.0056	0.0012	<.0001
vltv_CCXS_pw2			median(0,ltv_i_R-40,60-40)	0.0028	0.0010	0.0045
vltv_CCXS_pw3			median(0,ltv_i_R-60,88-60)	0.0101	0.0008	<.0001

Current Transition Model Parameters – FRM15 C_PRE

The model parameters for the FRM15 current to prepayment transition are shown below.

Table 40: Current to Prepayment Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-5.5339	0.0475	<.0001
mdpa_comb13_CPRE	**2**	Categorical of dpa (down payment assistance)	dpa = "nonprof"	-0.1958	0.0309	<.0001
mdpa_comb13_CPRE	**3**		dpa = "govt" or dpa = "relative"	0.0700	0.0122	<.0001
mperiodnbr_CPRE	**L02**	Categorical of period_number	period_number = 2	-2.0168	0.0243	<.0001
mperiodnbr_CPRE	**L03**		period_number = 3	-1.2168	0.0169	<.0001
mperiodnbr_CPRE	**L04**		period_number = 4	-0.8217	0.0142	<.0001
mperiodnbr_CPRE	**L05**		period_number = 5	-0.5306	0.0125	<.0001
mperiodnbr_CPRE	**L06**		period_number = 6	-0.3779	0.0118	<.0001
mperiodnbr_CPRE	**L07**		period_number = 7	-0.2969	0.0115	<.0001
mperiodnbr_CPRE	**L08**		period_number = 8	-0.2053	0.0112	<.0001
mperiodnbr_CPRE	**L09**		period_number = 9	-0.1100	0.0109	<.0001
mperiodnbr_CPRE	**L10**		period_number = 10	-0.0950	0.0110	<.0001
mperiodnbr_CPRE	**L11**		period_number = 11	-0.0606	0.0111	<.0001
mperiodnbr_CPRE	**L12**		period_number = 12	-0.0459	0.0111	<.0001
vperiodnbr_CPRE_pw1		Variate piecewise of period_number	median(0,period_number-12,34-12)	0.0038	0.0004	<.0001
vperiodnbr_CPRE_pw2			median(0,period_number-34,42-34)	0.0064	0.0011	<.0001
vperiodnbr_CPRE_pw3			median(0,period_number-42,56-42)	0.0366	0.0010	<.0001
vperiodnbr_CPRE_pw4			median(0,period_number-56,60-56)	0.3479	0.0040	<.0001
mcredit_score_CPRE	**L00**	Categorical of credit_score	credit_score = 0	0.5532	0.0228	<.0001
vcredit_CPRE_pw1		Variate piecewise of credit_score	median(0,credit_score-500,650-500)	0.0031	0.0002	<.0001
vcredit_CPRE_pw2			median(0,credit_score-650,800-650)	0.0006	0.0001	<.0001
vloanraw_CPRE_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,62400-0)	2.E-06	2.E-07	<.0001
vloanraw_CPRE_pw2			median(0,loansize_raw-62400,124000-62400)	5.E-06	1.E-07	<.0001
vloanraw_CPRE_pw3			median(0,loansize_raw-124000,250000-124000)	3.E-06	7.E-08	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vloanraw_CPRE_pw4			median(0,loansize_raw-250000,425000-250000)	1.E-06	1.E-07	<.0001
vdeltaUEinit_CPRE_pw2		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-63,97-63)	0.0045	0.0002	<.0001
vdeltaUEinit_CPRE_pw3			median(0,DeltaUEInit_R-97,200-97)	0.0027	0.0001	<.0001
vdeltaUEinit_CPRE_pw4			median(0,DeltaUEInit_R-200,300-200)	0.0011	0.0002	<.0001
mratio_tmp_tei_CPRE	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei = 0	-0.2554	0.0268	<.0001
vratiotmptei_CPRE_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,11-0)	-0.0132	0.0027	<.0001
vratiotmptei_CPRE_pw2			median(0,ratio_tmp_tei-11,16-11)	-0.0054	0.0018	0.0019
vratiotmptei_CPRE_pw3			median(0,ratio_tmp_tei-16,36-16)	-0.0067	0.0004	<.0001
vratiotmptei_CPRE_pw4			median(0,ratio_tmp_tei-36,50-36)	-0.0053	0.0014	0.0001
mpriordef_CPRE	**L01**	Categorical of prior default count	prior_default_cnt = 1	-0.1155	0.0072	<.0001
mpriordef_CPRE	**L02**		prior_default_cnt = 2	-0.2387	0.0123	<.0001
mpriordef_CPRE	**L03**		prior_default_cnt = 3	-0.3312	0.0169	<.0001
mpriordef_CPRE	**L04**		prior_default_cnt >= 4	-0.3740	0.0164	<.0001
vpriordef_CPRE_pw1		Variate piecewise of prior default count	median(0,prior_default_cnt-4,15-4)	0.0113	0.0055	0.0387
vsato_CPre_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-.4)	0.1145	0.0042	<.0001
vsato_CPre_pw2			max(sato-.4,0)	-0.1589	0.0146	<.0001
mltv_CPRE	**Miss**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	-0.1674	0.0129	<.0001
vltv_CPRE_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,39-0)	-0.0106	0.0004	<.0001
vltv_CPRE_pw3			median(0,ltv_i_R-90,100-90)	-0.0848	0.0044	<.0001
mhpa2yb_CPRE	**L084**	Categorical of hpa2y_blended_r[6]	0<hpa2y_blended_R <= 84	0.2391	0.0198	<.0001
mhpa2yb_CPRE	**L088**		hpa2y_blended_R <= 88	0.0577	0.0214	0.0069
vhpa2yb_CPRE_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-88,105-88)	0.0462	0.0009	<.0001
vhpa2yb_CPRE_pw2			median(0,hpa2y_blended_R-105,112-105)	0.0158	0.0010	<.0001
vhpa2yb_CPRE_pw3			median(0,hpa2y_blended_R-112,117-112)	0.0201	0.0014	<.0001
vhpa2yb_CPRE_pw4			median(0,hpa2y_blended_R-117,140-117)	0.0137	0.0004	<.0001
mseason_grp_CPRE	**L02**	Categorical of season	season = "spring"	0.1293	0.0042	<.0001
mseason_grp_CPRE	**L03**		season = "summer"	0.1290	0.0042	<.0001
vCCI_CPRE_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0017	0.0006	0.0058
vCCI_CPRE_pw2			median(0,CCI_r-75,110-75)	-0.0149	0.0002	<.0001
vCCI_CPRE_pw3			median(0,CCI_r-110,134-110)	-0.0141	0.0005	<.0001
vSBOI_CPRE_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	0.0185	0.0022	<.0001
vSBOI_CPRE_pw2			median(0,SBOI_r-95,100-95)	0.1132	0.0015	<.0001
vSBOI_CPRE_pw3			median(0,SBOI_r-100,108-100)	0.0036	0.0013	0.0058
v_UE_CW_growthQ_pw1		Variate piecewise of country wide	max(0.4,UE_CW_growthQ)	-0.0374	0.0081	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		unemployment rate quarterly growth				
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1687	0.0073	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0616	0.0072	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-3.7023	0.1178	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.1097	0.0062	<.0001

Current Transition Model Parameters – ARM C_SR

The model parameters for the ARM current to streamlined refinance transition are shown below.

Table 41: Current to Streamlined Refinance Transition ARM Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-9.0820	0.2908	<.0001
mjudicial	**1**		Categorical of judicial (judicial state)	judicial = 1 , judicial state	-0.1608	0.0088	<.0001
mdpa_nprof	**LNPro**		Categorical of dpa (down payment assistance)	dpa= "nonprof"	0.5380	0.0166	<.0001
mycslope_CSR	**L01**		Categorical of Yield Curve Slope	1<=ycslope<=2	0.1617	0.0120	<.0001
mfrst_tm_by	**1**		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.0358	0.0120	0.0028
mrfnc_ind	**2**		Categorical of rfnc_ind (refinanced loan indicator)	frnc_ind = "Y"	0.2592	0.0162	<.0001
mperiodnbr_CSR	**L02**		Categorical of period_number	period_number = 2	-1.1427	0.0263	<.0001
mperiodnbr_CSR	**L03**			period_number = 3	-0.1360	0.0186	<.0001
mperiodnbr_CSR	**L04**			period_number = 4	0.2568	0.0165	<.0001
mperiodnbr_CSR	**L05**			period_number = 5	0.3283	0.0164	<.0001
mperiodnbr_CSR	**L06**			period_number = 6	0.1267	0.0177	<.0001
mperiodnbr_CSR	**L07**			period_number = 7	-0.1355	0.0198	<.0001
vperiodnbr_CSR_pw1			Variate piecewise of period_number	median(0,period_number-8,33-8)	-0.0579	0.0009	<.0001
vperiodnbr_CSR_pw2				median(0,period_number-33,53-33)	-0.0804	0.0035	<.0001
vperiodnbr_CSR_pw3				median(0,period_number-53,68-53)	0.0496	0.0082	<.0001
vperiodnbr_CSR_pw4				median(0,period_number-68,108-68)	-0.0564	0.0092	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mperiodnbr_CSR* mdpa_nprof	**L02**	**LNPro**	Interaction of Categorical of period_number and Categorical of dpa	period_number = 2; dpa= "nonprof"	-0.3369	0.0714	<.0001
mperiodnbr_CSR* mdpa_nprof	**L03**	**LNPro**		period_number = 3; dpa= "nonprof"	-0.5355	0.0497	<.0001
mperiodnbr_CSR* mdpa_nprof	**L04**	**LNPro**		period_number = 4; dpa= "nonprof"	-0.7320	0.0464	<.0001
mperiodnbr_CSR* mdpa_nprof	**L05**	**LNPro**		period_number = 5; dpa= "nonprof"	-0.4077	0.0419	<.0001
mperiodnbr_CSR* mdpa_nprof	**L06**	**LNPro**		period_number = 6; dpa= "nonprof"	-0.2313	0.0451	<.0001
mperiodnbr_CSR* mdpa_nprof	**L07**	**LNPro**		period_number = 7; dpa= "nonprof"	-0.1588	0.0512	0.0019
vcredit_CSR_pw1			Variate piecewise of credit_score	0<credit_score<=450	-0.6710	0.2313	0.0037
vcredit_CSR_pw6				median(0,credit_score-680,720-680)	-0.0070	0.0004	<.0001
vcredit_CSR_pw8				median(0,credit_score-745,800-745)	-0.0060	0.0007	<.0001
vperiodnbr_CSR_pw2* mpriordef_ind	**L01**		Interaction of variate of piecewise of period_number and categorical of prior_default_cnt	median(0,period_number-33,53-33); prior_default_cnt ne 0	0.0649	0.0041	<.0001
vperiodnbr_CSR_pw3* mpriordef_ind	**L01**			median(0,period_number-53,68-53); prior_default_cnt ne 0	-0.0637	0.0102	<.0001
vperiodnbr_CSR_pw4* mpriordef_ind	**L01**			median(0,period_number-68,108-68); prior_default_cnt ne 0	0.0297	0.0105	0.0045
vdeltaUEinit_CSR_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-0,90-0)	-0.0077	0.0005	<.0001
vdeltaUEinit_CSR_pw3				median(0,deltaUEinit_r-97,100-97)	0.0704	0.0043	<.0001
vdeltaUEinit_CSR_pw5				median(0,deltaUEinit_r-110,140-110)	0.0056	0.0005	<.0001
vdeltaUEinit_CSR_pw7				median(0,deltaUEinit_r-175,200-175)	-0.0044	0.0011	<.0001
vdeltaUEinit_CSR_pw8				median(0,deltaUEinit_r-200,300-200)	0.0038	0.0006	<.0001
mRatioTmpTei_CSR	**L00**		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.8467	0.0350	<.0001
vratiotmptei_CSR_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0182	0.0015	<.0001
vratiotmptei_CSR_pw2				median(0,ratio_tmp_tei-24,36-24)	0.0026	0.0013	0.0452
vratiotmptei_CSR_pw3				median(0,ratio_tmp_tei-36,50-36)	0.0073	0.0021	0.0004
mpriordef_CSR* mtimesinceD_CSR	**L01**	**L01**	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	-0.7107	0.0450	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L01**	**L02**		prior_default_cnt = 1; cx_time = 2	-0.5537	0.0502	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L01**	**L03**		prior_default_cnt = 1; cx_time = 3	-0.3216	0.0526	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L02**	**L01**		prior_default_cnt = 2; cx_time <= 1	-0.9001	0.0760	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L02**	**L02**		prior_default_cnt = 2; cx_time = 2	-0.6298	0.0829	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L02**	**L03**		prior_default_cnt = 2; cx_time = 3	-0.5059	0.0928	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L03**	**L01**		prior_default_cnt >= 3; cx_time <= 1	-1.1194	0.0756	<.0001
mpriordef_CSR* mtimesinceD_CSR	**L03**	**L02**		prior_default_cnt >= 3; cx_time = 2	-1.1033	0.0941	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CSR* mtimesinceD_CSR	**L03**	**L03**		prior_default_cnt >= 3; cx_time = 3	-0.5675	0.0871	<.0001
vpriordef_CSR_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.0533	0.0107	<.0001
vsato_csr_pw1			Variate piecewise of sato (spread at origination)	min(0,sato-(-.1))	0.3606	0.0077	<.0001
vsato_csr_pw2				median(sato-(-.1),0,.7-(-.1))	0.8384	0.0462	<.0001
vloanraw_CSR_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,64000-0)	4.E-05	3.E-06	<.0001
vloanraw_CSR_pw2				median(0,loansize_raw-64000,157000-64000)	8.E-06	2.E-07	<.0001
vloanraw_CSR_pw3				median(0,loansize_raw-157000,425000-157000)	1.E-06	7.E-08	<.0001
vltv_CSR_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	0.0018	0.0007	0.0119
vltv_CSR_pw2				median(0,ltv_i_r-70,80-70)	0.0215	0.0028	<.0001
vltv_CSR_pw3				median(0,ltv_i_r-80,94-80)	0.0098	0.0013	<.0001
vltv_CSR_pw4				median(0,ltv_i_r-94,100-94)	0.0176	0.0051	0.0006
vhpa2yb_CSR_pw1			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-0,85-0)	0.0079	0.0019	<.0001
vhpa2yb_CSR_pw2				median(0,hpa2y_blended_r-85,95-85)	-0.0182	0.0024	<.0001
vhpa2yb_CSR_pw3				median(0,hpa2y_blended_r-95,117-95)	0.0058	0.0009	<.0001
vhpa2yb_CSR_pw4				median(0,hpa2y_blended_r-117,129-117)	-0.0065	0.0016	<.0001
vhpa2yb_CSR_pw5				median(0,hpa2y_blended_r-129,170-129)	-0.0198	0.0017	<.0001
vUEblend_CSR_pw1			Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-0,420-0)	0.0016	0.0002	<.0001
vUEblend_CSR_pw2				median(0,ue_blended_r-420,820-420)	-0.0013	0.0000	<.0001
vUEblend_CSR_pw3				median(0,ue_blended_r-820,1500-820)	-0.0002	0.0001	0.0048
mcalperiod_CSR	**L200104**		Categorical of Calendar Period	period < 200604	0.1926	0.0162	<.0001
mcalperiod_CSR	**L200604**			period = 200604	0.7800	0.0334	<.0001
mcalperiod_CSR	**L200701**			period = 200701	0.6308	0.0343	<.0001
mcalperiod_CSR	**L200702**			period = 200702	0.9345	0.0325	<.0001
mcalperiod_CSR	**L200703**			period = 200703	0.7860	0.0349	<.0001
vdeltaUEpr3_csr_pw1			Variate piecewise of deltaueepr3_r[5] (change in unemployment from 3 quarters prior)	median(deltaueepr3_r-(-200),0,(-20)-(-200))	0.0011	0.0002	<.0001
vdeltaUEpr3_csr_pw2				median(deltaueepr3_r-(-20),0,10-(-20))	0.0073	0.0004	<.0001
vdeltaUEpr3_csr_pw3				median(deltaueepr3_r-10,0,200-10)	0.0035	0.0001	<.0001
mseason_grp_CSR	**L02**		Categorical of season	season = "spring"	-0.0259	0.0098	0.0085
mseason_grp_CSR	**L03**			season = "summer"	-0.1519	0.0102	<.0001
vCCI_CSR_pw1			Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0115	0.0012	<.0001
vCCI_CSR_pw2				median(0,CCI_r-75,110-75)	-0.0066	0.0006	<.0001
vCCI_CSR_pw3				median(0,CCI_r-110,134-110)	0.0317	0.0016	<.0001
vSBOI_CSR_pw1				median(0,SBOI_r-83,95-83)	-0.0517	0.0051	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vSBOI_CSR_pw3			Variate piecewise of small business optimism index	median(0,SBOI_r-100,108-100)	-0.1698	0.0040	<.0001
m_product	**ARMSR**		Categorical of product	product = "ARMSR"	-0.2090	0.0197	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.1044	0.0386	0.0069
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.2215	0.0361	<.0001
v_UE_CW_growthQ_lag2_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.3539	0.0386	<.0001
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	-5.3323	0.6223	<.0001
MTG_RATE30Y_growthY_lag1			Variate of 30 year mortage rate yearly growth with 1Q lag	MTG_RATE30Y_growthY_lag1	-2.0286	0.0486	<.0001

Current Transition Model Parameters – ARM C_CXS

The model parameters for the ARM current to self-cure transition are shown below.

Table 42: Current to Self-Cure Transition ARM Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-2.4391	0.1489	<.0001
mrfnc_ind	**2**		Categorical of rfnc_ind (refinanced loan indicator)	frnc_ind = "Y"	-0.0563	0.0156	0.0003
mdpa_rel	**LRela**		Categorical of dpa (down payment assistance)	dpa = "relative"	0.0595	0.0137	<.0001
mcalperiod_CCXS	**L200104**		Categorical of Calendar Period	period < 200604	-1.3108	0.0255	<.0001
mcalperiod_CCXS	**L200604**			period = 200604	1.0876	0.0290	<.0001
mcalperiod_CCXS	**L200701**			period = 200701	1.1438	0.0271	<.0001
mcalperiod_CCXS	**L200702**			period = 200702	0.5280	0.0339	<.0001
mcalperiod_CCXS	**L200703**			period = 200703	0.3968	0.0327	<.0001
vpriordef_CCXS_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.1134	0.0023	<.0001
mperiodnbr_CCXS	**L02**		Categorical of period_number	period_number = 2	-0.1962	0.0445	<.0001
mperiodnbr_CCXS	**L03**			period_number = 3	0.1248	0.0384	0.0012
mperiodnbr_CCXS	**L04**			period_number = 4	0.1837	0.0368	<.0001
mperiodnbr_CCXS	**L05**			period_number = 5	0.1335	0.0369	0.0003

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mperiodnbr_CCXS	L06			period_number = 6	0.2213	0.0348	<.0001
mperiodnbr_CCXS	L07			period_number = 7	0.1085	0.0352	0.002
vperiodnbr_CCXS_pw1			Variate piecewise of period_number	median(0,period_number-8,36-8)	-0.0127	0.0012	<.0001
vperiodnbr_CCXS_pw2				median(0,period_number-36,53-36)	-0.0187	0.0024	<.0001
vperiodnbr_CCXS_pw3				median(0,period_number-53,76-53)	-0.0109	0.0008	<.0001
vperiodnbr_CCXS_pw4				median(0,period_number-76,108-76)	-0.0088	0.0007	<.0001
vcredit_CCXS_pw5			Variate piecewise of credit_score	median(0,credit_score-630,680-630)	-0.0044	0.0004	<.0001
vcredit_CCXS_pw6				median(0,credit_score-680,720-680)	-0.0062	0.0010	<.0001
vcredit_CCXS_pw7				median(0,credit_score-720,745-720)	-0.0089	0.0023	0.0001
vcredit_CCXS_pw8				median(0,credit_score-745,800-745)	-0.0077	0.0016	<.0001
mRatioTmpTei_CCXS	L00		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.3332	0.0437	<.0001
vratiotmptei_CCXS_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,19-0)	0.0129	0.0022	<.0001
vratiotmptei_CCXS_pw4				median(0,ratio_tmp_tei-33,50-33)	0.0049	0.0015	0.0015
mpriordef_CCXS* mtimesinceD_CCXS	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	2.4579	0.0207	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L02		prior_default_cnt = 1; cx_time = 2	2.1937	0.0263	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L03		prior_default_cnt = 1; cx_time = 3	1.9362	0.0327	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L04		prior_default_cnt = 1; cx_time = 4	1.8854	0.0369	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L05		prior_default_cnt = 1; cx_time = 5	1.5434	0.0471	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L06		prior_default_cnt = 1; cx_time = 6	1.3686	0.0542	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L07		prior_default_cnt = 1; cx_time = 7	1.2869	0.0596	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L08		prior_default_cnt = 1; cx_time = 8	1.2669	0.0637	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L09		prior_default_cnt = 1; cx_time = 9	1.1478	0.0714	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L01	L10		prior_default_cnt = 1; else	1.0820	0.0352	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L01		prior_default_cnt = 2; cx_time <= 1	2.8984	0.0224	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L02		prior_default_cnt = 2; cx_time = 2	2.6013	0.0293	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L03		prior_default_cnt = 2; cx_time = 3	2.3457	0.0373	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L04		prior_default_cnt = 2; cx_time = 4	2.1298	0.0459	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L05		prior_default_cnt = 2; cx_time = 5	1.8448	0.0577	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L06		prior_default_cnt = 2; cx_time = 6	1.6503	0.0678	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CCXS* mtimesinceD_CCXS	L02	L07		prior_default_cnt = 2; cx_time = 7	1.6006	0.0745	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L08		prior_default_cnt = 2; cx_time = 8	1.4462	0.0854	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L09		prior_default_cnt = 2; cx_time = 9	1.6159	0.0830	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L02	L10		prior_default_cnt = 2; else	1.2704	0.0423	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L01		prior_default_cnt >= 3; cx_time <= 1	3.2598	0.0163	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L02		prior_default_cnt >= 3; cx_time = 2	2.8458	0.0192	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L03		prior_default_cnt >= 3; cx_time = 3	2.4660	0.0238	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L04		prior_default_cnt >= 3; cx_time = 4	2.2946	0.0278	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L05		prior_default_cnt >= 3; cx_time = 5	1.9858	0.0346	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L06		prior_default_cnt >= 3; cx_time = 6	1.7778	0.0408	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L07		prior_default_cnt >= 3; cx_time = 7	1.5937	0.0478	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L08		prior_default_cnt >= 3; cx_time = 8	1.5424	0.0525	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L09		prior_default_cnt >= 3; cx_time = 9	1.4063	0.0598	<.0001
mpriordef_CCXS* mtimesinceD_CCXS	L03	L10		prior_default_cnt >= 3; else	1.1656	0.0347	<.0001
vtimesinced_CCXS_pw1			Variate piecwise of cx_time[1]	median(0,cx_time-10,24-10)	-0.0415	0.0038	<.0001
vtimesinced_CCXS_pw2				median(0,cx_time-24,40-24)	-0.0158	0.0048	0.001
vloanraw_CCXS_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,64000-0)	-7.E-06	9.E-07	<.0001
vloanraw_CCXS_pw2				median(0,loansize_raw-64000,157000-64000)	-3.E-06	2.E-07	<.0001
vhpa2yb_CCXS_pw1			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-0,100-0)	-0.0072	0.0009	<.0001
vhpa2yb_CCXS_pw2				median(0,hpa2y_blended_r-100,104-100)	-0.0330	0.0034	<.0001
vhpa2yb_CCXS_pw4				median(0,hpa2y_blended_r-113,115-113)	-0.0054	0.0015	0.0002
mseason_grp_CCXS	L02		Categorical of season	season = "spring"	-0.3208	0.0116	<.0001
mseason_grp_CCXS	L03			season = "summer"	-0.0993	0.0109	<.0001
vCCI_CCXS_pw1			Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0160	0.0006	<.0001
vCCI_CCXS_pw2				median(0,CCI_r-75,110-75)	0.0055	0.0008	<.0001
vSBOI_CCXS_pw1			Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0914	0.0035	<.0001
m_product	ARMSR		Categorical of product	product = "ARMSR"	-0.1781	0.0237	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.1214	0.0210	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
v_UE_CW_growthQ_lag2_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0766	0.0274	0.0052
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	7.5515	0.4831	<.0001

Current Transition Model Parameters – ARM C_D

The model parameters for the ARM current to default transition are shown below.

Table 43: Current to Default Transition ARM Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-2.7247	0.1633	<.0001
mjudicial	1		Categorical of judicial (judicial state)	judicial = 1 , judicial state	0.0315	0.0042	<.0001
mdpa_govt	LGovt		Categorical of dpa (down payment assistance)	dpa = "govt"	0.1127	0.0222	<.0001
mdpa_nprof	LNPro			dpa= "nonprof"	0.0956	0.0070	<.0001
mdpa_rel	LRela			dpa = "relative"	0.0516	0.0066	<.0001
mycslope_cd	L01		Categorical of Yield Curve Slope	1<=ycslope<=2	0.2540	0.0061	<.0001
mfrst_tm_by	1		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.0434	0.0058	<.0001
mrfnc_ind	2		Categorical of rfnc_ind (refinanced loan indicator)	frnc_ind = "Y"	0.0815	0.0091	<.0001
mcalperiod_cd	L200104		Categorical of Calendar Period	period < 200604	-0.2604	0.0100	<.0001
mcalperiod_cd	L200604			period = 200604	1.6158	0.0136	<.0001
mcalperiod_cd	L200701			period = 200701	1.1058	0.0156	<.0001
mcalperiod_cd	L200702			period = 200702	0.8839	0.0168	<.0001
mcalperiod_cd	L200703			period = 200703	0.4810	0.0164	<.0001
mperiodnbr_CD	L02		Categorical of period_number	period_number = 2	-0.7091	0.0184	<.0001
mperiodnbr_CD	L03			period_number = 3	-0.2779	0.0153	<.0001
mperiodnbr_CD	L04			period_number = 4	-0.1147	0.0144	<.0001
vperiodnbr_cd_pw1			Variate piecewise of period_number	median(0,period_number-5,27-5)	-0.0141	0.0007	<.0001
vperiodnbr_cd_pw2				median(0,period_number-27,35-27)	-0.0315	0.0022	<.0001
vperiodnbr_cd_pw3				median(0,period_number-35,63-35)	-0.0197	0.0009	<.0001
vperiodnbr_cd_pw4				median(0,period_number-63,68-63)	-0.0071	0.0024	0.0033
vcredit_cd_pw1			Variate piecewise of credit_score	0<credit_score<=450	-1.4227	0.2098	<.0001
vcredit_cd_pw2				median(0,credit_score-450,500-450)	-0.0124	0.0030	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vcredit_cd_pw3				median(0,credit_score-500,600-500)	-0.0045	0.0004	<.0001
vcredit_cd_pw4				median(0,credit_score-600,630-600)	-0.0064	0.0008	<.0001
vcredit_cd_pw5				median(0,credit_score-630,680-630)	-0.0109	0.0005	<.0001
vcredit_cd_pw6				median(0,credit_score-680,720-680)	-0.0113	0.0007	<.0001
vcredit_cd_pw7				median(0,credit_score-720,745-720)	-0.0103	0.0016	<.0001
vcredit_cd_pw8				median(0,credit_score-745,800-745)	-0.0104	0.0011	<.0001
icredit_grp0_CD	L000		Categorical of credit_score	credit_score=0	-1.5297	0.1458	<.0001
vdeltaUEinit_cd_pw1			Variate piecewise of DeltaUEInit_r4 (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-0,90-0)	0.0026	0.0002	<.0001
vdeltaUEinit_cd_pw4				median(0,deltaUEinit_r-100,110-100)	0.0041	0.0009	<.0001
vdeltaUEinit_cd_pw5				median(0,deltaUEinit_r-110,140-110)	0.0008	0.0003	0.006
mRatioTmpTei_CD	L00		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.3974	0.0167	<.0001
vratiotmptei_cd_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0150	0.0007	<.0001
vratiotmptei_cd_pw2				median(0,ratio_tmp_tei-24,36-24)	0.0065	0.0007	<.0001
vratiotmptei_cd_pw3				median(0,ratio_tmp_tei-36,50-36)	0.0066	0.0011	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	1.6081	0.0411	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L02		prior_default_cnt = 1; cx_time = 2	1.4197	0.0417	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L03		prior_default_cnt = 1; cx_time = 3	1.1931	0.0425	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L04		prior_default_cnt = 1; cx_time = 4	0.8879	0.0437	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L05		prior_default_cnt = 1; cx_time = 5	0.6953	0.0450	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L06		prior_default_cnt = 1; cx_time = 6	0.5479	0.0463	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L07		prior_default_cnt = 1; cx_time = 7	0.4998	0.0474	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L08		prior_default_cnt = 1; cx_time = 8	0.3323	0.0494	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L09		prior_default_cnt = 1; cx_time = 9	0.2350	0.0512	<.0001
mpriordef_CD* mtimesinceD_CD	L01	L10		prior_default_cnt = 1; cx_time = 10	0.1829	0.0527	0.0005
mpriordef_CD* mtimesinceD_CD	L01	L11		prior_default_cnt = 1; cx_time = 11	0.1289	0.0444	0.0037
mpriordef_CD* mtimesinceD_CD	L02	L01		prior_default_cnt = 2; cx_time <= 1	2.0323	0.0418	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L02		prior_default_cnt = 2; cx_time = 2	1.7722	0.0427	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L03		prior_default_cnt = 2; cx_time = 3	1.5631	0.0438	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CD* mtimesinceD_CD	L02	L04		prior_default_cnt = 2; cx_time = 4	1.2181	0.0457	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L05		prior_default_cnt = 2; cx_time = 5	1.0284	0.0477	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L06		prior_default_cnt = 2; cx_time = 6	0.8388	0.0501	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L07		prior_default_cnt = 2; cx_time = 7	0.8023	0.0519	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L08		prior_default_cnt = 2; cx_time = 8	0.6156	0.0553	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L09		prior_default_cnt = 2; cx_time = 9	0.5556	0.0575	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L10		prior_default_cnt = 2; cx_time = 10	0.4197	0.0612	<.0001
mpriordef_CD* mtimesinceD_CD	L02	L11		prior_default_cnt = 2; cx_time = 11	0.2661	0.0461	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L01		prior_default_cnt >= 3; cx_time <= 1	2.3765	0.0416	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L02		prior_default_cnt >= 3; cx_time = 2	2.0598	0.0419	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L03		prior_default_cnt >= 3; cx_time = 3	1.8112	0.0424	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L04		prior_default_cnt >= 3; cx_time = 4	1.4616	0.0432	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L05		prior_default_cnt >= 3; cx_time = 5	1.2253	0.0441	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L06		prior_default_cnt >= 3; cx_time = 6	1.0494	0.0452	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L07		prior_default_cnt >= 3; cx_time = 7	0.8548	0.0467	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L08		prior_default_cnt >= 3; cx_time = 8	0.7092	0.0483	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L09		prior_default_cnt >= 3; cx_time = 9	0.5347	0.0505	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L10		prior_default_cnt >= 3; cx_time = 10	0.4549	0.0523	<.0001
mpriordef_CD* mtimesinceD_CD	L03	L11		prior_default_cnt >= 3; cx_time = 11	0.2637	0.0446	<.0001
vpriordef_cd_pw1			Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	0.0757	0.0013	<.0001
vtimesinced_cd_pw1			Variate piecwise of cx_time[1]	median(0,cx_time-12,24-12)	-0.0434	0.0020	<.0001
vtimesinced_cd_pw2				median(0,cx_time-24,40-24)	-0.0175	0.0024	<.0001
vsato_cd_pw1			Variate piecewise of sato (spread at origination)	min(0,sato-(-.1))	0.0529	0.0035	<.0001
vsato_cd_pw2				median(sato-(-.1),0,.7-(-.1))	0.1167	0.0289	<.0001
vperiodnbr_cd_pw1* mpriordef_ind	L01		Interaction of variate of piecewise of period_number and categorical of prior_default_cnt	median(0,period_number-8,40-8); prior_default_cnt ne 0	-0.0031	0.0009	0.0006
vperiodnbr_cd_pw2* mpriordef_ind	L01			median(0,period_number-40,53-40); prior_default_cnt ne 0	0.0250	0.0024	<.0001
vperiodnbr_cd_pw3* mpriordef_ind	L01			median(0,period_number-53,68-53); prior_default_cnt ne 0	0.0136	0.0009	<.0001
vltv_cd_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	0.0066	0.0004	<.0001
vltv_cd_pw2				median(0,ltv_i_r-70,80-70)	0.0076	0.0010	<.0001
vltv_cd_pw3				median(0,ltv_i_r-80,94-80)	0.0077	0.0007	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vhpa2yb_cd_pw2			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,95-85)	-0.0110	0.0010	<.0001
vhpa2yb_cd_pw3				median(0,hpa2y_blended_r-95,113-95)	-0.0104	0.0007	<.0001
vhpa2yb_cd_pw4				median(0,hpa2y_blended_r-110,118-110)	-0.0079	0.0010	<.0001
vhpa2yb_cd_pw5				median(0,hpa2y_blended_r-118,149-118)	-0.0075	0.0006	<.0001
vhpa2yb_cd_pw6				median(0,hpa2y_blended_r-149,170-149)	-0.0168	0.0034	<.0001
vUEblend_cd_pw2			Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-420,820-420)	0.0001	0.0000	<.0001
vUEblend_cd_pw3				median(0,ue_blended_r-820,1500-820)	0.0002	0.0000	<.0001
vdeltaUEpr3_cd_pw1				median(deltaueper3_r-(-200),0,(-20)-(-200))	-0.0003	0.0001	0.0057
vdeltaUEpr3_cd_pw2			Variate piecewise of deltaueper3_r[5] (change in unemployment from 3 quarters prior)	median(deltaueper3_r-(-20),0,10-(-20))	0.0016	0.0002	<.0001
vdeltaUEpr3_cd_pw3				median(deltaueper3_r-10,0,200-10)	0.0008	0.0001	<.0001
mpriordef_ind* icredit_grp0_CD	L01	L000	Interaction of categorical of prior default indicator and categorical of credit_score	prior_default_cnt ne 0; credit_score=0	0.9269	0.0401	<.0001
mpriordef_ind* icredit_grp1_CD	L01	L450		prior_default_cnt ne 0; credit_score<450	0.7855	0.1910	<.0001
vcredit_cd_pw3* mpriordef_ind	L01		Interaction of variate piecewise of credit_score and categorical of prior default indicator	median(0,credit_score-500,600-500); prior_default_cnt ne 0	0.0037	0.0005	<.0001
vcredit_cd_pw4* mpriordef_ind	L01			median(0,credit_score-600,630-600); prior_default_cnt ne 0	0.0051	0.0010	<.0001
vcredit_cd_pw5* mpriordef_ind	L01			median(0,credit_score-630,680-630); prior_default_cnt ne 0	0.0075	0.0006	<.0001
vcredit_cd_pw6* mpriordef_ind	L01			median(0,credit_score-680,720-680); prior_default_cnt ne 0	0.0074	0.0010	<.0001
vcredit_cd_pw7* mpriordef_ind	L01			median(0,credit_score-720,745-720); prior_default_cnt ne 0	0.0062	0.0023	0.0069
vcredit_cd_pw8* mpriordef_ind	L01			median(0,credit_score-745,800-745); prior_default_cnt ne 0	0.0074	0.0017	<.0001
mseason_grp_CD	L02		Categorical of season	season = "spring"	-0.2560	0.0053	<.0001
mseason_grp_CD	L03			season = "summer"	-0.0405	0.0050	<.0001
vCCI_CD_pw1			Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	-0.0010	0.0003	0.0017
vSBOI_CD_pw1			Variate piecewise of small business optimism index	median(0,SBOI_r-85,100-85)	-0.0144	0.0014	<.0001
vSBOI_CD_pw2				median(0,SBOI_r-100,108-100)	-0.0178	0.0015	<.0001
m_product	ARMSR		Categorical of product	product = "ARMSR"	-0.1112	0.0114	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.4868	0.0104	<.0001
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate	max(0.4,UE_CW_growthQ_lag1)	0.0962	0.0121	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
			quarterly growth with 1Q lag				
v_UE_CW_growthQ_lag2_pw2			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	min(UE_CW_growthQ_lag2, -0.2)	1.6738	0.2538	<.0001

Current Transition Model Parameters – ARM C_PRE

The model parameters for the ARM current to prepayment transition are shown below.

Table 44: Current to Prepayment Transition ARM Model Parameters

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
Intercept					-4.3586	0.1898	<.0001
mjudicial	**1**		Categorical of judicial (judicial state)	judicial = 1 , judicial state	-0.0907	0.0042	<.0001
mdpa_govt	**LGovt**		Categorical of dpa (down payment assistance)	dpa = "govt"	-0.3383	0.0323	<.0001
mdpa_nprof	**LNPro**			dpa= "nonprof"	-0.2072	0.0105	<.0001
mycslope_CPRE	**L01**		Categorical of Yield Curve Slope	1<=ycslope<=2	0.1555	0.0053	<.0001
mfrst_tm_by	**1**		Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.0716	0.0051	<.0001
mrfnc_ind	**2**		Categorical of rfnc_ind (refinanced loan indicator)	frnc_ind = "Y"	-0.1246	0.0073	<.0001
mcalperiod_CPRE	**L200104**		Categorical of Calendar Period	period < 200604	0.6121	0.0113	<.0001
mcalperiod_CPRE	**L200604**			period = 200604	0.9372	0.0155	<.0001
mcalperiod_CPRE	**L200701**			period = 200701	0.9193	0.0165	<.0001
mcalperiod_CPRE	**L200702**			period = 200702	1.0649	0.0160	<.0001
mcalperiod_CPRE	**L200703**			period = 200703	0.8300	0.0178	<.0001
mperiodnbr_CPRE	**L02**		Categorical of period_number	period_number = 2	-1.6653	0.0229	<.0001
mperiodnbr_CPRE	**L03**			period_number = 3	-0.9105	0.0165	<.0001
mperiodnbr_CPRE	**L04**			period_number = 4	-0.5010	0.0141	<.0001
mperiodnbr_CPRE	**L05**			period_number = 5	-0.1561	0.0126	<.0001
mperiodnbr_CPRE	**L06**			period_number = 6	-0.0409	0.0122	0.0008
mperiodnbr_CPRE	**L07**			period_number = 7	-0.0768	0.0125	<.0001
vperiodnbr_CPRE_pw1			Variate piecewise of period_number	median(0,period_number-8,14-8)	0.0413	0.0016	<.0001
vperiodnbr_CPRE_pw2				median(0,period_number-14,27-14)	-0.0147	0.0007	<.0001
vperiodnbr_CPRE_pw3				median(0,period_number-27,41-27)	-0.0213	0.0008	<.0001
vperiodnbr_CPRE_pw4				median(0,period_number-41,53-41)	-0.0172	0.0012	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vperiodnbr_CPRE_pw6				median(0,period_number-71,108-71)	-0.0102	0.0010	<.0001
mperiodnbr_CPRE*mdpa_nprof	L02	LNPro	Interaction of Categorical of period_number and Categorical of dpa	period_number = 2; dpa= "nonprof"	-0.9830	0.1157	<.0001
mperiodnbr_CPRE*mdpa_nprof	L03	LNPro		period_number = 3; dpa= "nonprof"	-0.8349	0.0728	<.0001
mperiodnbr_CPRE*mdpa_nprof	L04	LNPro		period_number = 4; dpa= "nonprof"	-0.5731	0.0533	<.0001
mperiodnbr_CPRE*mdpa_nprof	L05	LNPro		period_number = 5; dpa= "nonprof"	-0.3186	0.0410	<.0001
mperiodnbr_CPRE*mdpa_nprof	L06	LNPro		period_number = 6; dpa= "nonprof"	-0.2311	0.0384	<.0001
mperiodnbr_CPRE*mdpa_nprof	L07	LNPro		period_number = 7; dpa= "nonprof"	-0.1434	0.0387	0.0002
vperiodnbr_CPRE_pw1*mpriordef_ind	L01		Interaction of variate of piecewise of period_number and categorical of prior_default_cnt	median(0,period_number-8,40-8); prior_default_cnt ne 0	-0.0207	0.0068	0.0023
vperiodnbr_CPRE_pw2*mpriordef_ind	L01			median(0,period_number-40,53-40); prior_default_cnt ne 0	0.0182	0.0021	<.0001
vperiodnbr_CPRE_pw3*mpriordef_ind	L01			median(0,period_number-53,68-53); prior_default_cnt ne 0	0.0172	0.0017	<.0001
vperiodnbr_CPRE_pw4*mpriordef_ind	L01			median(0,period_number-68,108-68); prior_default_cnt ne 0	0.0061	0.0018	0.0006
vcredit_CPRE_pw2			Variate piecewise of credit_score	median(0,credit_score-450,500-450)	-0.0099	0.0008	<.0001
vcredit_CPRE_pw3				median(0,credit_score-500,600-500)	0.0027	0.0004	<.0001
vcredit_CPRE_pw5				median(0,credit_score-630,680-630)	0.0049	0.0003	<.0001
vcredit_CPRE_pw6				median(0,credit_score-680,720-680)	0.0027	0.0004	<.0001
vcredit_CPRE_pw7				median(0,credit_score-720,745-720)	0.0024	0.0008	0.0016
vcredit_CPRE_pw8				median(0,credit_score-745,800-745)	0.0020	0.0004	<.0001
vdeltaUEinit_CPRE_pw1			Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-0,90-0)	0.0012	0.0002	<.0001
vdeltaUEinit_CPRE_pw2				median(0,deltaUEinit_r-90,97-90)	-0.0089	0.0015	<.0001
vdeltaUEinit_CPRE_pw3				median(0,deltaUEinit_r-97,100-97)	-0.0134	0.0034	<.0001
vdeltaUEinit_CPRE_pw5				median(0,deltaUEinit_r-110,140-110)	0.0008	0.0002	0.0009
mRatioTmpTei_CPRE	L00		Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.1618	0.0132	<.0001
vratiotmptei_CPRE_pw1			Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	-0.0066	0.0006	<.0001
vratiotmptei_CPRE_pw2				median(0,ratio_tmp_tei-24,36-24)	-0.0105	0.0007	<.0001
vratiotmptei_CPRE_pw3				median(0,ratio_tmp_tei-36,50-36)	-0.0085	0.0012	<.0001
mpriordef_CPRE*mtimesinceD_CPRE	L01	L01	Interaction of categorical of prior_default_cnt and categorical of cx_time[1]	prior_default_cnt = 1; cx_time <= 1	-0.4576	0.0354	<.0001
mpriordef_CPRE*mtimesinceD_CPRE	L01	L02		prior_default_cnt = 1; cx_time = 2	-0.5209	0.0386	<.0001
mpriordef_CPRE*mtimesinceD_CPRE	L01	L03		prior_default_cnt = 1; cx_time = 3	-0.5567	0.0416	<.0001
mpriordef_CPRE*mtimesinceD_CPRE	L01	L04		prior_default_cnt = 1; cx_time = 4	-0.4159	0.0425	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CPRE* mtimesinceD_CPRE	L01	L05		prior_default_cnt = 1; cx_time = 5	-0.3515	0.0437	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L01	L06		prior_default_cnt = 1; cx_time = 6	-0.4185	0.0461	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L01	L07		prior_default_cnt = 1; cx_time = 7	-0.3881	0.0473	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L01	L08		prior_default_cnt = 1; cx_time = 8	-0.3388	0.0481	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L01	L09		prior_default_cnt = 1; cx_time >= 9	-0.3861	0.0360	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L01		prior_default_cnt = 2; cx_time <= 1	-0.5330	0.0443	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L02		prior_default_cnt = 2; cx_time = 2	-0.6297	0.0494	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L03		prior_default_cnt = 2; cx_time = 3	-0.5766	0.0525	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L04		prior_default_cnt = 2; cx_time = 4	-0.4741	0.0541	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L05		prior_default_cnt = 2; cx_time = 5	-0.4760	0.0569	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L06		prior_default_cnt = 2; cx_time = 6	-0.3918	0.0581	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L07		prior_default_cnt = 2; cx_time = 7	-0.4187	0.0613	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L08		prior_default_cnt = 2; cx_time = 8	-0.4953	0.0652	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L02	L09		prior_default_cnt = 2; cx_time >= 9	-0.4793	0.0388	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L01		prior_default_cnt = 3; cx_time <= 1	-0.5819	0.0522	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L02		prior_default_cnt = 3; cx_time = 2	-0.6845	0.0599	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L03		prior_default_cnt = 3; cx_time = 3	-0.6402	0.0652	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L04		prior_default_cnt = 3; cx_time = 4	-0.5177	0.0675	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L05		prior_default_cnt = 3; cx_time = 5	-0.5442	0.0728	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L06		prior_default_cnt = 3; cx_time = 6	-0.6825	0.0815	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L07		prior_default_cnt = 3; cx_time = 7	-0.4723	0.0796	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L08		prior_default_cnt = 3; cx_time = 8	-0.7277	0.0922	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L03	L09		prior_default_cnt = 3; cx_time >= 9	-0.5683	0.0433	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L01		prior_default_cnt = 4; cx_time <= 1	-0.7656	0.0636	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L02		prior_default_cnt = 4; cx_time = 2	-0.7718	0.0728	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L03		prior_default_cnt = 4; cx_time = 3	-0.7496	0.0806	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L04		prior_default_cnt = 4; cx_time = 4	-0.6337	0.0841	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L05		prior_default_cnt = 4; cx_time = 5	-0.6177	0.0902	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
mpriordef_CPRE* mtimesinceD_CPRE	L04	L06		prior_default_cnt =42; cx_time = 6	-0.5447	0.0941	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L07		prior_default_cnt = 4; cx_time = 7	-0.6388	0.1039	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L08		prior_default_cnt = 4; cx_time = 8	-0.6928	0.1121	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L04	L09		prior_default_cnt = 4; cx_time >= 9	-0.5875	0.0481	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L01		prior_default_cnt >= 5; cx_time <= 1	-0.8358	0.0488	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L02		prior_default_cnt >= 5; cx_time = 2	-0.9261	0.0556	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L03		prior_default_cnt >= 5; cx_time = 3	-0.9073	0.0610	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L04		prior_default_cnt >= 5; cx_time = 4	-0.8184	0.0643	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L05		prior_default_cnt >= 5; cx_time = 5	-0.6270	0.0650	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L06		prior_default_cnt >= 5; cx_time = 6	-0.6149	0.0694	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L07		prior_default_cnt >= 5; cx_time = 7	-0.6619	0.0749	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L08		prior_default_cnt >= 5; cx_time = 8	-0.8537	0.0851	<.0001
mpriordef_CPRE* mtimesinceD_CPRE	L05	L09		prior_default_cnt >= 5; cx_time >= 9	-0.6265	0.0431	<.0001
vsato_CPre_pw1			Variate piecewise of sato (spread at origination)	min(0,sato-(-.1))	0.0567	0.0034	<.0001
vsato_CPre_pw2				median(sato-(-.1),0,.7-(-.1))	0.0684	0.0324	0.0348
vsato_CPre_pw3				max(sato-.7,0)	0.2143	0.1050	0.0414
vloanraw_CPRE_pw1			Variate piecewise of loansize_raw	median(0,loansize_raw-0,64000-0)	8.E-06	6.E-07	<.0001
vloanraw_CPRE_pw2				median(0,loansize_raw-64000,157000-64000)	7.E-06	2.E-07	<.0001
vloanraw_CPRE_pw3				median(0,loansize_raw-157000,425000-157000)	3.E-06	3.E-08	<.0001
mltv_CPRE	L01		Categorical of ltv_i_r7 (loan-to-value)	ltv_i_r = .	0.1371	0.0286	<.0001
vltv_CPRE_pw1			Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	-0.0093	0.0007	<.0001
vltv_CPRE_pw2				median(0,ltv_i_r-70,80-70)	0.0179	0.0011	<.0001
vltv_CPRE_pw3				median(0,ltv_i_r-80,94-80)	-0.0238	0.0007	<.0001
vltv_CPRE_pw4				median(0,ltv_i_r-94,100-94)	-0.1082	0.0042	<.0001
vhpa2yb_CPRE_pw1				median(0,hpa2y_blended_r-0,85-0)	-0.0149	0.0020	<.0001
vhpa2yb_CPRE_pw2			Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,95-85)	0.0293	0.0024	<.0001
vhpa2yb_CPRE_pw3				median(0,hpa2y_blended_r-95,113-95)	0.0312	0.0004	<.0001
vhpa2yb_CPRE_pw4				median(0,hpa2y_blended_r-113,120-113)	0.0195	0.0004	<.0001
vhpa2yb_CPRE_pw5				median(0,hpa2y_blended_r-120,149-120)	0.0128	0.0012	<.0001
vUEblend_CPRE_pw1				median(0,ue_blended_r-0,420-0)	-0.0007	0.0001	<.0001

Variable	Level		Description	Description Detail	Estimate	StdErr	PValue
vUEblend_CPRE_pw2			Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-420,820-420)	-0.0007	0.0000	<.0001
vUEblend_CPRE_pw3				median(0,ue_blended_r-820,1500-820)	-0.0008	0.0000	<.0001
vdeltaUEpr3_cpre_pw1			Variate piecewise of deltaueper3_r[5] (change in unemployment from 3 quarters prior)	median(deltaueper3_r-(-200),0,(-20)-(-200))	0.0003	0.0001	0.0221
vdeltaUEpr3_cpre_pw2				median(deltaueper3_r-(-20),0,10-(-20))	0.0063	0.0002	<.0001
vdeltaUEpr3_cpre_pw3				median(deltaueper3_r-10,0,200-10)	0.0011	0.0001	<.0001
mseason_grp_CPRE	L02		Categorical of season	season = "spring"	0.1567	0.0048	<.0001
mseason_grp_CPRE	L03			season = "summer"	0.1733	0.0048	<.0001
vCCI_CPRE_pw1			Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	-0.0051	0.0003	<.0001
vCCI_CPRE_pw2				median(0,CCI_r-75,110-75)	-0.0068	0.0005	<.0001
vSBOI_CPRE_pw1			Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	0.0559	0.0026	<.0001
vSBOI_CPRE_pw2				median(0,SBOI_r-95,100-95)	0.0285	0.0022	<.0001
v_UE_CW_growthQ_pw1			Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.3515	0.0154	<.0001
v_UE_CW_growthQ_lag1_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.0749	0.0156	<.0001
v_UE_CW_growthQ_lag2_pw1			Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	0.0663	0.0155	<.0001
v_UE_CW_growthQ_lag2_pw2				min(UE_CW_growthQ_lag2, -0.2)	-5.0024	0.2685	<.0001

Default Transition Model Parameters – FRM30NSR D_CLM

The model parameters for the FRM30NSR default to claim transition are shown below.

Table 45: Default to Claim Transition FRM30NSR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				4.2589	0.0918	<.0001
mrfnc_ind	2	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind = "N"	0.1154	0.0041	<.0001
mDeltaTm3_DCLM	L01	Categorical of DeltaTm3Init_r[12] (change in 3 month treasury from policy inception to current)	DeltaTm3Init_r12 > 600	-0.3940	0.0061	<.0001
mseason	1	Categorical of season	season = "winter"	0.0169	0.0031	<.0001
mseason	2		season = "spring"	0.0270	0.0032	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mseason	**3**		season = "summer"	0.0480	0.0032	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.2015	0.0023	<.0001
mdpa	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	0.1210	0.0070	<.0001
mdpa	**2**		base level: else	0.4798	0.0034	<.0001
mdpa	**3**		dpa = "Relative"	-0.0226	0.0035	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.0947	0.0031	<.0001
mhpa2yb_DCLM	**L085**	Categorical of hpa2y_blended_r[6]	hpa2y_blended_r <= 80	0.1181	0.0105	<.0001
vhpa2yb_DCLM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-80,98-80)	-0.0104	0.0005	<.0001
vhpa2yb_DCLM_pw2			median(0,hpa2y_blended_r-98,108-98)	0.0290	0.0005	<.0001
vhpa2yb_DCLM_pw3			median(0,hpa2y_blended_r-108,117-108)	-0.0267	0.0005	<.0001
vhpa2yb_DCLM_pw4			median(0,hpa2y_blended_r-117,180-117)	-0.0128	0.0004	<.0001
mperiodnbr_DCLM	**L02**	Categorical of period_number	period number <= 2	-1.2799	0.1464	<.0001
mperiodnbr_DCLM	**L03**		period number = 3	-0.9649	0.0440	<.0001
mperiodnbr_DCLM	**L04**		period number = 4	-0.3300	0.0198	<.0001
vperiodnbr_DCLM_pw1		Variate piecewise of period_number	median(0,period_number-5,9-5)	0.0523	0.0021	<.0001
vperiodnbr_DCLM_pw2			median(0,period_number-9,17-9)	-0.0090	0.0005	<.0001
vperiodnbr_DCLM_pw4			median(0,period_number-60,86-60)	-0.0265	0.0006	<.0001
mcredit_DCLM	**L01**	Categorical of credit_score	credit_score = 0	0.0234	0.0055	<.0001
vcredit_DCLM_pw1		Variate piecewise of credit_score	median(0,credit_score-525,635-525)	0.0008	0.0001	<.0001
vcredit_DCLM_pw2			median(0,credit_score-635,780-635)	0.0042	0.0000	<.0001
mdurdefepi_DCLM	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.8908	0.0055	<.0001
mdurdefepi_DCLM	**L03**		dur_def_episode = 3	1.4339	0.0054	<.0001
mdurdefepi_DCLM	**L04**		dur_def_episode = 4	1.6642	0.0054	<.0001
mdurdefepi_DCLM	**L05**		dur_def_episode = 5	1.7748	0.0056	<.0001
mdurdefepi_DCLM	**L06**		dur_def_episode = 6	1.7813	0.0059	<.0001
mdurdefepi_DCLM	**L07**		dur_def_episode = 7	1.7610	0.0062	<.0001
mdurdefepi_DCLM	**L08**		dur_def_episode = 8	1.7230	0.0065	<.0001
mdurdefepi_DCLM	**L09**		dur_def_episode = 9	1.6875	0.0069	<.0001
mdurdefepi_DCLM	**L10**		dur_def_episode = 10	1.6560	0.0073	<.0001
mdurdefepi_DCLM	**L11**		else	1.6383	0.0061	<.0001
vdurdefepi_DCLM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	-0.0190	0.0005	<.0001
vdurdefepi_DCLM_pw2			median(0,dur_def_episode-30,40-30)	-0.0594	0.0020	<.0001
vdeltaUEInit_DCLM_pw1		Variate piecewise of DeltaUEInit_r (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,63-0)	-0.0055	0.0003	<.0001
vdeltaUEInit_DCLM_pw2			median(0,DeltaUEInit_r-63,100-63)	0.0015	0.0001	<.0001
vdeltaUEInit_DCLM_pw3			median(0,DeltaUEInit_r-100,116-100)	0.0049	0.0003	<.0001
vdeltaUEInit_DCLM_pw4			median(0,DeltaUEInit_r-116,218-116)	0.0012	0.0001	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vdeltaUEInit_DCLM_pw5			median(0,DeltaUEInit_r-218,330-218)	0.0005	0.0001	<.0001
mRatioTmpTei_DCLM	L00	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.1305	0.0102	<.0001
vratiotmptei_DCLM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0059	0.0004	<.0001
vratiotmptei_DCLM_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0034	0.0003	<.0001
vratiotmptei_DCLM_pw3			median(0,ratio_tmp_tei-36,50-36)	-0.0130	0.0007	<.0001
mpriordef_DCLM	L01	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.2305	0.0029	<.0001
mpriordef_DCLM	L02		prior_default_cnt = 2	-0.4028	0.0039	<.0001
mpriordef_DCLM	L03		prior_default_cnt = 3	-0.5404	0.0050	<.0001
mpriordef_DCLM	L04		prior_default_cnt = 4	-0.6769	0.0062	<.0001
mpriordef_DCLM	L05		prior_default_cnt = 5	-0.8136	0.0078	<.0001
mpriordef_DCLM	L06		prior_default_cnt = 6	-0.9408	0.0099	<.0001
mpriordef_DCLM	L07		prior_default_cnt = 7	-1.0589	0.0127	<.0001
mpriordef_DCLM	L08		prior_default_cnt = 8	-1.1453	0.0163	<.0001
mpriordef_DCLM	L09		prior_default_cnt = 9	-1.2260	0.0212	<.0001
mpriordef_DCLM	L10		prior_default_cnt = 10	-1.2775	0.0274	<.0001
mpriordef_DCLM	L11		prior_default_cnt = 11	-1.3682	0.0363	<.0001
mpriordef_DCLM	L12		prior_default_cnt >= 12	-1.5362	0.0335	<.0001
vUEblend_DCLM_pw1		Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r8-200,450-200)	0.0014	0.0000	<.0001
vUEblend_DCLM_pw2			median(0,ue_blended_r8-450,850-450)	-0.0006	0.0000	<.0001
vUEblend_DCLM_pw3			median(0,ue_blended_r8-850,1500-850)	-0.0001	0.0000	<.0001
vltv_DCLM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	-0.0072	0.0011	<.0001
vloanraw_DCLM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-27000,65000-27000)	-3.E-06	2.E-07	<.0001
vloanraw_DCLM_pw2			median(0,loansize_raw-65000,120000-65000)	9.E-07	7.E-08	<.0001
vloanraw_DCLM_pw3			median(0,loansize_raw-120000,500000-120000)	-2.E-06	2.E-08	<.0001
mDeltaTY10_DCLM	L01	Categorical of DeltaTy10Init_r[2] (10 year treasury rate)	DeltaTy10Init_r2 < 53	0.1374	0.0034	<.0001
mDeltaTY10_DCLM	L02		DeltaTy10Init_r2> 130	-0.4330	0.0098	<.0001
mprior3_ue_DCLM	L01	Categorical of prior3_ue_r[11] (state unemployment 3 prior quarters)	prior3_ue_r11<1400	-1.2145	0.0252	<.0001
vSBOI_DCLM_pw1		Variate piecewise of small business optimism index	median(0,mSBOI-85,100-85)	0.0092	0.0005	<.0001
vSBOI_DCLM_pw2			median(0,mSBOI-100,108-100)	0.0121	0.0009	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.5343	0.0095	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate	max(0.4,UE_CW_growthQ_lag1)	-0.8037	0.0100	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		quarterly growth with 1Q lag				
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-1.0376	0.0111	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	37.4134	0.3555	<.0001
vMTG_RATE30Y_growthQ_DCLM1		Variate piecewise of 30 year mortgate rate quarterly growth	min(MTG_RATE30Y_growthQ,0.1)	0.3523	0.0239	<.0001
vMTG_RATE30Y_growthQ_DCLM2			max(MTG_RATE30Y_growthQ,0.1)	2.1137	0.0788	<.0001
v_MTG_RATE30Y_lag4_DCLM1		Variate piecewise of 30 year mortgate rate with 4Q lag	min(MTG_RATE30Y_lag4,5)	-0.1417	0.0036	<.0001
v_MTG_RATE30Y_lag4_DCLM2			max(MTG_RATE30Y_lag4,5)	0.0883	0.0020	<.0001

Default Transition Model Parameters – FRM30NSR D_CXM

The model parameters for the FRM30NSR default to modified cure transition are shown below.

Table 46: Default to Modified Cure Transition FRM30NSR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-5.0093	0.0370	<.0001
mcalperiod_DCXM	L01	Categorical of Calendar Period	period < 200604	-6.8704	0.0540	<.0001
mseason	1	Categorical of season	season = "winter"	0.1064	0.0036	<.0001
mseason	2		season = "spring"	0.2683	0.0035	<.0001
mseason	3		season = "summer"	0.2155	0.0036	<.0001
mjudicial	1	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.0516	0.0021	<.0001
mdpa_govt	LGovt	Categorical of dpa (down payment assistance)	dpa = "govt"	-0.0771	0.0065	<.0001
mdpa_rel	LRela		dpa = "Relative"	-0.0383	0.0028	<.0001
mfrst_tm_by	1	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.0642	0.0024	<.0001
mycslope_DCXM	L01	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=300	-0.0246	0.0049	<.0001
mycslope_DCXM	L02		ycslope_r>=900	-0.0741	0.0041	<.0001
mycslope_DCXM	L03		ycslope_r>=1500	0.0106	0.0042	0.0116
mhpa2yb_DCXM	L085	Categorical of hpa2y_blended_r[6]	hpa2y_blended_r6 <= 85	-0.0812	0.0056	<.0001
vhpa2yb_DCXM_pw2		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-106,111-106)	0.0124	0.0003	<.0001
mperiodnbr_DCXM	L02	Categorical of period_number	period_number <= 2	-0.6731	0.0716	<.0001
mperiodnbr_DCXM	L03		eriod_number = 3 , else mperiodnbr_DCXM="Z04"	-0.1063	0.0210	<.0001
vperiodnbr_DCXM_pw1		Variate piecewise of period_number	median(0,period_number-4,9-4)	0.1151	0.0017	<.0001
vperiodnbr_DCXM_pw2			median(0,period_number-9,15-9)	-0.0238	0.0008	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vperiodnbr_DCXM_pw3			median(0,period_number-15,25-15)	0.0051	0.0004	<.0001
vperiodnbr_DCXM_pw4			median(0,period_number-25,59-25)	-0.0081	0.0002	<.0001
vperiodnbr_DCXM_pw5			median(0,period_number-59,90-59)	-0.0124	0.0004	<.0001
vcredit_DCXM_pw1		Variate piecewise of credit_score	median(0,credit_score-530,640-530)	-0.0025	0.0000	<.0001
vcredit_DCXM_pw3			median(0,credit_score-680,780-680)	-0.0008	0.0001	<.0001
mdurdefepi_DCXM	L02	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.4470	0.0032	<.0001
mdurdefepi_DCXM	L03		dur_def_episode = 3	0.5745	0.0034	<.0001
mdurdefepi_DCXM	L04		dur_def_episode = 4	0.5864	0.0038	<.0001
mdurdefepi_DCXM	L05		dur_def_episode = 5	0.4449	0.0044	<.0001
mdurdefepi_DCXM	L06		dur_def_episode = 6	0.3364	0.0051	<.0001
mdurdefepi_DCXM	L07		dur_def_episode = 7	0.2094	0.0058	<.0001
mdurdefepi_DCXM	L08		dur_def_episode = 8	0.0901	0.0067	<.0001
mdurdefepi_DCXM	L09		dur_def_episode = 9	-0.0581	0.0078	<.0001
mdurdefepi_DCXM	L10		dur_def_episode >= 10	-0.2980	0.0061	<.0001
vdurdefepi_DCXM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,23-10)	-0.0701	0.0009	<.0001
vdeltaUEInit_DCXM_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,66-0)	0.0024	0.0002	<.0001
vdeltaUEInit_DCXM_pw2			median(0,DeltaUEInit_r-66,95-66)	-0.0024	0.0001	<.0001
vdeltaUEInit_DCXM_pw3			median(0,DeltaUEInit_r-95,230-95)	0.0009	0.0000	<.0001
vdeltaUEInit_DCXM_pw4			median(0,DeltaUEInit_r-230,300-230)	-0.0013	0.0001	<.0001
mRatioTmpTei_DCXM	L00	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0, else MRatioTmpTei_DCXM = "Z00"	0.6952	0.0293	<.0001
vratiotmptei_DCXM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,14-0)	0.0304	0.0018	<.0001
vratiotmptei_DCXM_pw2			median(0,ratio_tmp_tei-14,26-14)	0.0178	0.0004	<.0001
vratiotmptei_DCXM_pw3			median(0,ratio_tmp_tei-26,44-26)	0.0008	0.0003	0.0008
vratiotmptei_DCXM_pw4			median(0,ratio_tmp_tei-44,52-44)	-0.0180	0.0022	<.0001
mpriordef_DCXM	L04	Categorical of prior_default_cnt	prior_default_cnt = 4	-0.0129	0.0043	0.0025
mpriordef_DCXM	L05		prior_default_cnt = 5	-0.0427	0.0052	<.0001
mpriordef_DCXM	L06		prior_default_cnt = 6	-0.0818	0.0063	<.0001
mpriordef_DCXM	L07		prior_default_cnt = 7	-0.1263	0.0077	<.0001
mpriordef_DCXM	L08		prior_default_cnt = 8	-0.1597	0.0093	<.0001
mpriordef_DCXM	L09		prior_default_cnt = 9	-0.2033	0.0115	<.0001
mpriordef_DCXM	L10		prior_default_cnt = >10	-0.2239	0.0119	<.0001
vpriordef_DCXM_pw1		Variate of prior_default_cnt	median(0,prior_default_cnt-10,16-10)	-0.0548	0.0052	<.0001
vsato_DCXM_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-(-.6))	0.3029	0.0099	<.0001
vsato_DCXM_pw2			median(sato-(-.6),0,.9-(-.6))	0.0561	0.0028	<.0001
vsato_DCXM_pw3			median(sato-.9,0,1.82-.9)	-0.0998	0.0101	<.0001
vloanraw_DCXM_pw1			median(0,loansize_raw-0,70000-0)	0.0000	0.0000	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vloanraw_DCXM_pw2		Variate piecewise of loansize_raw	median(0,loansize_raw-70000,98000-70000)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw3			median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw4			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
vSBOI_DCXM_pw1		Variate piecewise of SBOI (small business optimism index)	median(0,mSBOI-85,100-85)	0.0315	0.0005	<.0001
vSBOI_DCXM_pw2			median(0,mSBOI-100,108-100)	-0.0437	0.0009	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.1062	0.0053	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.0223	0.0043	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	0.2247	0.0038	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-4.E-01	6.E-02	<.0001
vMTG_RATE30Y_growthQ_lag3_DCXM1		Variate piecewise of 30 year mortgage rate quarterly growth with 3Q lag	min(MTG_RATE30Y_growthQ_lag3,0.1)	5.E-01	3.E-02	<.0001
vMTG_RATE30Y_growthQ_lag3_DCXM2			max(MTG_RATE30Y_growthQ_lag3,0.1)	3.E+00	7.E-02	<.0001
v_CCI_growthY_lag3_DCXM1		Variate piecewise of CCI yearly growth with 3Q lag	min(CCI_growthY_lag3,0.25)	-0.5071	0.0074	<.0001
v_CCI_growthY_lag3_DCXM2			max(CCI_growthY_lag3,0.25)	0.8714	0.0172	<.0001
v_TR1Q_growthQ_DCXM1		Variate piecewise of Quarterly treasure rate quarterly growth	median(0,TR1Q_growthQ-0,2-0)	0.0852	0.0035	<.0001
v_TR1Q_growthQ_DCXM2			max(TR1Q_growthQ,2)	-0.4044	0.0066	<.0001

Default Transition Model Parameters – FRM30NSR D_CXS

The model parameters for the FRM30NSR default to self-cure transition are shown below.

Table 47: Default to Self-Cure Transition FRM30NSR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-1.7756	0.0494	<.0001
mseason	1	Categorical of season	season = "winter"	0.2491	0.0015	<.0001
mseason	2		season = "spring"	0.2884	0.0015	<.0001
mseason	3		season = "summer"	0.1490	0.0016	<.0001
mjudicial	1	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.1086	0.0011	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-1.7756	0.0494	<.0001
mdpa_rel	**LRela**	Categorical of dpa (down payment assistance)	dpa = "Relative"	0.0394	0.0014	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.0210	0.0012	<.0001
mycslope_DCXS	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=111	-0.1211	0.0019	<.0001
mycslope_DCXS	**L02**		ycslope_r>=2000	0.1891	0.0027	<.0001
mycslope_DCXS	**L03**		ycslope_r>=875	0.0667	0.0027	<.0001
mhpa2yb_DCXS	**L080**	Categorical of hpa2y_blended_r[6]	hpa2y_blended_r <= 80	-0.0411	0.0053	<.0001
vhpa2yb_DCXS_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-80,99-80)	0.0141	0.0002	<.0001
vhpa2yb_DCXS_pw2			median(0,hpa2y_blended_r-99,105-99)	-0.0180	0.0004	<.0001
vhpa2yb_DCXS_pw3			median(0,hpa2y_blended_r-105,115-105)	0.0069	0.0002	<.0001
vhpa2yb_DCXS_pw4			median(0,hpa2y_blended_r-115,180-115)	0.0023	0.0002	<.0001
mperiodnbr_DCXS	**L02**	Categorical of period_number	period_number <= 2	1.2472	0.0107	<.0001
mperiodnbr_DCXS	**L03**		period_number = 3	0.3748	0.0051	<.0001
vperiodnbr_DCXS_pw1		Variate piecewise of period_number	median(0,period_number-4,9-4)	-0.0352	0.0006	<.0001
vperiodnbr_DCXS_pw2			median(0,period_number-9,17-9)	0.0054	0.0003	<.0001
vperiodnbr_DCXS_pw3			median(0,period_number-17,30-17)	0.0112	0.0002	<.0001
vperiodnbr_DCXS_pw4			median(0,period_number-30,38-30)	0.0077	0.0003	<.0001
vperiodnbr_DCXS_pw5			median(0,period_number-38,57-38)	0.0099	0.0002	<.0001
vperiodnbr_DCXS_pw6			median(0,period_number-57,85-57)	0.0049	0.0002	<.0001
vperiodnbr_DCXS_pw7			median(0,period_number-85,105-85)	-0.0037	0.0005	<.0001
mcredit_DCXS	**L01**	Categorical of credit_score	credit_score = 0	0.2175	0.0034	<.0001
vcredit_DCXS_pw1		Variate piecewise of credit_score	median(0,credit_score-500,625-500)	0.0030	0.0000	<.0001
vcredit_DCXS_pw2			median(0,credit_score-625,680-625)	0.0030	0.0000	<.0001
vcredit_DCXS_pw3			median(0,credit_score-680,780-680)	0.0004	0.0000	<.0001
mdurdefepi_DCXS	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.6109	0.0013	<.0001
mdurdefepi_DCXS	**L03**		dur_def_episode = 3	-0.9817	0.0017	<.0001
mdurdefepi_DCXS	**L04**		dur_def_episode = 4	-1.3488	0.0022	<.0001
mdurdefepi_DCXS	**L05**		dur_def_episode = 5	-1.5494	0.0027	<.0001
mdurdefepi_DCXS	**L06**		dur_def_episode = 6	-1.7638	0.0033	<.0001
mdurdefepi_DCXS	**L07**		dur_def_episode = 7	-1.9533	0.0040	<.0001
mdurdefepi_DCXS	**L08**		dur_def_episode = 8	-2.1379	0.0048	<.0001
mdurdefepi_DCXS	**L09**		dur_def_episode = 9	-2.2609	0.0055	<.0001
mdurdefepi_DCXS	**L10**		dur_def_episode = 10	-2.4061	0.0063	<.0001
mdurdefepi_DCXS	**L11**		else	-2.5465	0.0069	<.0001
vdurdefepi_DCXS_pw1		Variate piecewise of dur_def_episode	median(0,dur_def_episode-10,16-10)	-0.0156	0.0017	<.0001
vdurdefepi_DCXS_pw2			median(0,dur_def_episode-16,30-16)	-0.0170	0.0007	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-1.7756	0.0494	<.0001
		(duration of default episode)				
vdeltaUEInit_DCXS_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,60-0)	0.0017	0.0001	<.0001
vdeltaUEInit_DCXS_pw2			median(0,DeltaUEInit_r-60,100-60)	-0.0025	0.0001	<.0001
vdeltaUEInit_DCXS_pw3			median(0,DeltaUEInit_r-100,116-100)	-0.0066	0.0001	<.0001
vdeltaUEInit_DCXS_pw4			median(0,DeltaUEInit_r-116,218-116)	-0.0015	0.0000	<.0001
mRatioTmpTei_DCXS	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.3219	0.0060	<.0001
vratiotmptei_DCXS_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	-0.0147	0.0002	<.0001
vratiotmptei_DCXS_pw2			median(0,ratio_tmp_tei-24,36-24)	-0.0105	0.0002	<.0001
vratiotmptei_DCXS_pw3			median(0,ratio_tmp_tei-36,50-36)	-0.0022	0.0003	<.0001
mpriordef_DCXS	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.1030	0.0015	<.0001
mpriordef_DCXS	**L02**		prior_default_cnt > 1	-0.1426	0.0017	<.0001
vpriordef_DCXS_pw1		Variate of prior_default_cnt	median(0,prior_default_cnt-1,22-1)	0.0073	0.0003	<.0001
vdeltaUEpr3_DCXS_pw1		Variate piecewise of deltaueepr3_r[5] (change in unemployment from 3 quarters prior)	median(0,delta_ue_sa_st_r-(-20),-30-(-20))	0.0019	0.0002	<.0001
vdeltaUEpr3_DCXS_pw2			median(0,delta_ue_sa_st_r-(-20),10-(-20))	-0.0003	0.0001	<.0001
vUEblend_DCXS_pw1		Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r-200,480-200)	-0.0006	0.0000	<.0001
vUEblend_DCXS_pw2			median(0,ue_blended_r-480,800-480)	-0.0002	0.0000	<.0001
vltv_DCXS_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,71-0)	-0.0019	0.0009	0.0358
vloanraw_DCXS_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-27000,70000-27000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw2			median(0,loansize_raw-70000,98000-70000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw3			median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw4			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
mDeltaTY10_DCXS	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r 2< 53	-0.0369	0.0017	<.0001
mDeltaTY10_DCXS	**L02**		DeltaTy10Init_r2 > 112	0.1118	0.0019	<.0001
mDeltaTm3_DCXS	**L01**		DeltaTm3Init_r12 > 1000	1.E-01	2.E-03	<.0001
mTY30_DCXS	**L01**	Categorical of treasury_yr_30	treasury_yr_30>6	-6.E-02	6.E-03	<.0001
mcalperiod_DCXS	**L01**	Categorical of Calendar Period	period < 200102	3.E-02	7.E-03	<.0001
vSBOI_DCXS_pw1		Variate piecewise of SBOI (small business optimism index)	median(0,mSBOI-85,100-85)	-0.0352	0.0002	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.2491	0.0025	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-1.7756	0.0494	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1967	0.0024	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.3162	0.0027	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	8.9778	0.0489	<.0001
v_CCI_lag2_DCXS_pw1		Variate piecewise of CCI with 2Q lag	min(CCI_lag2,50)	0.0181	0.0003	<.0001
v_CCI_lag2_DCXS_pw2			max(CCI_lag2,50)	0.0027	0.0001	<.0001
v_HPI_CW_lag1_DCXS_pw1		Variate piecewise of country wide HPI with 1Q lag	min(HPI_CW_lag1,180)	0.0145	0.0002	<.0001
v_HPI_CW_lag1_DCXS_pw2			median(0,HPI_CW_lag1 - 180, 230 - 180)	0.0068	0.0001	<.0001
v_HPI_CW_lag1_DCXS_pw3			max(HPI_CW_lag1,230)	-0.0004	0.0001	<.0001

Default Transition Model Parameters – FRM30NSR D_END

The model parameters for the FRM30NSR default to end (prepayment or refinance) transition are shown below.

Table 48: Default to End Transition FRM30NSR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-3.3327	0.0436	<.0001
mseason	**1**	Categorical of season	season = "winter"	-0.1111	0.0046	<.0001
mseason	**2**		season = "spring"	0.1488	0.0045	<.0001
mseason	**3**		season = "summer"	0.1090	0.0046	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.2057	0.0031	<.0001
mdpa	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	-0.1701	0.0112	<.0001
mdpa	**2**		dpa = "nonprof"	-0.4003	0.0072	<.0001
mdpa	**3**		dpa = "relative"	0.0534	0.0041	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.1389	0.0034	<.0001
mycslope_DEND	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=111	0.1615	0.0050	<.0001
mycslope_DEND	**L02**		ycslope_r>=875	-0.7144	0.0073	<.0001
mycslope_DEND	**L03**		ycslope_r>=2000	-0.5942	0.0073	<.0001
vhpa2yb_DEND_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-80,105-80)	0.0120	0.0006	<.0001
vhpa2yb_DEND_pw2			median(0,hpa2y_blended_r-105,120-105)	0.0602	0.0004	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vhpa2yb_DEND_pw3			median(0,hpa2y_blended_r-120,180-120)	0.0388	0.0003	<.0001
vperiodnbr_DEND_pw2		Variate piecewise of period_number	median(0,period_number-6,30-6)	0.0235	0.0003	<.0001
vperiodnbr_DEND_pw3			median(0,period_number-30,65-30)	0.0107	0.0003	<.0001
vperiodnbr_DEND_pw5			median(0,period_number-97,120-97)	0.0705	0.0021	<.0001
mcredit_DEND	**L01**	Categorical of credit_score	credit_score = 0	0.4619	0.0226	<.0001
vcredit_DEND_pw1		Variate piecewise of credit_score	median(0,credit_score-450,600-450)	0.0014	0.0002	<.0001
vcredit_DEND_pw2			median(0,credit_score-600,680-600)	0.0050	0.0001	<.0001
vcredit_DEND_pw3			median(0,credit_score-680,780-680)	0.0034	0.0001	<.0001
mdurdefepi_DEND	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.4831	0.0045	<.0001
mdurdefepi_DEND	**L03**		dur_def_episode = 3	-0.6638	0.0054	<.0001
mdurdefepi_DEND	**L04**		dur_def_episode = 4	-0.7649	0.0064	<.0001
mdurdefepi_DEND	**L05**		dur_def_episode = 5	-0.8804	0.0076	<.0001
mdurdefepi_DEND	**L06**		dur_def_episode = 6	-0.9376	0.0085	<.0001
mdurdefepi_DEND	**L07**		dur_def_episode = 7	-1.0049	0.0095	<.0001
mdurdefepi_DEND	**L08**		dur_def_episode = 8	-1.0186	0.0103	<.0001
mdurdefepi_DEND	**L09**		dur_def_episode = 9	-1.0411	0.0112	<.0001
mdurdefepi_DEND	**L10**		dur_def_episode = 10	-1.0618	0.0120	<.0001
mdurdefepi_DEND	**L11**		dur_def_episode >10	-1.1132	0.0077	<.0001
vdurdefepi_DEND_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0139	0.0008	<.0001
vdurdefepi_DEND_pw2			median(0,dur_def_episode-30,40-30)	-0.0285	0.0023	<.0001
vdeltaUEInit_DEND_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,63-0)	-0.0055	0.0004	<.0001
vdeltaUEInit_DEND_pw2			median(0,DeltaUEInit_r-63,100-63)	0.0011	0.0001	<.0001
vdeltaUEInit_DEND_pw4			median(0,DeltaUEInit_r-116,200-116)	-0.0066	0.0008	<.0001
mRatioTmpTei_DEND	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.4119	0.0215	<.0001
vratiotmptei_DEND_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,15-0)	-0.0236	0.0014	<.0001
vratiotmptei_DEND_pw2			median(0,ratio_tmp_tei-15,24-15)	-0.0130	0.0007	<.0001
vratiotmptei_DEND_pw3			median(0,ratio_tmp_tei-24,50-24)	-0.0042	0.0003	<.0001
mpriordef_DEND	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.3217	0.0041	<.0001
mpriordef_DEND	**L02**		prior_default_cnt = 2	-0.5075	0.0054	<.0001
mpriordef_DEND	**L03**		prior_default_cnt = 3	-0.6703	0.0069	<.0001
mpriordef_DEND	**L04**		prior_default_cnt = 4	-0.7981	0.0084	<.0001
mpriordef_DEND	**L05**		prior_default_cnt = 5	-0.9249	0.0102	<.0001
mpriordef_DEND	**L06**		prior_default_cnt = 6	-1.0075	0.0120	<.0001
mpriordef_DEND	**L07**		prior_default_cnt = 7	-1.0510	0.0140	<.0001
mpriordef_DEND	**L08**		prior_default_cnt = 8	-1.1086	0.0166	<.0001
mpriordef_DEND	**L09**		prior_default_cnt = 9	-1.1292	0.0196	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mpriordef_DEND	**L10**		prior_default_cnt >= 10	-1.1587	0.0146	<.0001
vsato_DEND_pw1		Variate piecewise of sato (spread at origination)	median(sato-(-.4),0,.95-(-.4))	0.0149	0.0037	<.0001
vdeltaUEpr3_DEND_pw1		Variate piecewise of deltauepr3_r[5] (change in unemployment from 3 quarters prior)	median(0,delta_ue_sa_st_r-(-20),-30-(-20))	0.0027	0.0005	<.0001
vdeltaUEpr3_DEND_pw2			median(0,delta_ue_sa_st_r-(-20),10-(-20))	0.0039	0.0002	<.0001
vUEblend_DEND_pw1		Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r-0,450-0)	-0.0013	0.0000	<.0001
vUEblend_DEND_pw2			median(0,ue_blended_r-450,850-450)	-0.0007	0.0000	<.0001
vUEblend_DEND_pw3			median(0,ue_blended_r-850,1500-850)	-0.0001	0.0000	<.0001
vltv_DEND_pw6		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-94,99-94)	-0.2367	0.0035	<.0001
vloanraw_DEND_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-30000,70000-30000)	0.0000	0.0000	<.0001
vloanraw_DEND_pw2			median(0,loansize_raw-70000,98000-70000)	0.0000	0.0000	<.0001
vloanraw_DEND_pw3			median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
vloanraw_DEND_pw4			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
mDeltaTY10_DEND	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-2.E-01	6.E-03	<.0001
mprior3_ue_DEND	**L01**	Categorical of prior3_ue_r[11] (state unemployment 3 prior quarters)	prior3_ue_r11<1400	1.E-01	2.E-02	<.0001
vSBOI_DEND_pw1		Variate piecewise of SBOI (small business optimism index)	median(0,mSBOI-85,100-85)	3.E-02	1.E-03	<.0001
vSBOI_DEND_pw2			median(0,mSBOI-100,108-100)	0.0408	0.0011	<.0001
vCCI_DEND_pw1			median(0,mCCI-25,100-25)	-0.0085	0.0002	<.0001
vCCI_DEND_pw2			median(0,mCCI-100,142-100)	-0.0146	0.0002	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.1364	0.0082	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1788	0.0064	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.2443	0.0059	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-3.3895	0.1002	<.0001

Default Transition Model Parameters – FRM30SR D_CLM

The model parameters for the FRM30SR default to claim transition are shown below.

Table 49: Default to Claim Transition FRM30SR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				5.5555	0.1857	<.0001
mseason_grp_DCLM	**L02**	Categorical of season	mseason = 2	0.0235	0.0063	0.0002
mseason_grp_DCLM	**L03**		mseason = 3	0.0327	0.0066	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.2373	0.0055	<.0001
mcalperiod_DCLM	**L199704**	Categorical of Calendar Period	period < 199704	1.2432	0.0260	<.0001
mcalperiod_DCLM	**L200104**		period < 200104	0.7644	0.0211	<.0001
mcalperiod_DCLM	**L200604**		period < 200604	0.2381	0.0131	<.0001
mycslope_DCLM	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=141	-0.0879	0.0094	<.0001
vycslope_DCLM_pw1			median(0,ycslope_r-141,478-141)	-0.0001	0.0000	<.0001
vhpa2yb_DCLM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-45,85-45)	-0.0138	0.0013	<.0001
vhpa2yb_DCLM_pw2			median(0,hpa2y_blended_r-85,100-85)	0.0115	0.0010	<.0001
vhpa2yb_DCLM_pw3			median(0,hpa2y_blended_r-100,138-100)	-0.0069	0.0004	<.0001
vhpa2yb_DCLM_pw4			median(0,hpa2y_blended_r-138,160-138)	-0.0366	0.0031	<.0001
mperiodnbr_DCLM	**L02**	Categorical of period_number	period_number <= 2	-0.6378	0.1783	0.0003
mperiodnbr_DCLM	**L03**		period_number = 3	-0.4183	0.0587	<.0001
mperiodnbr_DCLM	**L04**		period_number = 4	-0.2359	0.0342	<.0001
mperiodnbr_DCLM	**L07**		period_number = 7	0.0998	0.0172	<.0001
mperiodnbr_DCLM	**L08**		period_number = 8	0.1066	0.0161	<.0001
mperiodnbr_DCLM	**L56**		period_number in (5,6)	0.0691	0.0160	<.0001
vperiodnbr_DCLM_pw1		Variate piecewise of period_number	median(0,period_number-9,17-9)	0.0113	0.0014	<.0001
vperiodnbr_DCLM_pw2			median(0,period_number-17,59-17)	0.0033	0.0004	<.0001
vperiodnbr_DCLM_pw3			median(0,period_number-59,86-59)	-0.0176	0.0019	<.0001
vcredit_DCLM_pw1		Variate piecewise of credit_score	median(0,credit_score-550,635-550)	-0.0011	0.0002	<.0001
vcredit_DCLM_pw2			median(0,credit_score-635,780-635)	0.0046	0.0002	<.0001
mdurdefepi_DCLM	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.6937	0.0115	<.0001
mdurdefepi_DCLM	**L03**		dur_def_episode = 3	1.1936	0.0112	<.0001
mdurdefepi_DCLM	**L04**		dur_def_episode = 4	1.4107	0.0115	<.0001
mdurdefepi_DCLM	**L05**		dur_def_episode = 5	1.5115	0.0120	<.0001
mdurdefepi_DCLM	**L06**		dur_def_episode = 6	1.5033	0.0127	<.0001
mdurdefepi_DCLM	**L07**		dur_def_episode = 7	1.4814	0.0136	<.0001
mdurdefepi_DCLM	**L08**		dur_def_episode = 8	1.4069	0.0146	<.0001
mdurdefepi_DCLM	**L09**		dur_def_episode = 9	1.4081	0.0155	<.0001
mdurdefepi_DCLM	**L10**		dur_def_episode = 10	1.3734	0.0166	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mdurdefepi_DCLM	**L11**		dur_def_episode = 11	1.3314	0.0179	<.0001
mdurdefepi_DCLM	**L12**		dur_def_episode = 12	1.3057	0.0191	<.0001
mdurdefepi_DCLM	**L13**		dur_def_episode = 13	1.3188	0.0203	<.0001
mdurdefepi_DCLM	**L14**		else	1.2820	0.0154	<.0001
vdurdefepi_DCLM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-13,40-13)	-0.0199	0.0015	<.0001
vdurdefepi_DCLM_pw2			median(0,dur_def_episode-40,50-40)	-0.1999	0.0170	<.0001
vdeltaUEinit_DCLM_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,53-0)	-0.0143	0.0010	<.0001
vdeltaUEinit_DCLM_pw2			median(0,DeltaUEInit_r-53,98-53)	-0.0097	0.0002	<.0001
vdeltaUEinit_DCLM_pw3			median(0,DeltaUEInit_r-98,330-98)	0.0009	0.0001	<.0001
vratiotmptei_DCLM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0039	0.0003	<.0001
mpriordef_DCLM	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.3882	0.0070	<.0001
mpriordef_DCLM	**L02**		prior_default_cnt = 2	-0.5903	0.0094	<.0001
mpriordef_DCLM	**L03**		prior_default_cnt = 3	-0.7515	0.0122	<.0001
mpriordef_DCLM	**L04**		prior_default_cnt = 4	-0.9184	0.0157	<.0001
mpriordef_DCLM	**L05**		prior_default_cnt = 5	-1.0180	0.0200	<.0001
mpriordef_DCLM	**L06**		prior_default_cnt = 6	-1.2225	0.0267	<.0001
mpriordef_DCLM	**L07**		prior_default_cnt = 7	-1.2996	0.0346	<.0001
mpriordef_DCLM	**L08**		prior_default_cnt = 8	-1.4636	0.0468	<.0001
mpriordef_DCLM	**L09**		else	-1.3384	0.0757	<.0001
vpriordef_DCLM_pw1		Variate of prior_default_cnt	median(0,prior_default_cnt-8,15-8)	-0.1422	0.0307	<.0001
vdeltaUEpr3_DCLM_pw2		Variate piecewise of deltauepr3_r[5] (change in unemployment from 3 quarters prior)	median(0,delta_ue_sa_st_r-(-20),10-(-20))	-0.0051	0.0003	<.0001
vUEblend_DCLM_pw1		Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r-200,550-200)	0.0026	0.0001	<.0001
vUEblend_DCLM_pw2			median(0,ue_blended_r-550,850-550)	-0.0005	0.0000	<.0001
vUEblend_DCLM_pw3			median(0,ue_blended_r-850,1500-850)	0.0003	0.0000	<.0001
vltv_DCLM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-40,70-40)	0.0038	0.0005	<.0001
vltv_DCLM_pw2			median(0,ltv_i_r-70,81-70)	0.0248	0.0013	<.0001
vltv_DCLM_pw3			median(0,ltv_i_r-81,92-81)	0.0074	0.0010	<.0001
vltv_DCLM_pw4			median(0,ltv_i_r-92,100-92)	0.0398	0.0029	<.0001
vloanraw_DCLM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-60000,100000-60000)	0.0000	0.0000	<.0001
vloanraw_DCLM_pw2			median(0,loansize_raw-100000,200000-100000)	-1.E-06	1.E-07	<.0001
vloanraw_DCLM_pw3			median(0,loansize_raw-200000,500000-200000)	-2.E-06	7.E-08	<.0001
mTY30_DCLM	**L07**	Categorical of treasury_yr_30	treasury_yr_30 > 7	3.E-01	3.E-02	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.3978	0.0231	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.6365	0.0237	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.8952	0.0262	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	34.9374	0.7756	<.0001
v_MTG_RATE30Y_growthQ_DCLM_pw1		Variate piecewise of 30 year mortgage rate quarterly growth	min(MTG_RATE30Y_growthQ,0.1)	0.1427	0.0547	0.0091
v_MTG_RATE30Y_growthQ_DCLM_pw2			max(MTG_RATE30Y_growthQ,0.1)	2.5112	0.1710	<.0001
v_MTG_RATE30Y_lag4_DCLM_pw1		Variate piecewise of 30 year mortgage rate with 4Q lag	min(MTG_RATE30Y_lag4,5)	-0.2369	0.0084	<.0001
v_MTG_RATE30Y_lag4_DCLM_pw2		Variate piecewise of 30 year mortgage rate with 4Q lag	max(MTG_RATE30Y_lag4,5)	-0.0708	0.0078	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.2140	0.0746	0.0041

Default Transition Model Parameters – FRM30SR D_CXM

The model parameters for the FRM30SR default to modified cure transition are shown below.

Table 50: Default to Modified Cure Transition FRM30SR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-5.9545	0.0954	<.0001
mcalperiod_DCXM	**L200604**	Categorical of Calendar Period	period < 200604	-6.4127	0.1477	<.0001
mseason	**1**	Categorical of season	season = "winter"	0.0677	0.0084	<.0001
mseason	**2**		season = "spring"	0.2326	0.0083	<.0001
mseason	**3**		season = "summer"	0.1570	0.0085	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.0667	0.0053	<.0001
vhpa2yb_DCXM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-65,83-65)	0.0190	0.0018	<.0001
vhpa2yb_DCXM_pw3			median(0,hpa2y_blended_r-94,115-94)	0.0091	0.0005	<.0001
vhpa2yb_DCXM_pw4			median(0,hpa2y_blended_r-115,140-115	0.0063	0.0009	<.0001
mperiodnbr_DCXM	**L03**	Categorical of period_number	period_number = 3	0.1366	0.0392	0.0005
mperiodnbr_DCXM	**L04**		period_number = 4	0.1308	0.0299	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vperiodnbr_DCXM_pw1		Variate piecewise of period_number	median(0,period_number-4,8-4)	0.1325	0.0066	<.0001
vperiodnbr_DCXM_pw2			median(0,period_number-8,12-8)	-0.0470	0.0035	<.0001
vperiodnbr_DCXM_pw3			median(0,period_number-12,21-12)	0.0268	0.0012	<.0001
vperiodnbr_DCXM_pw4			median(0,period_number-21,59-21)	-0.0017	0.0004	<.0001
mdurdefepi_DCXM	L02	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.4166	0.0076	<.0001
mdurdefepi_DCXM	L03		dur_def_episode = 3	0.4769	0.0083	<.0001
mdurdefepi_DCXM	L04		dur_def_episode = 4	0.4571	0.0092	<.0001
mdurdefepi_DCXM	L05		dur_def_episode = 5	0.2997	0.0109	<.0001
mdurdefepi_DCXM	L06		dur_def_episode = 6	0.2049	0.0124	<.0001
mdurdefepi_DCXM	L07		dur_def_episode = 7	0.0632	0.0144	<.0001
mdurdefepi_DCXM	L08		dur_def_episode = 8	0.1247	0.0153	<.0001
vdurdefepi_DCXM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-7,23-7)	-0.1562	0.0032	<.0001
vdeltaUEinit_DCXM_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,66-0)	0.0024	0.0006	<.0001
vdeltaUEinit_DCXM_pw2			median(0,DeltaUEInit_r-66,90-66)	-0.0013	0.0005	0.0047
vdeltaUEinit_DCXM_pw3			median(0,DeltaUEInit_r-90,131-90)	0.0046	0.0003	<.0001
vdeltaUEinit_DCXM_pw4			median(0,DeltaUEInit_r-131,200-131	0.0032	0.0002	<.0001
mRatioTmpTei_DCXM	L00	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.2508	0.0369	<.0001
vratiotmptei_DCXM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0139	0.0019	<.0001
vratiotmptei_DCXM_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0078	0.0018	<.0001
vratiotmptei_DCXM_pw3			median(0,ratio_tmp_tei-36,100-36)	-0.0040	0.0008	<.0001
mpriordef_DCXM	L01	Categorical of prior_default_cnt	prior_default_cnt = 1	0.0820	0.0072	<.0001
mpriordef_DCXM	L02		prior_default_cnt = 2	0.0916	0.0084	<.0001
mpriordef_DCXM	L03		prior_default_cnt = 3	0.0729	0.0098	<.0001
mpriordef_DCXM	L04		prior_default_cnt = 4	0.0705	0.0114	<.0001
mpriordef_DCXM	L05		prior_default_cnt >= 5	0.0282	0.0123	0.0223
vpriordef_DCXM_pw1		Variate pf prior_default_cnt	median(0,prior_default_cnt-5,9-5)	-0.0385	0.0056	<.0001
vpriordef_DCXM_pw2			median(0,prior_default_cnt-9,14-9)	-0.0661	0.0098	<.0001
vsato_DCXM_pw1		Variate piecewise of sato (spread at origination)	median(sato-(-1.4),0,.6-(-1.4))	0.0364	0.0075	<.0001
vsato_DCXM_pw2			max(sato-.6,0)	0.1084	0.0258	<.0001
vUEblend_DCXM_pw1		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-200,420-200)	0.0010	0.0001	<.0001
vUEblend_DCXM_pw2			median(0,ue_blended_r-420,940-420)	-0.0006	0.0000	<.0001
vUEblend_DCXM_pw3			median(0,ue_blended_r-940,1500-940)	-0.0002	0.0000	<.0001
vltv_DCXM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-48,82-48)	0.0050	0.0005	<.0001
vltv_DCXM_pw2			median(0,ltv_i_r-82,91-82)	0.0089	0.0009	<.0001
vloanraw_DCXM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,70000-0)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw2			median(0,loansize_raw-70000,120000-70000)	0.0000	0.0000	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vloanraw_DCXM_pw3			median(0,loansize_raw-120000,400000-120000)	0.0000	0.0000	<.0001
mDeltaTY10_DCXM	**L01**	Categorical of DeltaTy10Init_r^2 (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.1378	0.0079	<.0001
mDeltaTM3_DCXM	**L02**	Categorical of DeltaTm3Init_r^{12} (change in 3 month treasury from policy inception to current)	DeltaTM3Init_r > 550	-0.3082	0.0104	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.1705	0.0158	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	0.0869	0.0100	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	0.3419	0.0078	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-1.3983	0.1355	<.0001
vMTG_RATE30Y_growthQ_lag3_DCXM1		Variate piecewise of 30 year mortgage rate quarterly growth with 3Q lag	min(MTG_RATE30Y_growthQ_lag3,0.1)	0.4381	0.0589	<.0001
vMTG_RATE30Y_growthQ_lag3_DCXM2			max(MTG_RATE30Y_growthQ_lag3,0.1)	2.0349	0.1706	<.0001
v_CCI_growthY_lag3_DCXM_pw1		Variate piecewise of CCI yearly growth with 3Q lag	min(CCI_growthY_lag3,0.25)	-0.2852	0.0166	<.0001
v_CCI_growthY_lag3_DCXM_pw2			max(CCI_growthY_lag3,0.25)	0.8911	0.0385	<.0001
v_TR1Q_growthQ_DCXM_pw1		Variate piecewise of quarterly treature rate quarterly growth	median(0,TR1Q_growthQ-0,2-0)	0.0475	0.0075	<.0001
v_TR1Q_growthQ_DCXM_pw2			max(TR1Q_growthQ,2)	-0.3399	0.0149	<.0001

Default Transition Model Parameters – FRM30SR D_CXS

The model parameters for the FRM30SR default to self-cure transition are shown below.

Table 51: Default to Self-Cure Transition FRM30SR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-0.0970	0.0509	0.0567
mcalperiod_DCXS	**L200104**	Categorical of Calendar Period	period < 200104	-1.4759	0.0089	<.0001
mcalperiod_DCXS	**L200604**		period < 200604	-0.8185	0.0064	<.0001
mseason	**1**	Categorical of season	season = "winter"	0.1912	0.0036	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mseason	**2**		season = "spring"	0.2407	0.0036	<.0001
mseason	**3**		season = "summer"	0.1216	0.0038	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.1137	0.0027	<.0001
mhpa2yb_DCXS	**L085**	Categorical of hpa2y_blended_r[6]	hpa2y_blended_r <= 80	0.0561	0.0125	<.0001
vhpa2yb_DCXS_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-80,99-80)	0.0103	0.0005	<.0001
vhpa2yb_DCXS_pw2			median(0,hpa2y_blended_r-99,105-99)	-0.0080	0.0010	<.0001
vhpa2yb_DCXS_pw3			median(0,hpa2y_blended_r-105,116-105)	0.0083	0.0004	<.0001
vhpa2yb_DCXS_pw4			median(0,hpa2y_blended_r-116,180-116)	0.0077	0.0004	<.0001
mperiodnbr_DCXS	**L02**	Categorical of period_number	period_number <= 2	1.5042	0.0220	<.0001
mperiodnbr_DCXS	**L03**		period_number = 3	0.5085	0.0106	<.0001
mperiodnbr_DCXS	**L04**		period_number = 4	0.1505	0.0090	<.0001
vperiodnbr_DCXS_pw1		Variate piecewise of period_number	median(0,period_number-5,15-5)	-0.0207	0.0007	<.0001
vperiodnbr_DCXS_pw2			median(0,period_number-15,25-15)	0.0103	0.0005	<.0001
vperiodnbr_DCXS_pw3			median(0,period_number-25,57-25)	-0.0019	0.0002	<.0001
vperiodnbr_DCXS_pw4			median(0,period_number-57,85-57)	0.0059	0.0005	<.0001
vperiodnbr_DCXS_pw5			median(0,period_number-85,105-85)	-0.0066	0.0017	<.0001
mdurdefepi_DCXS	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.6687	0.0033	<.0001
mdurdefepi_DCXS	**L03**		dur_def_episode = 3	-1.0558	0.0042	<.0001
mdurdefepi_DCXS	**L04**		dur_def_episode = 4	-1.4216	0.0054	<.0001
mdurdefepi_DCXS	**L05**		dur_def_episode = 5	-1.6219	0.0067	<.0001
mdurdefepi_DCXS	**L06**		dur_def_episode = 6	-1.8194	0.0082	<.0001
mdurdefepi_DCXS	**L07**		dur_def_episode = 7	-2.0387	0.0101	<.0001
mdurdefepi_DCXS	**L08**		dur_def_episode = 8	-2.1788	0.0119	<.0001
mdurdefepi_DCXS	**L09**		dur_def_episode = 9	-2.3063	0.0137	<.0001
mdurdefepi_DCXS	**L10**		dur_def_episode = 10	-2.4483	0.0158	<.0001
mdurdefepi_DCXS	**L11**		dur_def_episode >10	-2.5087	0.0214	<.0001
vdurdefepi_DCXS_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,14-10)	-0.0335	0.0069	<.0001
vdurdefepi_DCXS_pw2			median(0,dur_def_episode-14,35-14)	-0.0196	0.0014	<.0001
vdeltaUEinit_DCXS_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,59-0)	0.0033	0.0003	<.0001
vdeltaUEinit_DCXS_pw2			median(0,DeltaUEInit_r-59,95-59)	0.0013	0.0002	<.0001
vdeltaUEinit_DCXS_pw3			median(0,DeltaUEInit_r-95,104-95)	-0.0088	0.0006	<.0001
vdeltaUEinit_DCXS_pw4			median(0,DeltaUEInit_r-104,200-104)	-0.0009	0.0001	<.0001
mRatioTmpTei_DCXS	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.1779	0.0084	<.0001
vratiotmptei_DCXS_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-10,24-10)	-0.0107	0.0008	<.0001
vratiotmptei_DCXS_pw2			median(0,ratio_tmp_tei-24,46-24)	-0.0060	0.0006	<.0001
mpriordef_DCXS	**L01**		prior_default_cnt = 1	-0.0218	0.0036	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mpriordef_DCXS	**L02**	Categorical of prior_default_cnt	else	-0.0379	0.0035	<.0001
vsato_DCXS_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-0)	-0.0553	0.0068	<.0001
vsato_DCXS_pw2			median(sato-0,0,.6-0)	-0.0923	0.0068	<.0001
vsato_DCXS_pw3			median(sato-.6,0,1.82-.6)	-0.0903	0.0115	<.0001
vdeltaUEpr3_DCXS_pw1		Variate piecewise of deltauepr3_r[5] (change in unemployment from 3 quarters prior)	min(0,delta_ue_sa_st_r-(-20))	0.0004	0.0000	<.0001
vdeltaUEpr3_DCXS_pw2			median(delta_ue_sa_st_r-(-20),0,10-(-20))	0.0019	0.0001	<.0001
vdeltaUEpr3_DCXS_pw3			max(delta_ue_sa_st_r-10,0)	0.0003	0.0000	<.0001
vUEblend_DCXS_pw1		Variate piecewise of ue_blended_r[8] (unemployment rate)	median(0,ue_blended_r-200,473-200)	-0.0008	0.0000	<.0001
vUEblend_DCXS_pw2			median(0,ue_blended_r-473,750-473)	-0.0004	0.0000	<.0001
vUEblend_DCXS_pw3			median(0,ue_blended_r-750,1500-750)	-0.0003	0.0000	<.0001
vltv_DCXS_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-69,85-69)	-0.0050	0.0003	<.0001
vltv_DCXS_pw2			median(0,ltv_i_r-85,94-85)	-0.0205	0.0006	<.0001
vltv_DCXS_pw3			median(0,ltv_i_r-94,99-94)	-0.0287	0.0024	<.0001
vloanraw_DCXS_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-27000,158000-27000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw2			median(0,loansize_raw-158000,520000-158000)	0.0000	0.0000	<.0001
mDeltaTY10_DCXS	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r > 127	0.1508	0.0051	<.0001
mDeltaTm3_DCXS	**L01**	Categorical of DeltaTm3Init_r[12] (change in 3 month treasury from policy inception to current)	DeltaTm3Init_r > 1000	0.1235	0.0052	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.2977	0.0066	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.4288	0.0111	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.5037	0.0073	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	5.5181	0.1571	<.0001
v_CCI_lag2_DCXS_pw1		Variate piecewise of CCI with 2Q lag	min(CCI_lag2,50)	0.0285	0.0007	<.0001
v_CCI_lag2_DCXS_pw2			max(CCI_lag2,50)	3.E-03	1.E-04	<.0001

Default Transition Model Parameters – FRM30SR D_END

The model parameters for the FRM30SR default to end (prepayment or refinance) transition are shown below.

Table 52: Default to End Transition FRM30SR Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-3.3699	0.0797	<.0001
mseason_grp_DEND	**L02**	Categorical of season	mseason = 2	0.2052	0.0092	<.0001
mseason_grp_DEND	**L03**		mseason = 3	0.1782	0.0097	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (yes)	-0.2260	0.0080	<.0001
mycslope_DEND	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=125	0.1043	0.0098	<.0001
mycslope_DEND	**L02**		ycslope_r>=470	-0.5956	0.0137	<.0001
mycslope_DEND	**L03**		ycslope_r>=2200	-0.6866	0.0174	<.0001
vhpa2yb_DEND_pw2		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-102,109-102)	0.0642	0.0023	<.0001
vhpa2yb_DEND_pw3			median(0,hpa2y_blended_r-109,120-109)	0.0623	0.0012	<.0001
vhpa2yb_DEND_pw4			median(0,hpa2y_blended_r-120,180-120)	0.0352	0.0006	<.0001
mperiodnbr_DEND	**L02**	Categorical of period_number	period_number = 2	0.5241	0.0847	<.0001
mperiodnbr_DEND	**L03**		period_number = 3	0.1307	0.0407	0.0013
vperiodnbr_DEND_pw1		Variate piecewise of period_number	median(0,period_number-3,14-3)	0.0414	0.0054	<.0001
vperiodnbr_DEND_pw2			median(0,period_number-14,32-14)	0.0161	0.0007	<.0001
vperiodnbr_DEND_pw4			median(0,period_number-57,110-57)	0.0120	0.0008	<.0001
mcredit_score_DEND	**L00**	Categorical of credit_score	credit_score = 0	0.0943	0.0180	<.0001
vcredit_DEND_pw1		Variate piecewise of credit_score	median(0,credit_score-642,780-642)	0.0030	0.0004	<.0001
mdurdefepi_DEND	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.5358	0.0107	<.0001
mdurdefepi_DEND	**L03**		dur_def_episode = 3	-0.7098	0.0130	<.0001
mdurdefepi_DEND	**L04**		dur_def_episode = 4	-0.8669	0.0158	<.0001
mdurdefepi_DEND	**L05**		dur_def_episode = 5	-0.9312	0.0186	<.0001
mdurdefepi_DEND	**L06**		dur_def_episode = 6	-0.9949	0.0210	<.0001
mdurdefepi_DEND	**L09**		dur_def_episode <= 9	-1.1140	0.0160	<.0001
mdurdefepi_DEND	**L20**		dur_def_episode <= 20	-1.1722	0.0142	<.0001
mdurdefepi_DEND	**L34**		dur_def_episode <= 34	-1.0719	0.0226	<.0001
mdurdefepi_DEND	**L60**		dur_def_episode <= 60	-1.3381	0.0479	<.0001
mdurdefepi_DEND	**L61**		else	-2.7154	0.1781	<.0001
vdeltaUEinit_DEND_pw1		Variate piecewise of DeltaUEInit_r4 (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-50,98-50)	0.0084	0.0003	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mpriordef_DEND	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.3269	0.0101	<.0001
mpriordef_DEND	**L02**		prior_default_cnt = 2	-0.5700	0.0136	<.0001
mpriordef_DEND	**L03**		prior_default_cnt = 3	-0.7667	0.0174	<.0001
mpriordef_DEND	**L04**		prior_default_cnt = 4	-0.9094	0.0211	<.0001
mpriordef_DEND	**L05**		prior_default_cnt = 5	-1.0318	0.0250	<.0001
mpriordef_DEND	**L07**		prior_default_cnt <= 7	-1.1829	0.0235	<.0001
mpriordef_DEND	**L10**		prior_default_cnt <= 10	-1.3901	0.0296	<.0001
mpriordef_DEND	**L11**		prior_default_cnt > 10	-1.5094	0.0438	<.0001
vdeltaUEpr3_DEND_pw1		Variate piecewise of deltauepr3_r[5] (change in unemployment from 3 quarters prior)	median(delta_ue_sa_st_r-(-20),0,10-(-20))	0.0060	0.0003	<.0001
vdeltaUEpr3_DEND_pw2			max(delta_ue_sa_st_r-10,0)	0.0008	0.0000	<.0001
vUEblend_DEND_pw1		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-200,700-200)	-0.0013	0.0000	<.0001
vUEblend_DEND_pw2			median(0,ue_blended_r-700,900-700)	-0.0016	0.0001	<.0001
mltv_DEND	**L00**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r=.	-0.3871	0.0589	<.0001
vltv_DEND_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-20,55-20)	-0.0159	0.0018	<.0001
vltv_DEND_pw2			median(0,ltv_i_r-55,83-55)	-0.0056	0.0008	<.0001
vltv_DEND_pw3			median(0,ltv_i_r-83,96-83)	-0.0200	0.0012	<.0001
vloanraw_DEND_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
vloanraw_DEND_pw2			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
mDeltaTY10_DEND	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.1501	0.0141	<.0001
mcalperiod_DEND	**L200202**	Categorical of Calendar Period	period < 200202	-0.5866	0.0163	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.2196	0.0195	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1555	0.0193	<.0001
v_UE_CW_growthQ_lag2_pw2		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	min(UE_CW_growthQ_lag2, -0.2)	-2.2931	0.1941	<.0001

Default Transition Model Parameters – FRM15 D_CLM

The model parameters for the FRM15 default to claim transition are shown below.

Table 53: Default to Claim Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				0.5166	0.5661	0.3614
mdpa	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	0.4057	0.1336	0.0024
mdpa	**2**		dpa= "nonprof"	0.3263	0.0390	<.0001
mdpa	**3**		dpa = "relative"	-0.2242	0.0514	<.0001
mperiodnbr_DCLM	**L08**	Categorical of period number	period_number <= 8	0.1369	0.0512	0.0075
vperiodnbr_DCLM_pw2		Variate piecewise of period_number	median(0,period_number-8,20-8)	0.0336	0.0050	<.0001
mcredit_score_DCLM	**L00**	Categorical of credit_score	credit_score = 0	-0.1547	0.0425	0.0003
vcredit_DCLM_pw2		Variate piecewise of credit_score	median(0,credit_score-570,630-570)	-0.0027	0.0007	0.0001
vcredit_DCLM_pw3			median(0,credit_score-630,800-630)	0.0052	0.0004	<.0001
mdurdefepi_DCLM	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	1.3215	0.0574	<.0001
mdurdefepi_DCLM	**L03**		dur_def_episode = 3	1.8259	0.0566	<.0001
mdurdefepi_DCLM	**L04**		dur_def_episode = 4	2.1640	0.0566	<.0001
mdurdefepi_DCLM	**L05**		dur_def_episode = 5	2.4309	0.0574	<.0001
mdurdefepi_DCLM	**L06**		dur_def_episode = 6	2.5225	0.0592	<.0001
mdurdefepi_DCLM	**L07**		dur_def_episode <= 17	2.5113	0.0525	<.0001
mdurdefepi_DCLM	**L18**		dur_def_episode >= 18	2.2575	0.0650	<.0001
vloanraw_DCLM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,48000-0)	0.0000	0.0000	<.0001
vloanraw_DCLM_pw2			median(0,loansize_raw-48000,200000-48000)	0.0000	0.0000	<.0001
vloanraw_DCLM_pw3			median(0,loansize_raw-200000,425000-200000)	0.0000	0.0000	0.0017
vdeltaUEinit_DCLM_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-0,80-0)	-0.0069	0.0014	<.0001
vdeltaUEinit_DCLM_pw4			median(0,DeltaUEInit_R-163,200-163)	0.0062	0.0015	<.0001
vdeltaUEinit_DCLM_pw5			median(0,DeltaUEInit_R-200,300-200)	-0.0034	0.0012	0.0037
vratiotmptei_DCLM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,20-0)	0.0145	0.0025	<.0001
vratiotmptei_DCLM_pw2			median(0,ratio_tmp_tei-20,36-20)	0.0080	0.0024	0.0009
vratiotmptei_DCLM_pw3			median(0,ratio_tmp_tei-36,50-36)	-0.0184	0.0078	0.0188
mpriordef_DCLM	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.1575	0.0263	<.0001
mpriordef_DCLM	**L02**		prior_default_cnt = 2	-0.3243	0.0347	<.0001
mpriordef_DCLM	**L03**		prior_default_cnt >= 3	-0.4502	0.0394	<.0001
vpriordef_DCLM_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,15-3)	-0.0996	0.0166	<.0001
vsato_DCLM_pw1			min(0,sato-(.4))	0.1081	0.0262	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vsato_DCLM_pw2		Variate piecewise of sato (spread at origination)	max(sato-.4,0)	-0.1539	0.0591	0.0092
vltv_DCLM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,65-0)	0.0226	0.0009	<.0001
vltv_DCLM_pw2			median(0,ltv_i_R-65,76-65)	0.0347	0.0035	<.0001
vltv_DCLM_pw3			median(0,ltv_i_R-76,93-76)	6.E-02	4.E-03	<.0001
mhpa2yb_DCLM	**L085**	Categorical of hpa2y_blended_r[6]	0<hpa2y_blended_r <= 85	5.E-01	8.E-02	<.0001
vhpa2yb_DCLM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-85,104-85)	3.E-02	4.E-03	<.0001
vhpa2yb_DCLM_pw2			median(0,hpa2y_blended_R-104,140-104)	-0.0115	0.0020	<.0001
vDeltaTY1_DCLM_pw1		Variate piecewise of DeltaTy1Init_r[3] (change in 1-year Treasury rate from policy inception to current)	median(0,DeltaTy1Init_R-0,87-0)	-0.0031	0.0006	<.0001
vDeltaTY1_DCLM_pw2			median(0,DeltaTy1Init_R-87,150-87)	-0.0024	0.0007	0.0004
mseason_grp_DCLM	**L03**	Categorical of season	season = "summer"	0.0578	0.0232	0.0129
vCCI_DCLM_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0120	0.0018	<.0001
vCCI_DCLM_pw2			median(0,CCI_r-75,110-75)	0.0089	0.0014	<.0001
m_product	**FRM15SR**	Categorical of product	product = "FRM15SR"	0.1787	0.0431	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.3189	0.0849	0.0002
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.4361	0.0790	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.8031	0.0995	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	26.2701	2.4044	<.0001
vMTG_RATE30Y_lag4_DCLM1		Variate piecewise of 30 year mortgage rate with 4Q lag	min(MTG_RATE30Y_lag4,5)	-0.2805	0.0297	<.0001
vMTG_RATE30Y_lag4_DCLM2			max(MTG_RATE30Y_lag4,5)	-0.0635	0.0266	0.0171

Default Transition Model Parameters – FRM15 D_CXM

The model parameters for the FRM15 default to modified cure transition are shown below.

Table 54: Default to Modified Cure Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-6.5336	0.1667	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vperiodnbr_DCXM_pw1		Variate piecewise of period_number	median(0,period_number-2,10-2)	0.0925	0.0081	<.0001
vperiodnbr_DCXM_pw2			median(0,period_number-10,31-10)	0.0094	0.0017	<.0001
vperiodnbr_DCXM_pw4			median(0,period_number-48,60-48)	0.0497	0.0068	<.0001
mcredit_score_DCXM	**L00**	Categorical of credit_score	credit_score = 0	-0.8496	0.0744	<.0001
vcredit_DCXM_pw1		Variate piecewise of credit_score	median(0,credit_score-450,545-450)	-0.0049	0.0008	<.0001
mdurdefepi_DCXM	**L01**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode <= 1	-0.8758	0.0349	<.0001
vdurdefepi_DCXM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-0,3-0)	-0.3008	0.0203	<.0001
vdurdefepi_DCXM_pw2			median(0,dur_def_episode-3,10-3)	-0.0817	0.0050	<.0001
vdurdefepi_DCXM_pw3			median(0,dur_def_episode-10,20-10)	-0.1108	0.0070	<.0001
vloanraw_DCXM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,62000-0)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw2			median(0,loansize_raw-62000,97000-62000)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw3			median(0,loansize_raw-97000,200000-97000)	0.0000	0.0000	<.0001
vDeltaUEinit_DCXM_pw2		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-95,184-95)	0.0026	0.0003	<.0001
mRatioTmpTei_DCXM	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.7026	0.0549	<.0001
vratiotmptei_DCXM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0254	0.0022	<.0001
mpriordef_DCXM	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	0.1011	0.0205	<.0001
mpriordef_DCXM	**L02**		prior_default_cnt = 2	0.0987	0.0237	<.0001
mpriordef_DCXM	**L03**		prior_default_cnt >= 3	0.1644	0.0283	<.0001
vpriordef_DCXM_pw1		Variate piecewise of prior default count	median(0,prior_default_cnt-2,10-2)	-0.0508	0.0075	<.0001
vsato_DCXM_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-(-.56))	0.1711	0.0480	0.0004
vsato_DCXM_pw3			median(sato-(-.15),0,.2-(-.15))	0.1762	0.0627	0.005
vsato_DCXM_pw4			max(sato-.2,0)	-0.2488	0.0453	<.0001
vltv_DCXM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,20-0)	0.0485	0.0037	<.0001
vltv_DCXM_pw2			median(0,ltv_i_R-20,92-20)	0.0060	0.0007	<.0001
vhpa2yb_DCXM_pw1		Variate piecewise of blended hpa	median(0,hpa2y_blended_R-84,100-84)	0.0124	0.0024	<.0001
vhpa2yb_DCXM_pw3			median(0,hpa2y_blended_R-116,140-116)	-0.0137	0.0034	<.0001
muest_DCXM	**L79**	Categorical of ue_sa_st_r[10] (seasonally	ue_sa_st_r>790	-0.0677	0.0197	0.0006

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		adjusted state unemployment)				
mseason_grp_DCXM	**L02**	Categorical of season	season = "spring"	0.2630	0.0181	<.0001
mseason_grp_DCXM	**L03**		season = "summer"	0.1121	0.0195	<.0001
vCCI_DCXM_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	-0.0110	0.0010	<.0001
m_product	**FRM15SR**	Categorical of product	product = "FRM15SR"	0.1186	0.0339	0.0005
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.1778	0.0446	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	3.E-01	3.E-02	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	5.E-01	2.E-02	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-7.E+00	3.E-01	<.0001

Default Transition Model Parameters – FRM15 D_CXS

The model parameters for the FRM15 default to self-cure transition are shown below.

Table 55: Default to Self-Cure Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				1.5319	0.0931	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1	-0.0805	0.0060	<.0001
mperiodnbr_DCXS	**L02**	Categorical of period number	period_number = 2	1.4199	0.0644	<.0001
mperiodnbr_DCXS	**L03**		period_number = 3	0.6266	0.0342	<.0001
mperiodnbr_DCXS	**L04**		period_number = 4	0.3348	0.0274	<.0001
mperiodnbr_DCXS	**L05**		period_number = 5	0.2244	0.0242	<.0001
mperiodnbr_DCXS	**L06**		period_number = 6	0.2245	0.0219	<.0001
mperiodnbr_DCXS	**L07**		period_number = 7	0.1599	0.0208	<.0001
mperiodnbr_DCXS	**L08**		period_number = 8	0.0837	0.0201	<.0001
vperiodnbr_DCXS_pw2		Variate piecewise of period_number	median(0,period_number-31,52-31)	-0.0046	0.0008	<.0001
mcredit_score_DCXS	**L00**	Categorical of credit_score	credit_score = 0	0.4756	0.0200	<.0001
vcredit_DCXS_pw1		Variate piecewise of credit_score	median(0,credit_score-465,643-465)	0.0040	0.0001	<.0001
vcredit_DCXS_pw2			median(0,credit_score-643,800-643)	0.0013	0.0001	<.0001
mdurdefepi_DCXS	**L02**		dur_def_episode = 2	-0.6503	0.0076	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mdurdefepi_DCXS	**L03**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 3	-1.0117	0.0098	<.0001
mdurdefepi_DCXS	**L04**		dur_def_episode = 4	-1.3775	0.0127	<.0001
mdurdefepi_DCXS	**L05**		dur_def_episode = 5	-1.5329	0.0156	<.0001
mdurdefepi_DCXS	**L06**		dur_def_episode = 6	-1.7324	0.0191	<.0001
mdurdefepi_DCXS	**L07**		dur_def_episode <= 7	-1.9876	0.0175	<.0001
vdurdefepi_DCXS_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-6,20-6)	-0.0747	0.0024	<.0001
vloanraw_DCXS_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-0,37000-0)	0.0000	0.0000	0.0016
vloanraw_DCXS_pw2			median(0,loansize_raw-37000,130000-37000)	0.0000	0.0000	<.0001
vdeltaUEinit_DCXS_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_R-0,78-0)	0.0011	0.0004	0.0073
vdeltaUEinit_DCXS_pw2			median(0,DeltaUEInit_R-78,107-78)	-0.0030	0.0005	<.0001
vdeltaUEinit_DCXS_pw3			median(0,DeltaUEInit_R-107,125-107)	-0.0033	0.0008	<.0001
vdeltaUEinit_DCXS_pw4			median(0,DeltaUEInit_R-125,200-125)	-0.0010	0.0002	<.0001
mRatioTmpTei_DCXS	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.2809	0.0512	<.0001
vratiotmptei_DCXS_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,12-0)	-0.0127	0.0044	0.0039
vratiotmptei_DCXS_pw2			median(0,ratio_tmp_tei-12,28-12)	-0.0161	0.0008	<.0001
vratiotmptei_DCXS_pw3			median(0,ratio_tmp_tei-28,50-28)	-0.0064	0.0010	<.0001
mpriordef_DCXS	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.1188	0.0084	<.0001
mpriordef_DCXS	**L02**		prior_default_cnt = 2	-0.1584	0.0098	<.0001
mpriordef_DCXS	**L07**		prior_default_cnt >= 7	-0.1306	0.0142	<.0001
mpriordef_DCXS	**PW1**		3 <= prior_default_cnt <= 6	-2.E-01	9.E-03	<.0001
vsato_DCXS_pw1		Variate piecewise of sato (spread at origination)	min(0,sato-(-0.4))	6.E-02	2.E-02	<.0001
vsato_DCXS_pw2			median(sato-(-.4),0,.14-(-.4))	-1.E-01	2.E-02	<.0001
vsato_DCXS_pw3			max(sato-.14,0)	-0.0496	0.0155	0.0013
vltv_DCXS_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,19-0)	0.0210	0.0009	<.0001
vltv_DCXS_pw2			median(0,ltv_i_R-19,83-19)	-0.0083	0.0003	<.0001
vltv_DCXS_pw3			median(0,ltv_i_R-83,88-83)	-0.0261	0.0045	<.0001
vltv_DCXS_pw4			median(0,ltv_i_R-88,91-88)	-0.0502	0.0120	<.0001
vltv_DCXS_pw5			median(0,ltv_i_R-91,100-91)	-0.0325	0.0119	0.0063
vUEblend_DCXS_pw1		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_R-0,525-0)	-0.0002	0.0001	0.0003
vUEblend_DCXS_pw2			median(0,ue_blended_R-525,800-525)	-0.0003	0.0000	<.0001
vUEblend_DCXS_pw3			median(0,ue_blended_R-800,1500-800)	-0.0002	0.0000	<.0001
vDeltaTY1_DCXS_pw1		Variate piecewise of DeltaTy1Init_r[3] (change in 1-year Treasury rate from	median(0,DeltaTy1Init_R-0,22-0)	-0.0074	0.0007	<.0001
vDeltaTY1_DCXS_pw2			median(0,DeltaTy1Init_R-22,80-22)	0.0018	0.0002	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		policy inception to current)				
mseason_grp_DCXS	**L02**	Categorical of season	season = "spring"	0.1188	0.0072	<.0001
mseason_grp_DCXS	**L03**		season = "summer"	-0.0285	0.0074	0.0001
vCCI_DCXS_pw2		Variate piecewise of consumer confidence index	median(0,CCI_r-75,110-75)	0.0034	0.0005	<.0001
vCCI_DCXS_pw3			median(0,CCI_r-110,134-110)	0.0244	0.0007	<.0001
vSBOI_DCXS_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0116	0.0017	<.0001
vSBOI_DCXS_pw2			median(0,SBOI_r-95,100-95)	-0.1122	0.0028	<.0001
m_product	**FRM15SR**	Categorical of product	product = "FRM15SR"	0.1370	0.0127	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.2238	0.0153	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.2401	0.0138	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	7.6543	0.2199	<.0001

Default Transition Model Parameters – FRM15 D_END

The model parameters for the fixed rate 15-year mortgage default to end transition are shown below.

Table 56: Default to End Transition FRM15 Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-1.1704	0.1442	<.0001
vhpa2yb_DEND_pw2		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_R-104,140-104)	0.0252	0.0013	<.0001
vperiodnbr_DEND_pw2		Variate piecewise of period_number	median(0,period_number-30,52-30)	0.0094	0.0019	<.0001
vperiodnbr_DEND_pw3			median(0,period_number-52,60-52)	0.1573	0.0057	<.0001
mcredit_score_DEND	**L00**	Categorical of credit_score	credit_score = 0	0.8231	0.0422	<.0001
vcredit_DEND_pw1		Variate piecewise of credit_score	median(0,credit_score-470,800-470)	0.0044	0.0002	<.0001
vdurdefepi_DEND_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode,12)	-0.1511	0.0030	<.0001
vdurdefepi_DEND_pw2			median(0,dur_def_episode-12,54-12)	0.0059	0.0021	0.0058
vloanraw_DEND_pw2		Variate piecewise of loansize_raw	median(0,loansize_raw-55000,120000-55000)	0.0000	0.0000	0.0009
vloanraw_DEND_pw3			median(0,loansize_raw-120000,200000-120000)	0.0000	0.0000	<.0001
vdeltaUEinit_DEND_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy	median(0,DeltaUEInit_R-0,175-0)	0.0023	0.0003	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		inception to current)				
mpriordef_DEND	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.4085	0.0214	<.0001
mpriordef_DEND	**L02**		prior_default_cnt = 2	-0.6106	0.0266	<.0001
mpriordef_DEND	**L03**		prior_default_cnt >= 3	-0.8453	0.0266	<.0001
vpriordef_DEND_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-3,14-3)	-0.0545	0.0071	<.0001
vUEblend_DEND_pw1		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_R-0,800-0)	-0.0013	0.0001	<.0001
vUEblend_DEND_pw2			median(0,ue_blended_R-800,1500-800)	-0.0009	0.0001	<.0001
mltv_DEND	**Miss**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i = .	-0.4463	0.0411	<.0001
vltv_DEND_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_R-0,63-0)	-0.0160	0.0009	<.0001
vltv_DEND_pw2			median(0,ltv_i_R-63,100-63)	-0.0215	0.0014	<.0001
vDeltaTY1_DEND_pw2		Variate piecewise of DeltaTy1Init_r[3] (change in 1-year Treasury rate from policy inception to current)	median(0,DeltaTy1Init_R-6,200-6)	0.0008	0.0002	<.0001
Mperiod_DEND	**L01**	Categorical of period (calendar period)	period < 200603	0.3552	0.0325	<.0001
mseason_grp_DEND	**L02**	Categorical of season	season = "spring"	0.0647	0.0191	0.0007
mseason_grp_DEND	**L03**		season = "summer"	0.1031	0.0198	<.0001
vSBOI_DEND_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0286	0.0045	<.0001
vSBOI_DEND_pw2			median(0,SBOI_r-95,100-95)	0.0176	0.0058	0.0025
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.3911	0.0415	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1322	0.0349	0.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.1308	0.0304	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	3.6117	0.5244	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 (judicial state)	-0.0841	0.0159	<.0001

Default Transition Model Parameters – ARM D_CLM

The model parameters for the ARM default to claim transition are shown below.

Table 57: Default to Claim Transition ARM Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				1.4874	0.6114	0.015
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 , judicial state	-0.1695	0.0103	<.0001
mdpa	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	0.4072	0.0445	<.0001
mdpa	**2**		dpa= "nonprof"	0.4834	0.0160	<.0001
mdpa	**3**		dpa = "relative"	0.0586	0.0169	0.0005
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.1904	0.0130	<.0001
vperiodnbr_DCLM_pw1		Variate piecewise of period_number	median(0,period_number-0,9-0)	-0.0529	0.0097	<.0001
vperiodnbr_DCLM_pw2			median(0,period_number-9,15-9)	0.0317	0.0039	<.0001
vperiodnbr_DCLM_pw3			median(0,period_number-15,55-15)	-0.0148	0.0009	<.0001
mcredit_DCLM	**L01**	Categorical of credit_score	credit_score = 0	0.4721	0.0641	<.0001
vcredit_DCLM_pw1		Variate piecewise of credit_score	median(0,credit_score-300,720-300)	0.0014	0.0002	<.0001
vcredit_DCLM_pw2			median(0,credit_score-720,800-720)	0.0075	0.0009	<.0001
mdurdefepi_DCLM	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.6261	0.0249	<.0001
mdurdefepi_DCLM	**L03**		dur_def_episode = 3	1.3491	0.0233	<.0001
mdurdefepi_DCLM	**L04**		dur_def_episode = 4	1.6335	0.0236	<.0001
mdurdefepi_DCLM	**L05**		dur_def_episode = 5	1.6943	0.0246	<.0001
mdurdefepi_DCLM	**L06**		dur_def_episode = 6	1.6942	0.0258	<.0001
mdurdefepi_DCLM	**L07**		dur_def_episode = 7	1.6809	0.0271	<.0001
mdurdefepi_DCLM	**L08**		dur_def_episode = 8	1.6308	0.0288	<.0001
mdurdefepi_DCLM	**L09**		dur_def_episode = 9	1.5809	0.0305	<.0001
mdurdefepi_DCLM	**L10**		dur_def_episode = 10	1.5544	0.0322	<.0001
mdurdefepi_DCLM	**L11**		dur_def_episode >= 11	1.5188	0.0265	<.0001
vdurdefepi_DCLM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	-0.0252	0.0022	<.0001
vdurdefepi_DCLM_pw2			median(0,dur_def_episode-30,40-30)	-0.0464	0.0077	<.0001
vdeltaUEinit_dclm_pw2		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,deltaUEinit_r-63,100-63)	-0.0023	0.0007	0.0005
vdeltaUEinit_dclm_pw3			median(0,deltaUEinit_r-100,116-100)	0.0048	0.0011	<.0001
vdeltaUEinit_dclm_pw5			median(0,deltaUEinit_r-218,330-218)	0.0017	0.0004	<.0001
mRatioTmpTei_DCLM	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.1250	0.0249	<.0001
vratiotmptei_DCLM_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0058	0.0015	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vratiotmptei_DCLM_pw3		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-36,50-36)	-0.0164	0.0031	<.0001
mpriordef_DCLM	**L00**	Categorical of prior_default_cnt	prior_default_cnt = 0	0.1802	0.0149	<.0001
vpriordef_DCLM_pw1		Variate piecewise of prior default count	median(0,prior_default_cnt-0,6-0)	-0.0985	0.0056	<.0001
vpriordef_DCLM_pw2			median(0,prior_default_cnt-6,20-6)	-0.0907	0.0127	<.0001
vloanraw_DCLM_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-30000,109000-30000)	-3.E-06	3.E-07	<.0001
vloanraw_DCLM_pw2			median(0,loansize_raw-109000,143000-109000)	3.E-06	3.E-07	<.0001
vloanraw_DCLM_pw3			median(0,loansize_raw-143000,200000-143000)	-3.E-06	1.E-07	<.0001
mltv_DCLM	**L01**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	-0.3664	0.0935	<.0001
vltv_DCLM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,70-0)	0.0140	0.0018	<.0001
vltv_DCLM_pw2			median(0,ltv_i_r-70,81-70)	0.0091	0.0023	<.0001
vltv_DCLM_pw3			median(0,ltv_i_r-81,94-81)	0.0215	0.0018	<.0001
vltv_DCLM_pw4			median(0,ltv_i_r-94,100-94)	0.0508	0.0142	0.0003
mhpa2yb_DCLM	**L085**	Categorical of hpa2y_blended_r[6]	hpa2y_blended_r <= 85	0.2866	0.0311	<.0001
vhpa2yb_DCLM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,98-85)	0.0059	0.0026	0.0227
vhpa2yb_DCLM_pw2			median(0,hpa2y_blended_r-98,108-98)	0.0188	0.0023	<.0001
vhpa2yb_DCLM_pw3			median(0,hpa2y_blended_r-108,130-108)	-0.0237	0.0011	<.0001
vhpa2yb_DCLM_pw4			median(0,hpa2y_blended_r-130,180-130)	-0.0636	0.0042	<.0001
vUEblend_DCLM_pw2		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(0,ue_blended_r-450,850-450)	-0.0004	0.0001	<.0001
vUEblend_DCLM_pw3			median(0,ue_blended_r-850,1500-850)	0.0003	0.0001	<.0001
vdeltaUEpr3_DCLM_pw1		Variate piecewise of deltauepr3_r[5] (change in unemployment from 3 quarters prior)	median(deltauepr3_r-(-200),0,(-20)-(-200))	-0.0014	0.0002	<.0001
vprior3uest_DCLM_pw1		Variate piecewise of prior3_ue_sa_st (change in prior-3 seasonally adjusted unemployment rate)	median(2.4,prior3_ue_sa_st,5)	0.1878	0.0160	<.0001
mDeltaTY10_DCLM	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	0.2037	0.0163	<.0001
vCCI_DCLM_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0021	0.0005	<.0001
vCCI_DCLM_pw2			median(0,CCI_r-75,110-75)	0.0078	0.0012	<.0001
vSBOI_DCLM_pw2		Variate piecewise of small business optimism index	median(0,SBOI_r-95,100-95)	-0.0559	0.0058	<.0001
vSBOI_DCLM_pw3			median(0,SBOI_r-100,108-100)	0.0147	0.0043	0.0005

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
m_product	**ARMSR**	Categorical of product	product = "ARMSR"	0.3055	0.0258	<.0001
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	-0.3289	0.0719	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.4819	0.0866	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.5896	0.0886	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	33.7424	2.8498	<.0001

Default Transition Model Parameters – ARM D_CXM

The model parameters for the ARM default to modified cure transition are shown below.

Table 58: Default to Modified Cure Transition ARM Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-5.8317	0.1980	<.0001
mdpa_DCXM	**2**	Categorical of dpa (down payment assistance)	dpa= "nonprof"	0.2234	0.0166	<.0001
mdpa_DCXM	**3**		dpa = "govt" or dpa = "relative"	0.0511	0.0174	0.0034
mycslope_DCXM	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=111	-0.2997	0.0277	<.0001
mycslope_DCXM	**L02**		ycslope_r>=875	0.0822	0.0261	0.0017
mycslope_DCXM	**L03**		ycslope_r>=2000	0.4474	0.0251	<.0001
mperiodnbr_DCXM	**L05**	Categorical of period_number	period_number <= 5	-0.8320	0.0756	<.0001
vperiodnbr_DCXM_pw1		Variate piecewise of period_number	median(0,period_number-5,9-5)	0.0174	0.0028	<.0001
vperiodnbr_DCXM_pw2			median(0,period_number-9,18-9)	-0.0144	0.0016	<.0001
vperiodnbr_DCXM_pw3			median(0,period_number-18,36-18)	0.0178	0.0021	<.0001
vperiodnbr_DCXM_pw4			median(0,period_number-36,50-36)	-0.0049	0.0014	0.0004
mcredit_DCXM	**L01**	Categorical of credit_score	credit_score = 0	-0.2867	0.0310	<.0001
vcredit_DCXM_pw1		Variate piecewise of credit_score	median(0,credit_score-525,645-525)	-0.0011	0.0003	<.0001
vcredit_DCXM_pw2			median(0,credit_score-645,800-645)	-0.0012	0.0003	0.0005
vdurdefepi_DCXM_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-5,7-5)	-0.0433	0.0087	<.0001
vdurdefepi_DCXM_pw2			median(0,dur_def_episode-7,40-7)	-0.0951	0.0030	<.0001
vdeltaUEinit_DCXM_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment	median(0,deltaUEinit_r-0,63-0)	0.0079	0.0016	<.0001
vdeltaUEinit_DCXM_pw2			median(0,deltaUEinit_r-63,100-63)	-0.0053	0.0005	<.0001
vdeltaUEinit_DCXM_pw3			median(0,DeltaUEInit_r-116,218-116)	0.0026	0.0002	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		rate from policy inception to current)				
mRatioTmpTei_DCXM	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.4723	0.0513	<.0001
vratiotmptei_DCXM_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	0.0229	0.0020	<.0001
mpriordef_DCXM	**L00**	Categorical of prior_default_cnt	prior_default_cnt = 0	-0.2494	0.0179	<.0001
vpriordef_DCXM_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-0,5-0)	0.0756	0.0052	<.0001
vpriordef_DCXM_pw2			median(0,prior_default_cnt-5,22-5)	-0.0426	0.0052	<.0001
vloanraw_DCXM_pw1		Variate piecewise of loansize_raw	median(30000,loansize_raw,109000)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw2			median(0,loansize_raw-109000,143000-109000)	0.0000	0.0000	<.0001
vloanraw_DCXM_pw4			median(0,loansize_raw-200000,425000-200000)	0.0000	0.0000	0.0005
vltv_DCXM_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,68-0)	0.0060	0.0016	0.0002
vltv_DCXM_pw2			median(0,ltv_i_r-68,81-68)	0.0084	0.0021	<.0001
vltv_DCXM_pw3			median(0,ltv_i_r-81,91-81)	-0.0102	0.0024	<.0001
vhpa2yb_DCXM_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,98-85)	-0.0058	0.0019	0.002
vhpa2yb_DCXM_pw2			median(0,hpa2y_blended_r-98,108-98)	-0.0374	0.0027	<.0001
vhpa2yb_DCXM_pw3			median(0,hpa2y_blended_r-108,117-108)	0.0057	0.0027	0.0316
vhpa2yb_DCXM_pw4			median(0,hpa2y_blended_r-117,180-117)	-3.E-02	2.E-03	<.0001
vdeltaUEpr3_DCXM_pw3		Variate piecewise of deltaueprr3_r[5] (change in unemployment from 3 quarters prior)	median(deltaueprr3_r-10,0,200-10)	-3.E-03	2.E-04	<.0001
vprior3uest_DCXM_pw2		Variate piecewise of prior3_ue_sa_st (change in prior-3 seasonally adjusted unemployment rate)	median(0,prior3_ue_sa_st-5,12.3-5)	-3.E-02	5.E-03	<.0001
mDeltaTY10_DCXM	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.3075	0.0169	<.0001
mseason_grp_DCXM	**L02**	Categorical of season	season = "spring"	0.2818	0.0135	<.0001
mseason_grp_DCXM	**L03**		season = "summer"	0.1983	0.0154	<.0001
vCCI_DCXM_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0219	0.0011	<.0001
vCCI_DCXM_pw2			median(0,CCI_r-75,110-75)	0.0599	0.0021	<.0001
vCCI_DCXM_pw3			median(0,CCI_r-110,134-110)	0.0774	0.0028	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vSBOI_DCXM_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.2063	0.0040	<.0001
vSBOI_DCXM_pw2			median(0,SBOI_r-95,100-95)	-0.2656	0.0086	<.0001
m_product	**ARMSR**	Categorical of product	product = "ARMSR"	0.1508	0.0278	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	1.0659	0.0357	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	1.2808	0.0305	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	-2.4606	0.4930	<.0001
v_TR1Q_growthY_lag3_DCXM_pw1		Variate piecewise of quarterly treasure rate yearly growth with 3Q lag	min(TR1Q_growthY_lag3,0)	0.2482	0.0238	<.0001
v_TR1Q_growthY_lag3_DCXM_pw2			median(0,TR1Q_growthY_lag3,5)	-0.1047	0.0072	<.0001
v_TR1Q_growthY_lag3_DCXM_pw3			max(TR1Q_growthY_lag3,5)	0.1744	0.0076	<.0001

Default Transition Model Parameters – ARM D_CXS

The model parameters for the ARM default to self-cure transition are shown below.

Table 59: Default to Self-Cure Transition ARM Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				0.7713	0.0919	<.0001
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 , judicial state	-0.1297	0.0053	<.0001
mpda_DCXS	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	-0.1528	0.0285	<.0001
mpda_DCXS	**2**		dpa= "nonprof"	-0.2048	0.0091	<.0001
mrfnc_ind	**2**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	-0.1223	0.0104	<.0001
mycslope_DCXS	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=111	-0.2326	0.0110	<.0001
mycslope_DCXS	**L02**		ycslope_r>=875	0.1266	0.0104	<.0001
mperiodnbr_DCXS	**L02**	Categorical of period_number	period_number <= 2	1.5983	0.0849	<.0001
mperiodnbr_DCXS	**L03**		period_number = 3	0.6680	0.0378	<.0001
mperiodnbr_DCXS	**L04**		period_number = 4	0.1557	0.0307	<.0001
vperiodnbr_DCXS_pw1		Variate piecewise of period_number	median(0,period_number-5,9-5)	-0.0638	0.0051	<.0001
vperiodnbr_DCXS_pw2			median(0,period_number-9,18-9)	0.0099	0.0009	<.0001
vperiodnbr_DCXS_pw3			median(0,period_number-18,36-18)	0.0098	0.0012	<.0001
vperiodnbr_DCXS_pw4			median(0,period_number-36,50-36)	0.0052	0.0010	<.0001
mcredit_DCXS	**L01**	Categorical of credit_score	credit_score = 0	0.1523	0.0191	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vcredit_DCXS_pw1		Variate piecewise of credit_score	median(0,credit_score-525,645-525)	0.0024	0.0002	<.0001
vcredit_DCXS_pw2			median(0,credit_score-645,800-645)	0.0012	0.0002	<.0001
mdurdefepi_DCXS	**L01**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode <=1	1.4997	0.0099	<.0001
mdurdefepi_DCXS	**L02**		dur_def_episode = 2	0.8953	0.0106	<.0001
mdurdefepi_DCXS	**L03**		dur_def_episode = 3	0.5532	0.0117	<.0001
mdurdefepi_DCXS	**L04**		dur_def_episode = 4	0.2064	0.0133	<.0001
vdurdefepi_DCXS_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-5,7-5)	-0.1383	0.0025	<.0001
vdurdefepi_DCXS_pw2			median(0,dur_def_episode-7,40-7)	-0.0136	0.0012	<.0001
vdeltaUEinit_DCXS_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,63-0)	-0.0016	0.0007	0.024
vdeltaUEinit_DCXS_pw3			median(0,DeltaUEInit_r-100,116-100)	-0.0034	0.0005	<.0001
vdeltaUEinit_DCXS_pw4			median(0,DeltaUEInit_r-116,218-116)	-0.0008	0.0001	<.0001
mRatioTmpTei_DCXS	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.2708	0.0214	<.0001
vratiotmptei_DCXS_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	-0.0104	0.0009	<.0001
vratiotmptei_DCXS_pw2			median(0,ratio_tmp_tei-24,36-24)	-0.0081	0.0008	<.0001
mpriordef_DCXS	**L00**	Categorical of prior_default_cnt	prior_default_cnt = 0	0.0694	0.0072	<.0001
vpriordef_DCXS_pw1		Variate piecewise of prior_default_cnt	median(0,prior_default_cnt-0,22-0)	-0.0070	0.0012	<.0001
vloanraw_DCXS_pw1		Variate piecewise of loansize_raw	median(30000,loansize_raw,143000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw2			median(0,loansize_raw-143000,200000-143000)	0.0000	0.0000	<.0001
vloanraw_DCXS_pw3			median(0,loansize_raw-200000,425000-200000)	-3.E-07	8.E-08	0.0005
vdeltaUEpr3_DCXS_pw3		Variate piecewise of deltaueper3_r[5] (change in unemployment from 3 quarters prior)	median(deltaueper3_r-10,0,200-10)	-1.E-03	8.E-05	<.0001
mltv_DCXS	**L01**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	2.E-01	3.E-02	<.0001
vltv_DCXS_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,68-0)	-0.0053	0.0005	<.0001
vltv_DCXS_pw2			median(0,ltv_i_r-68,81-68)	-0.0098	0.0010	<.0001
vltv_DCXS_pw3			median(0,ltv_i_r-81,91-81)	-0.0103	0.0013	<.0001
vltv_DCXS_pw4			median(0,ltv_i_r-91,100-91)	-0.0361	0.0034	<.0001
vhpa2yb_DCXS_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,98-85)	0.0066	0.0010	<.0001
vhpa2yb_DCXS_pw3			median(0,hpa2y_blended_r-108,117-108)	0.0078	0.0010	<.0001
vhpa2yb_DCXS_pw4			median(0,hpa2y_blended_r-117,130-117)	0.0041	0.0012	0.0008
vhpa2yb_DCXS_pw5			median(0,hpa2y_blended_r-130,180-130)	0.0084	0.0012	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vprior3uest_DCXS_pw1		Variate piecewise of prior3_ue_sa_st (change in prior-3 seasonally adjusted unemployment rate)	median(2.5,prior3_ue_sa_st,5)	-0.0283	0.0063	<.0001
vprior3uest_DCXS_pw2			median(0,prior3_ue_sa_st-5,12.1-5)	-0.0354	0.0025	<.0001
mDeltaTY10_DCXS	**L01**	Categorical of DeltaTy10Init_r^2 (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.0438	0.0082	<.0001
vDeltaTY1_DCXS_pw1		Variate piecewise of DeltaTy1Init_r^3 (change in 1-year Treasury rate from policy inception to current)	median(0,DeltaTy1Init_R-0,22-0)	-0.0043	0.0007	<.0001
vDeltaTY1_DCXS_pw2			median(0,DeltaTy1Init_R-22,80-22)	0.0015	0.0002	<.0001
vDeltaTY1_DCXS_pw3			median(0,DeltaTy1Init_R-80,150-80)	0.0008	0.0002	<.0001
mseason	**1**	Categorical of season	season = "winter"	0.1726	0.0073	<.0001
mseason	**2**		season = "spring"	0.2370	0.0075	<.0001
mseason	**3**		season = "summer"	0.0976	0.0077	<.0001
vCCI_DCXS_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-50,92-50)	0.0078	0.0005	<.0001
vCCI_DCXS_pw2			median(0,CCI_r-92,110-92)	0.0178	0.0008	<.0001
vCCI_DCXS_pw3			median(0,CCI_r-110,134-110)	0.0193	0.0010	<.0001
vSBOI_DCXS_pw1		Variate piecewise of small business optimism index	median(0,SBOI_r-83,95-83)	-0.0394	0.0023	<.0001
vSBOI_DCXS_pw2			median(0,SBOI_r-95,100-95)	-0.0959	0.0026	<.0001
vSBOI_DCXS_pw3			median(0,SBOI_r-100,108-100)	-0.0212	0.0028	<.0001
m_product	**ARMSR**	Categorical of product	product = "ARMSR"	0.0453	0.0152	0.0029
v_UE_CW_growthQ_pw1		Variate piecewise of country wide unemployment rate quarterly growth	max(0.4,UE_CW_growthQ)	0.1632	0.0156	<.0001
v_UE_CW_growthQ_lag2_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	max(0.4,UE_CW_growthQ_lag2)	-0.0943	0.0173	<.0001
v_UE_CW_growthQ_lag2_pw2			min(UE_CW_growthQ_lag2, -0.2)	7.7941	0.2626	<.0001

Default Transition Model Parameters – ARM D_END

The model parameters for the ARM default to end transition are shown below.

Table 60: Default to End Transition ARM Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-4.9483	0.2252	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
mjudicial	**1**	Categorical of judicial (judicial state)	judicial = 1 , judicial state	-0.1789	0.0126	<.0001
mpda_DEND	**1**	Categorical of dpa (down payment assistance)	dpa = "govt"	-0.5207	0.0919	<.0001
mpda_DEND	**2**		dpa= "nonprof"	-0.4995	0.0293	<.0001
mfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	-0.0716	0.0146	<.0001
mycslope_DEND	**L01**	Categorical of ycslope_r[9] (yield curve slope)	ycslope_r<=111	0.2245	0.0216	<.0001
mycslope_DEND	**L02**		ycslope_r>=875	-0.7879	0.0334	<.0001
mycslope_DEND	**L03**		ycslope_r>=2000	-0.7401	0.0388	<.0001
mperiodnbr_DEND	**L02**	Categorical of period_number	period_number <= 2	1.1114	0.3238	0.0006
mperiodnbr_DEND	**L03**		period_number = 3	0.3898	0.1250	0.0018
vperiodnbr_DEND_pw1		Variate piecewise of period_number	median(0,period_number-4,9-4)	0.0290	0.0112	0.0093
vperiodnbr_DEND_pw3			median(0,period_number-18,38-18)	0.0171	0.0014	<.0001
vperiodnbr_DEND_pw4			median(0,period_number-38,68-38)	0.0100	0.0013	<.0001
mcredit_DEND	**L01**	Categorical of credit_score	credit_score = 0	0.4169	0.0655	<.0001
vcredit_DEND_pw1		Variate piecewise of credit_score	median(0,credit_score-525,645-525)	0.0020	0.0005	0.0002
vcredit_DEND_pw2			median(0,credit_score-645,800-645)	0.0032	0.0005	<.0001
mdurdefepi_DEND	**L01**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode <=1	0.6829	0.0268	<.0001
mdurdefepi_DEND	**L02**		dur_def_episode = 2	0.3340	0.0287	<.0001
mdurdefepi_DEND	**L03**		dur_def_episode = 3	0.1510	0.0310	<.0001
mdurdefepi_DEND	**L04**		dur_def_episode = 4	0.1169	0.0329	0.0004
vdurdefepi_DEND_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-5,7-5)	-0.0805	0.0137	<.0001
vdurdefepi_DEND_pw3			median(0,dur_def_episode-24,40-24)	-0.0182	0.0030	<.0001
vdeltaUEinit_DEND_pw1		Variate piecewise of DeltaUEInit_r[4] (change in unemployment rate from policy inception to current)	median(0,DeltaUEInit_r-0,63-0)	0.0072	0.0017	<.0001
vdeltaUEinit_DEND_pw2			median(0,DeltaUEInit_r-63,100-63)	0.0018	0.0007	0.017
vdeltaUEinit_DEND_pw3			median(0,DeltaUEInit_r-100,116-100)	0.0053	0.0012	<.0001
mRatioTmpTei_DEND	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.2492	0.0474	<.0001
vratiotmptei_DEND_pw1		Variate piecewise of ratio_tmp_tei (front-end ratio)	median(0,ratio_tmp_tei-0,24-0)	-0.0126	0.0017	<.0001
mpriordef_DEND	**L01**	Categorical of prior_default_cnt	prior_default_cnt = 1	-0.1953	0.0152	<.0001
mpriordef_DEND	**L02**		prior_default_cnt = 2	-0.3708	0.0204	<.0001
mpriordef_DEND	**L03**		3 <= prior_default_cnt	-0.4807	0.0242	<.0001
vpriordef_DEND_pw1		Variate piecewise of prior default count	median(0,prior_default_cnt-3,6-3)	-0.1841	0.0138	<.0001
vpriordef_DEND_pw2			median(0,prior_default_cnt-6,14-6)	-0.0489	0.0100	<.0001
vloanraw_DEND_pw1			median(30000,loansize_raw,143000)	0.0000	0.0000	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
vloanraw_DEND_pw3		Variate piecewise of loansize_raw	median(0,loansize_raw-200000,425000-200000)	7.E-07	2.E-07	0.0001
mltv_DEND	**L01**	Categorical of ltv_i_r[7] (loan-to-value)	ltv_i_r = .	5.E-01	7.E-02	<.0001
vltv_DEND_pw1		Variate piecewise of ltv_i_r[7] (loan-to-value)	median(0,ltv_i_r-0,68-0)	-1.E-02	1.E-03	<.0001
vltv_DEND_pw3			median(0,ltv_i_r-81,91-81)	-0.0105	0.0025	<.0001
vltv_DEND_pw4			median(0,ltv_i_r-91,100-91)	-0.1175	0.0074	<.0001
vhpa2yb_DEND_pw1		Variate piecewise of hpa2y_blended_r[6]	median(0,hpa2y_blended_r-85,98-85)	0.0181	0.0039	<.0001
vhpa2yb_DEND_pw2			median(0,hpa2y_blended_r-98,108-98)	0.0283	0.0036	<.0001
vhpa2yb_DEND_pw3			median(0,hpa2y_blended_r-108,117-108)	0.0604	0.0023	<.0001
vhpa2yb_DEND_pw4			median(0,hpa2y_blended_r-117,180-117)	0.0291	0.0008	<.0001
vUEblend_DEND_pw1		Variate piecewise of ue_blended_r[8] (change in unemployment rate)	median(200,ue_blended_r,450)	-0.0017	0.0002	<.0001
vUEblend_DEND_pw3			median(0,ue_blended_r-850,1500-850)	-0.0009	0.0001	<.0001
mDeltaTY10_DEND	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.2308	0.0269	<.0001
vDeltaTY1_DEND_pw1		Variate piecewise of DeltaTy1Init_r[3] (change in 1-year Treasury rate from policy inception to current)	median(0,DeltaTy1Init_R-0,22-0)	0.0206	0.0022	<.0001
vDeltaTY1_DEND_pw2			median(0,DeltaTy1Init_R-22,80-22)	0.0022	0.0005	<.0001
vDeltaTY1_DEND_pw3			median(0,DeltaTy1Init_R-80,150-80)	0.0028	0.0004	<.0001
mseason_grp_DEND	**L02**	Categorical of season	season = "spring"	0.1529	0.0144	<.0001
mseason_grp_DEND	**L03**		season = "summer"	0.1087	0.0147	<.0001
vCCI_DEND_pw1		Variate piecewise of consumer confidence index	median(0,CCI_r-30,75-30)	0.0058	0.0014	<.0001
vCCI_DEND_pw2			median(0,CCI_r-75,110-75)	-0.0058	0.0009	<.0001
vCCI_DEND_pw3			median(0,CCI_r-110,134-110)	-0.0230	0.0021	<.0001
vSBOI_DEND_pw3		Variate piecewise of small business optimism index	median(0,SBOI_r-100,108-100)	0.0457	0.0044	<.0001
m_product	**ARMSR**	Categorical of product	product = "ARMSR"	-0.3010	0.0330	<.0001
v_UE_CW_growthQ_lag1_pw1		Variate piecewise of country wide unemployment rate quarterly growth with 1Q lag	max(0.4,UE_CW_growthQ_lag1)	-0.1361	0.0366	0.0002
v_UE_CW_growthQ_lag2_pw2		Variate piecewise of country wide unemployment rate quarterly growth with 2Q lag	min(UE_CW_growthQ_lag2, -0.2)	-3.9526	0.6054	<.0001

cx_time[1] = time since last condition D

DeltaTy10Init_r[2] = round(DeltaTy10Init*100,1)

DeltaTy1Init_r[3] = round(DeltaTy1Init*100,1)

DeltaUEInit_r[4] = round(100*DeltaUEInit,1)

deltauepr3_r[5] = round(delta_ue_sa_st*100,1)

hpa2y_blended_r[6] = round(hpa2y_blended*100,1); HPA2Y = 2 year house price appreciation

ltv_i_r[7] = round(ltv_i*100,1)

ue_blended_r[8] = round(ue_blended*100,1)

ycslope_r[9] = round(ycslope*100,1)

ue_sa_st_r[10] = round(ue_sa_st*100,1)

prior3_ue_r[11] = round(prior3_ue_sa_st*100,1) state unemployment 3rd prior quarter

DeltaTm3Init_r[12] = Round(DeltaTm3Init*100,1)

refi_incent2_r[13] = round(100*int_rt/frm30_rate,1); int_rt = loan interest rate; frm30_rate = current frm30 rate

Section 4: Model Validation

Model validation was accomplished in part by applying the model structure developed using the training set to the validation dataset. The application of the model to the validation data produces the probability of each type of transition. The actual target variable is then compared to the predicted target variable to ensure the model fits the transition process without over-fitting the actual data.

Specifically, for the final condition transition state, we calculate the actual transition rate and the predicted transition rate. The actual transition is 1 for the final transition state of the record and 0 for all other transition states. The probability of each final transition state for each record in the validation dataset is derived from the model parameters. The sum of all predicted final condition transition states' probabilities is 1 for each record.

Simple quantile plots are then created for each final condition transition state. All records are sorted in increasing order by the predicted probability. Ten equal sized decile groups are created with 10% of the records in each group. The sum of the actual probability and the sum of the predicted probability for each ending condition within each decile is calculated. The total number of actual and predicted transitions are compared for consistency. The objective of a model is to have a significant spread in predicted values while maintaining a close relationship between the resulting actual and predicted values.

The validation charts shown below show that the spread in prediction is consistent between the actual and predicted experience, and also the actual vs. predicted ratio for each decile are consistent as well.

Current FRM30NSR Transition Models

The validation charts by ending condition for the FRM30NSR models are shown below.

Figure 16: Current FRM30NSR Transition Model Validation - Ending Condition Streamlined Refinance

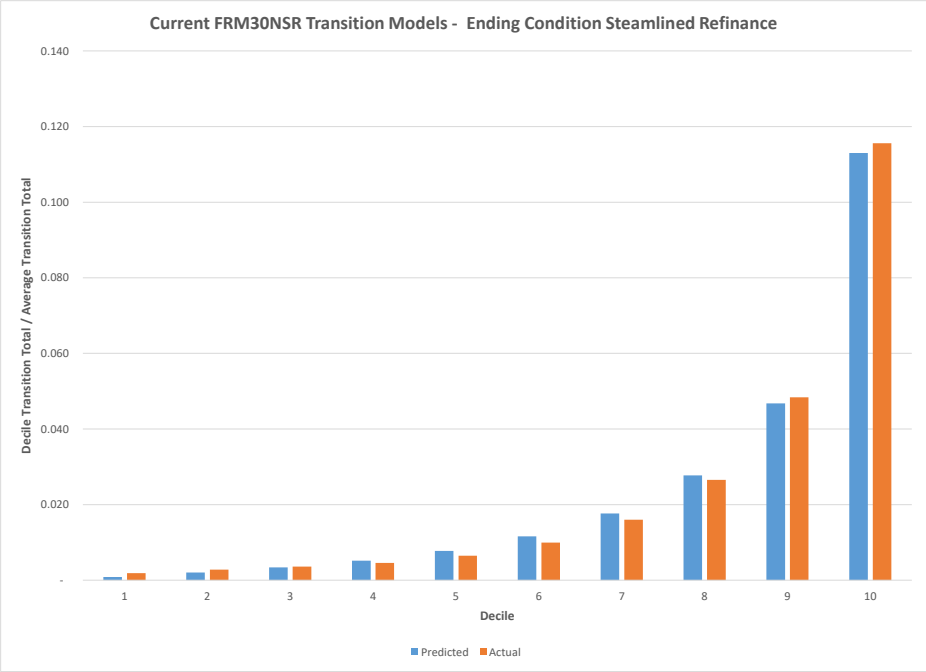


Figure 17: Current FRM30NSR Transition Model Validation - Ending Condition Prepayment

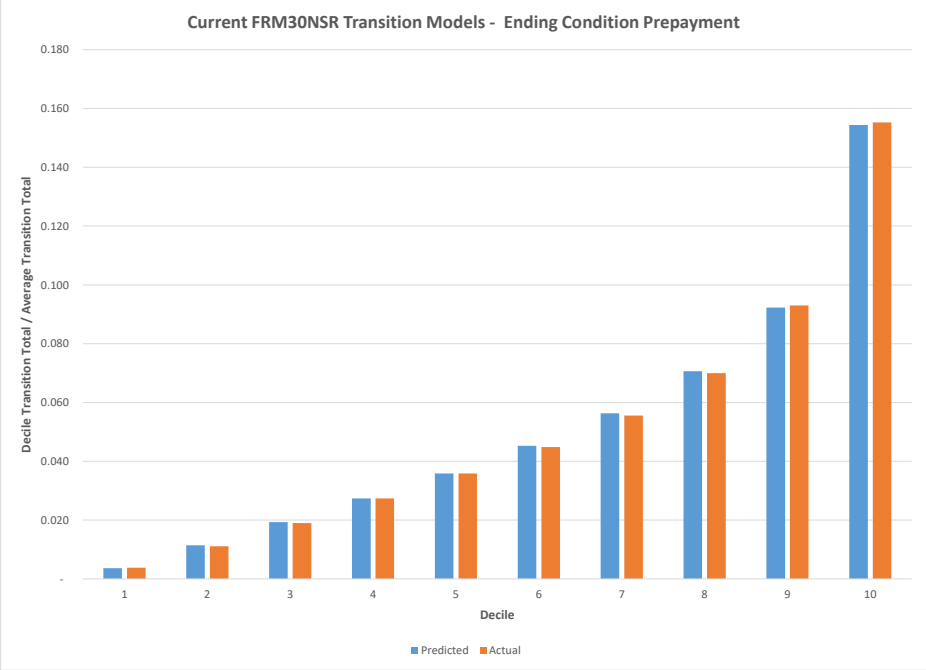


Figure 18: Current FRM30NSR Transition Model Validation - Ending Condition Self-Cure

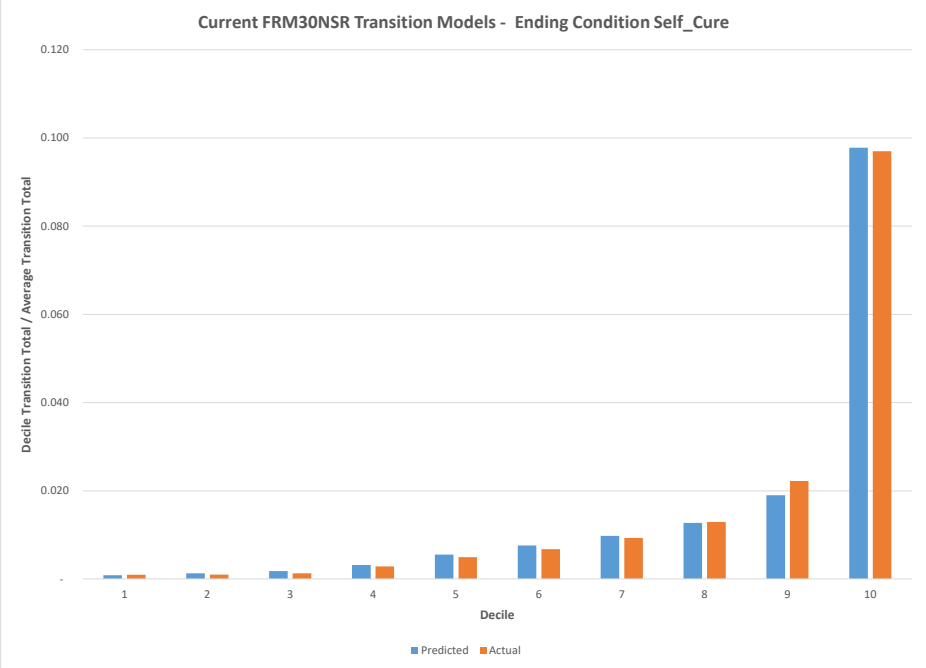
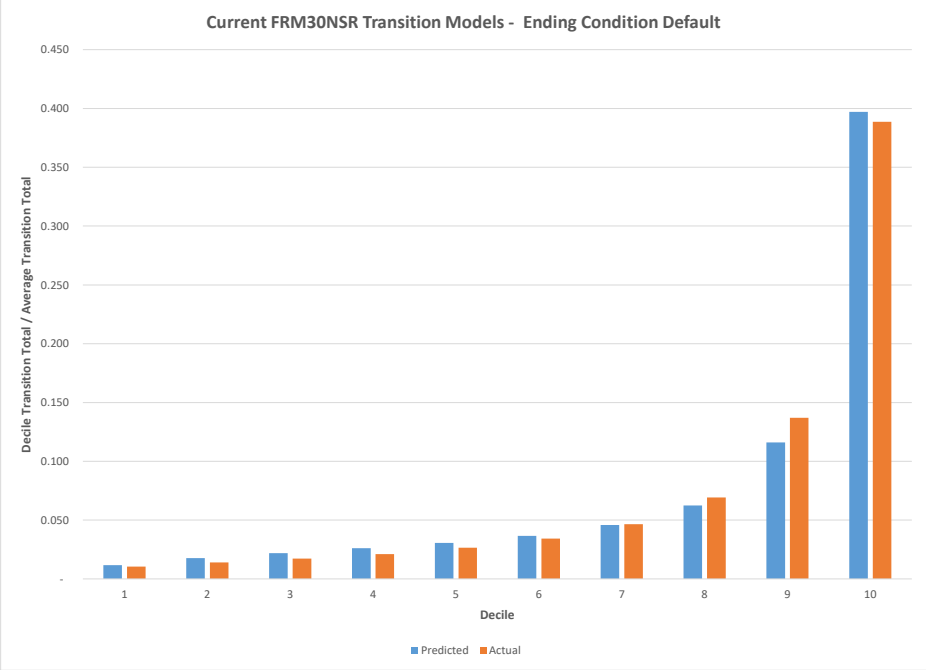


Figure 19: Current FRM30NSR Transition Model Validation - Ending Condition Default



Current FRM30SR Transition Models

The validation charts by ending condition for the FRM30SR models are shown below.

Figure 20: Current FRM30SR Transition Model Validation - Ending Condition Self-Cure

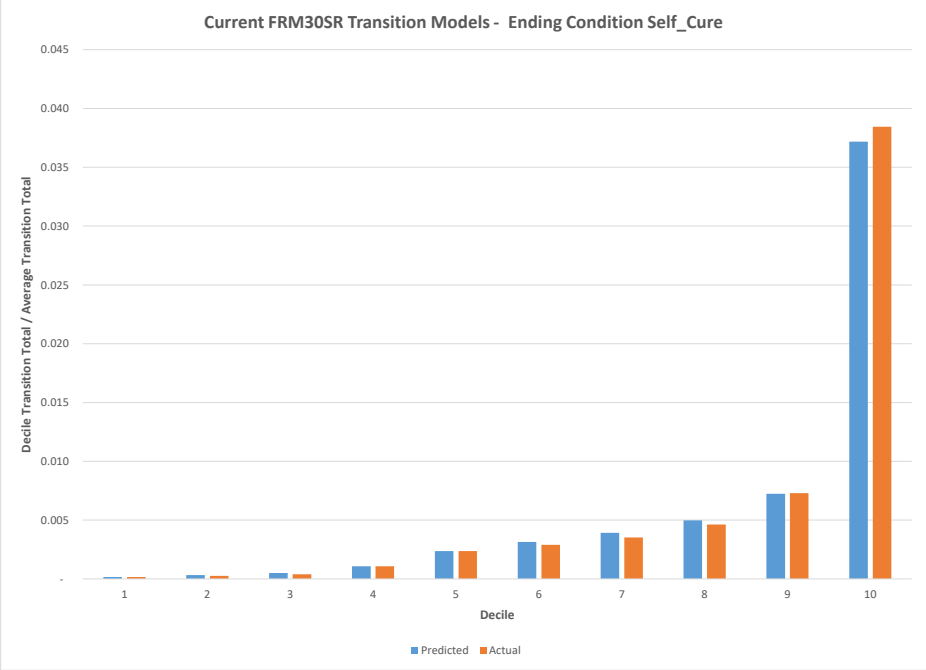


Figure 21: Current FRM30SR Transition Model Validation - Ending Condition Default

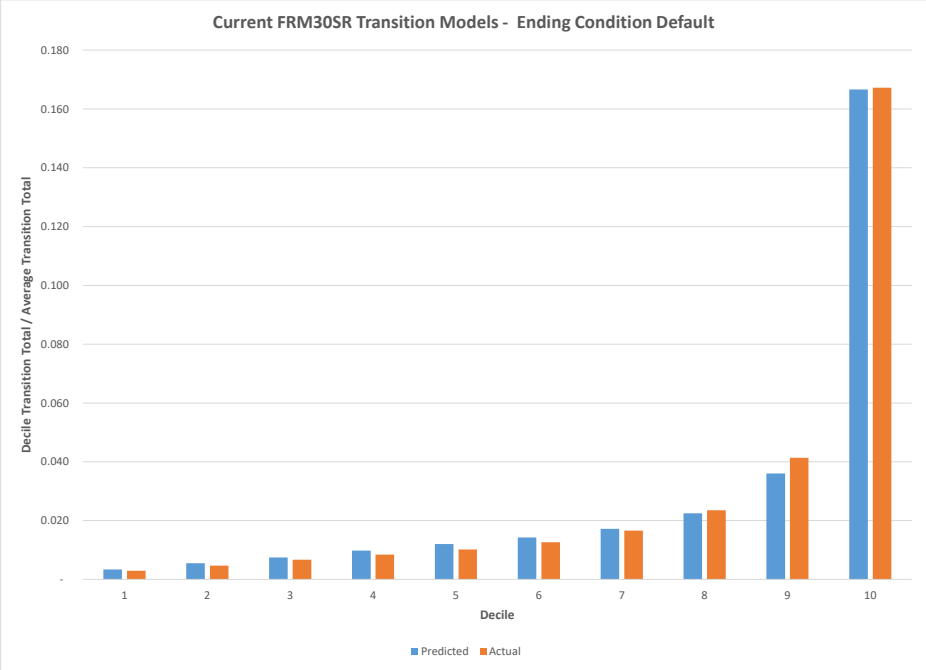
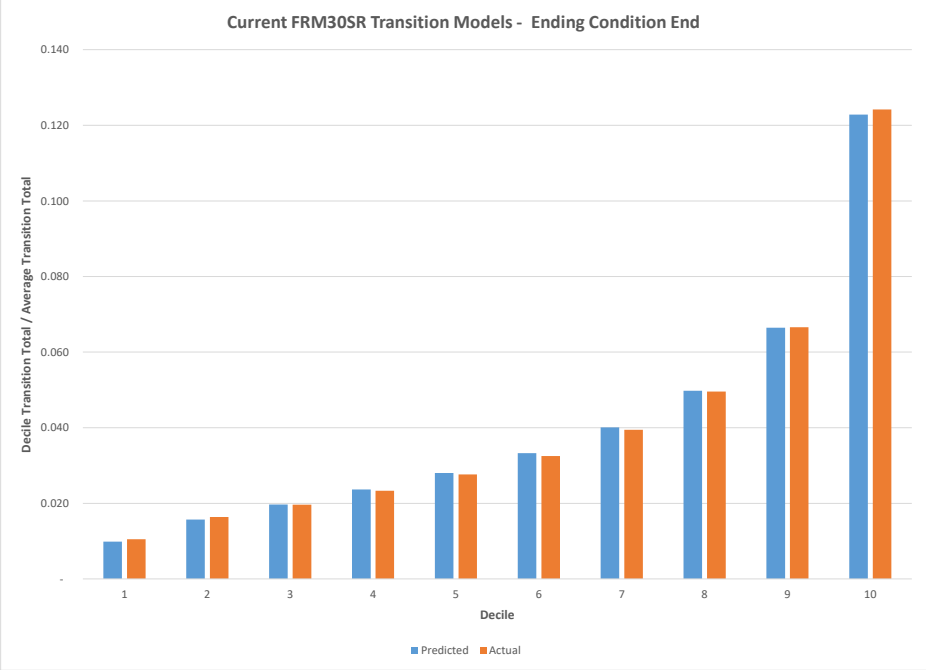


Figure 22: Current FRM30SR Transition Model Validation - Ending Condition End



Current FRM15 Transition Models

The validation charts by ending condition for the FRM15 models are shown below.

Figure 23: Current FRM15 Transition Model Validation - Ending Condition Streamlined Refinance

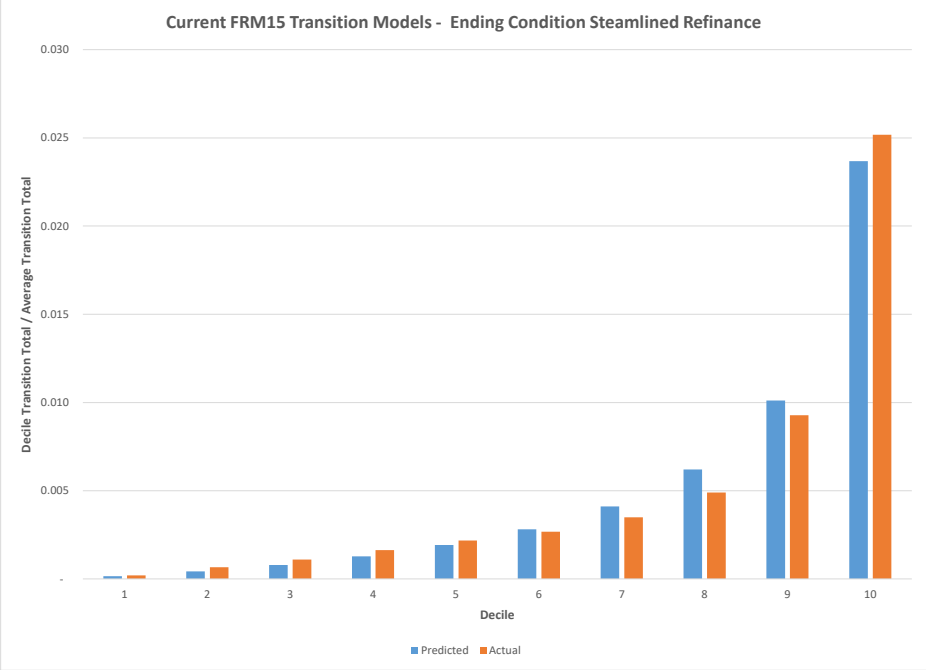


Figure 24: Current FRM15 Transition Model Validation - Ending Condition Default

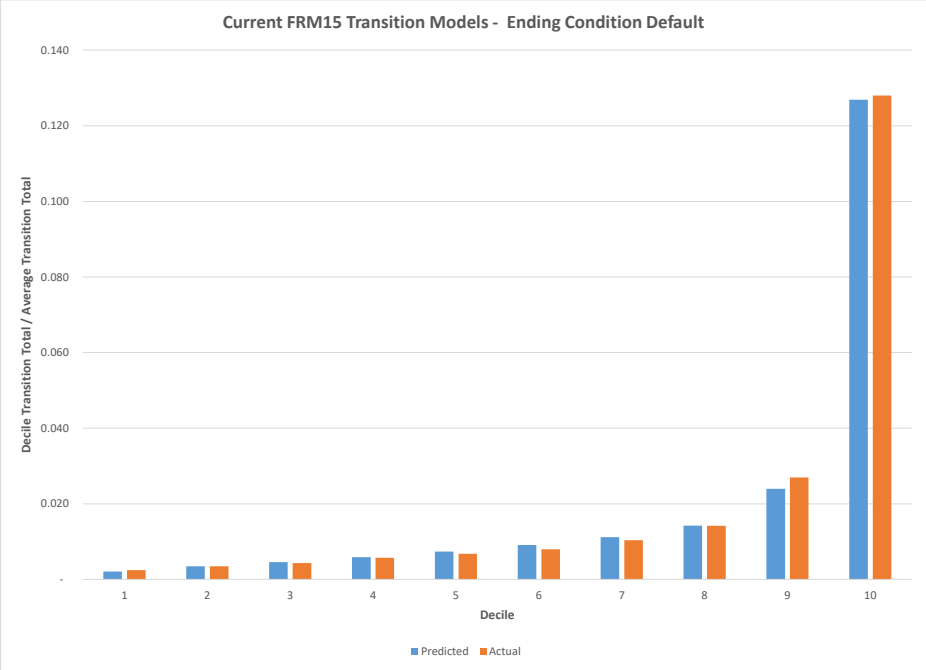


Figure 25: Current FRM15 Transition Model Validation - Ending Condition Self-Cure

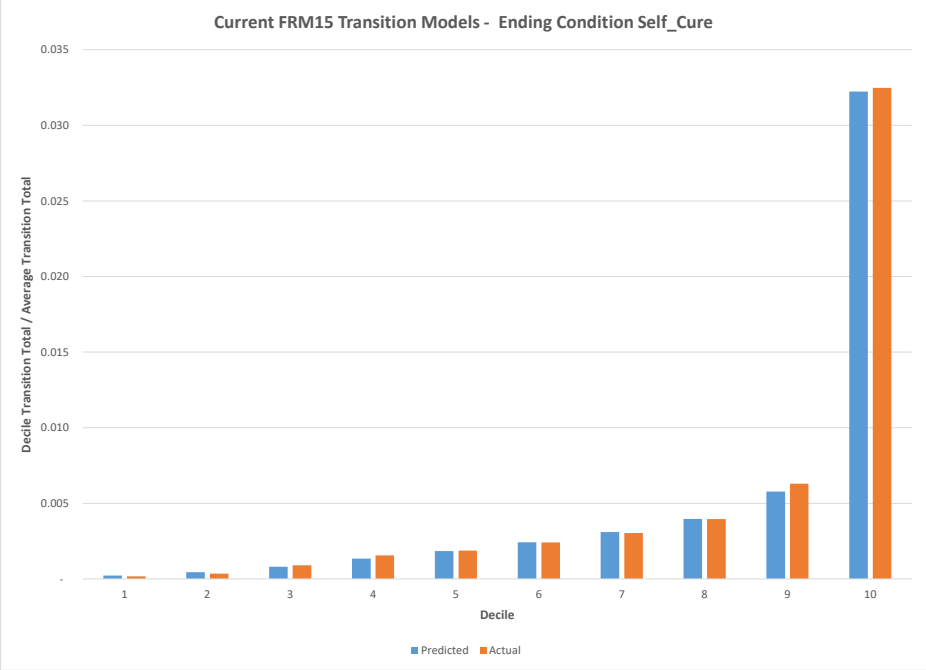
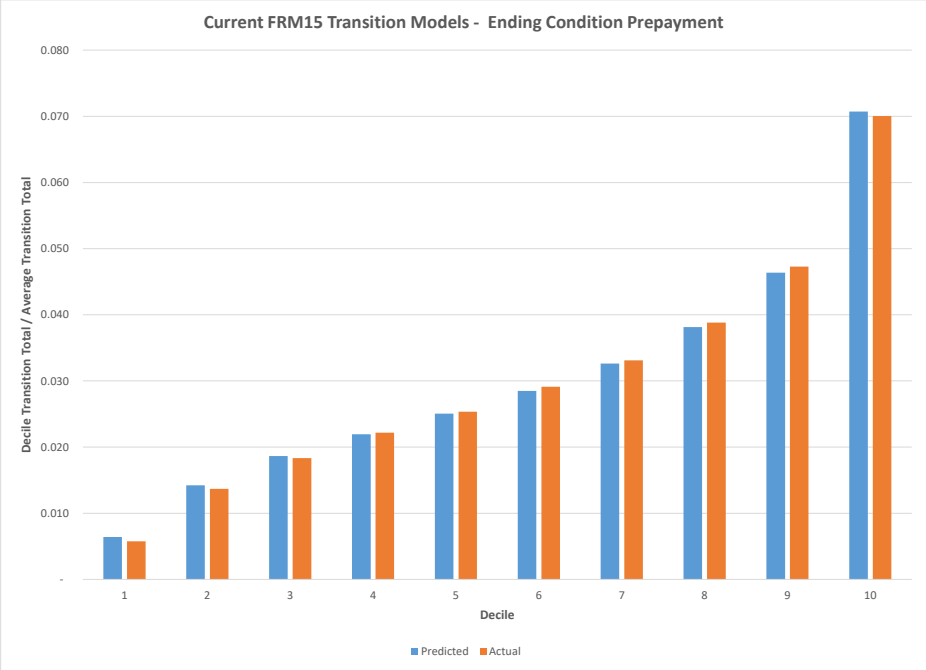


Figure 26: Current FRM15 Transition Model Validation - Ending Condition Prepayment



Current ARM Transition Models

The validation charts by ending condition for the ARM models are shown below.

Figure 27: Current ARM Transition Model Validation - Ending Condition Streamlined Refinance

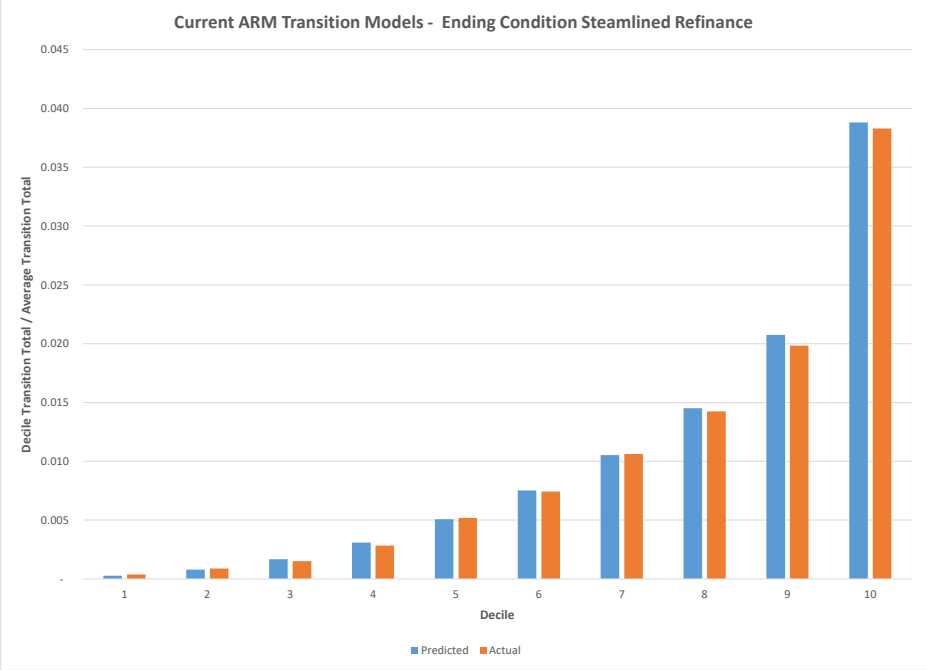


Figure 28: Current ARM Transition Model Validation - Ending Condition Default

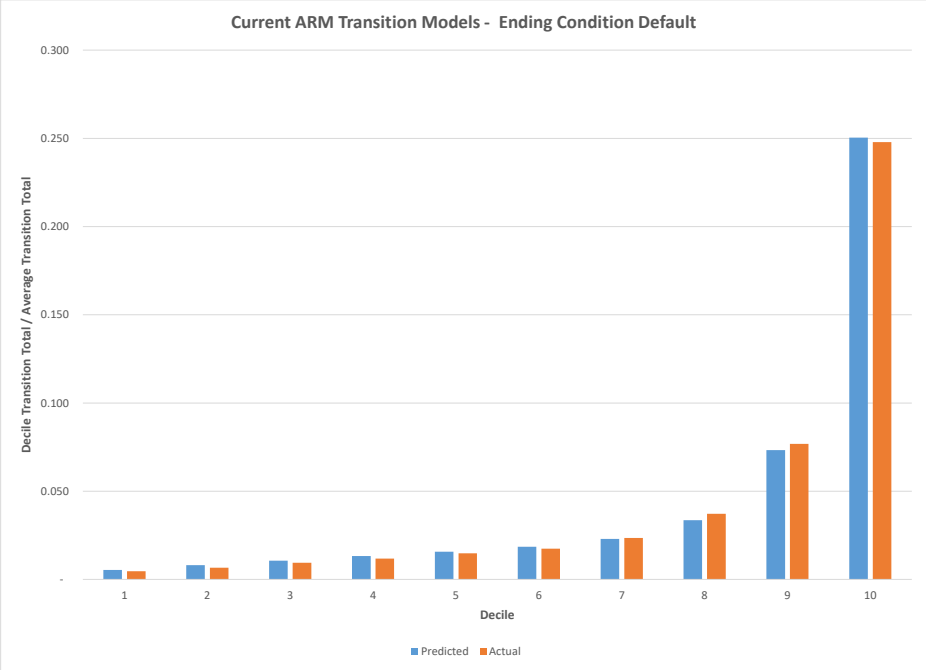


Figure 29: Current ARM Transition Model Validation - Ending Condition Self-Cure

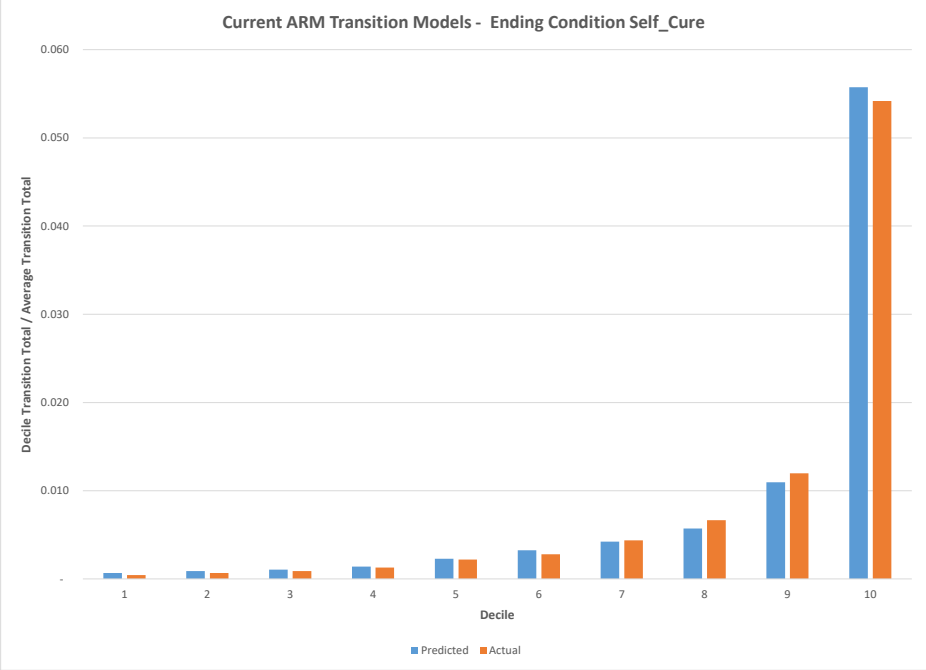


Figure 30: Current ARM Transition Model Validation - Ending Condition Prepayment

Default FRM30NSR Transition Models

The validation charts by ending condition for the FRM30NSR models are shown below.

Figure 31: Default FRM30 Transition Model Validation - Ending Condition Claim

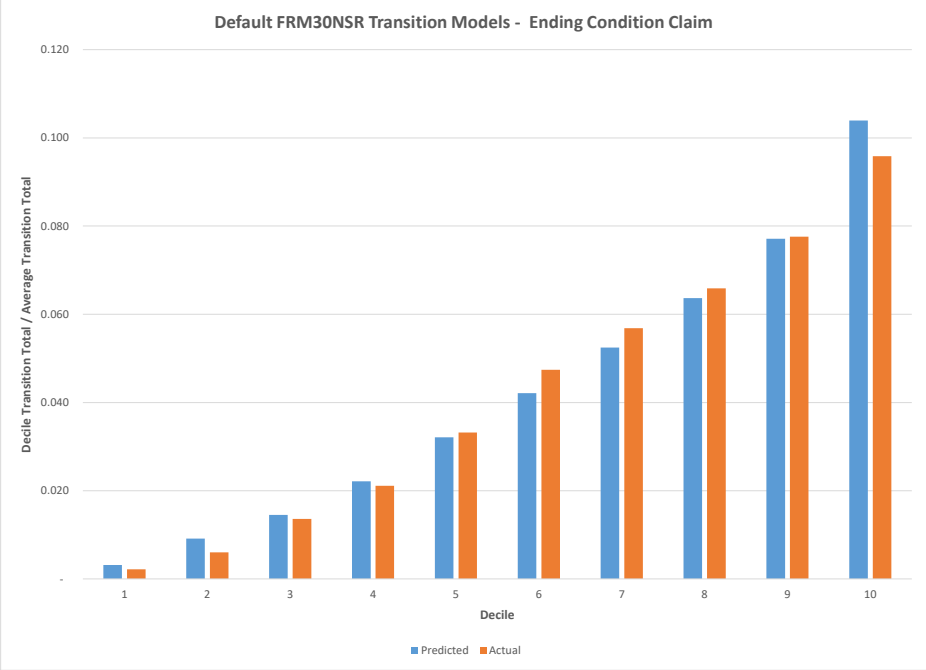


Figure 32: Default FRM30 Transition Model Validation - Ending Condition Cure with Modification

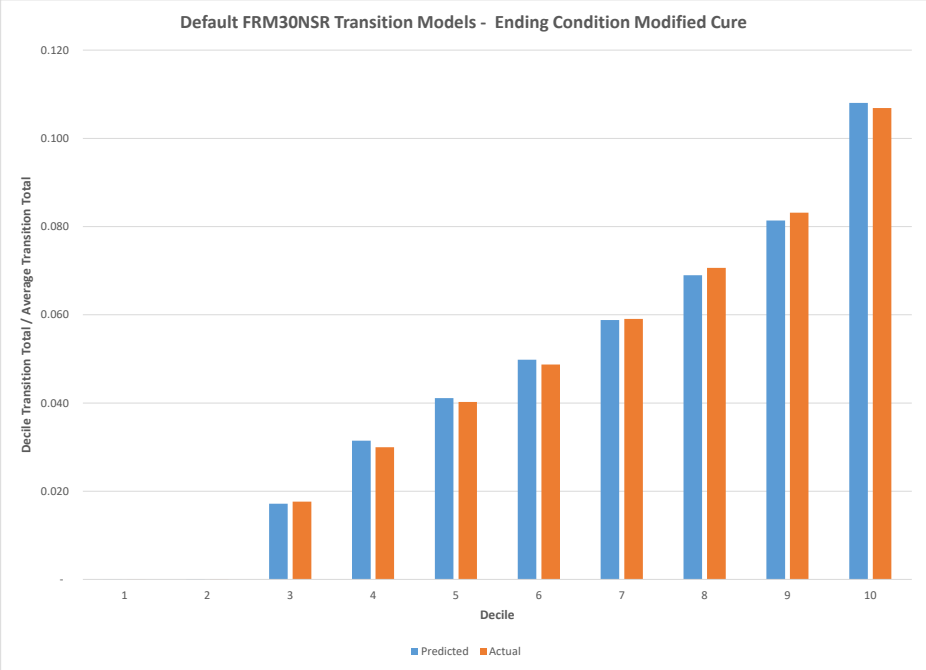


Figure 33: Default FRM30 Transition Model Validation - Ending Condition Self-Cure

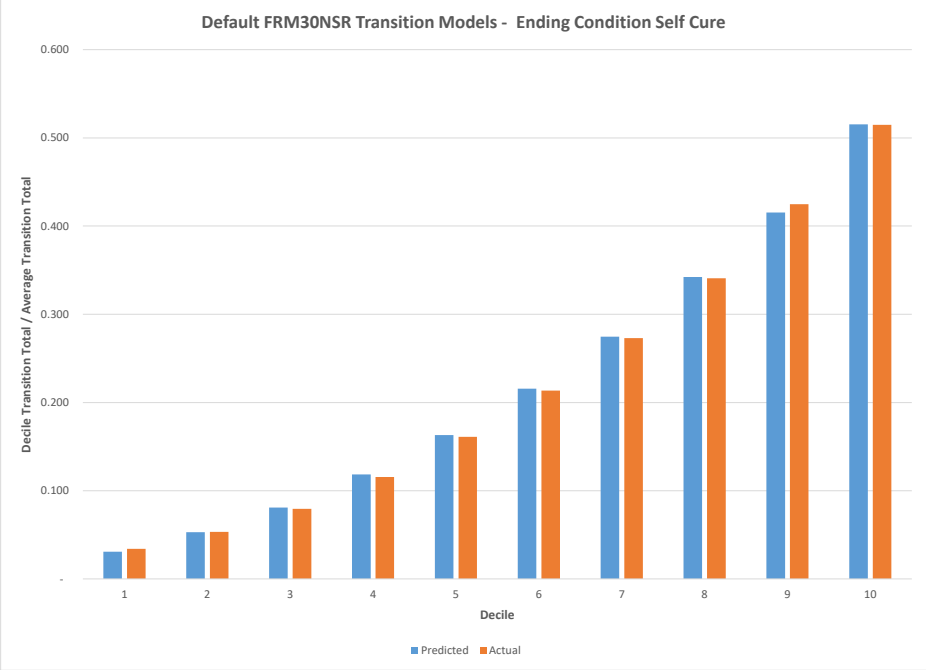
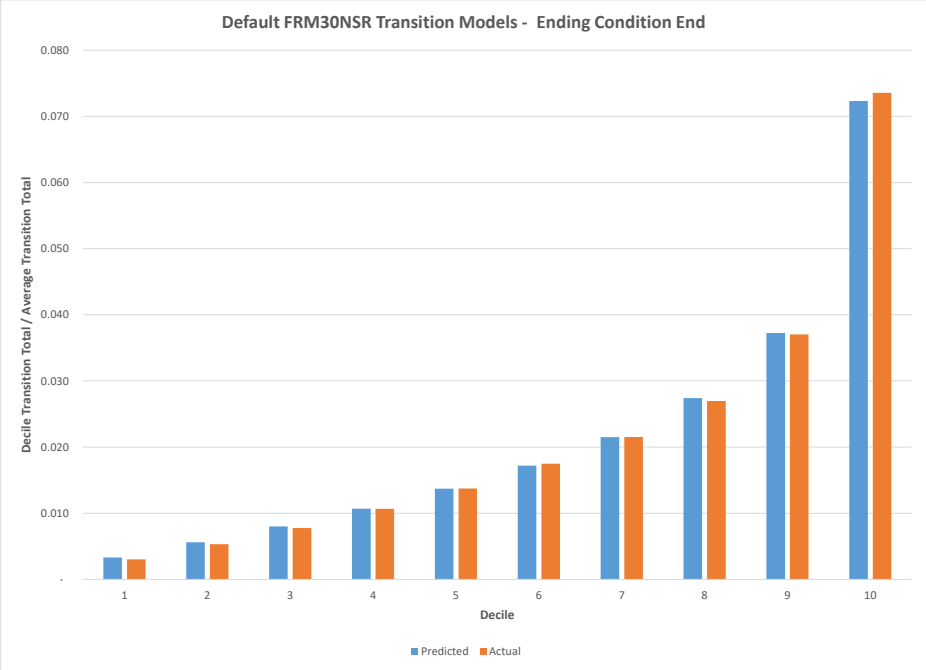


Figure 34: Default FRM30 Transition Model Validation - Ending Condition End



Default FRM30SR Transition Models

The validation charts by ending condition for the FRM30SR models are shown below.

Figure 35: Default FRM30 Transition Model Validation - Ending Condition Claim

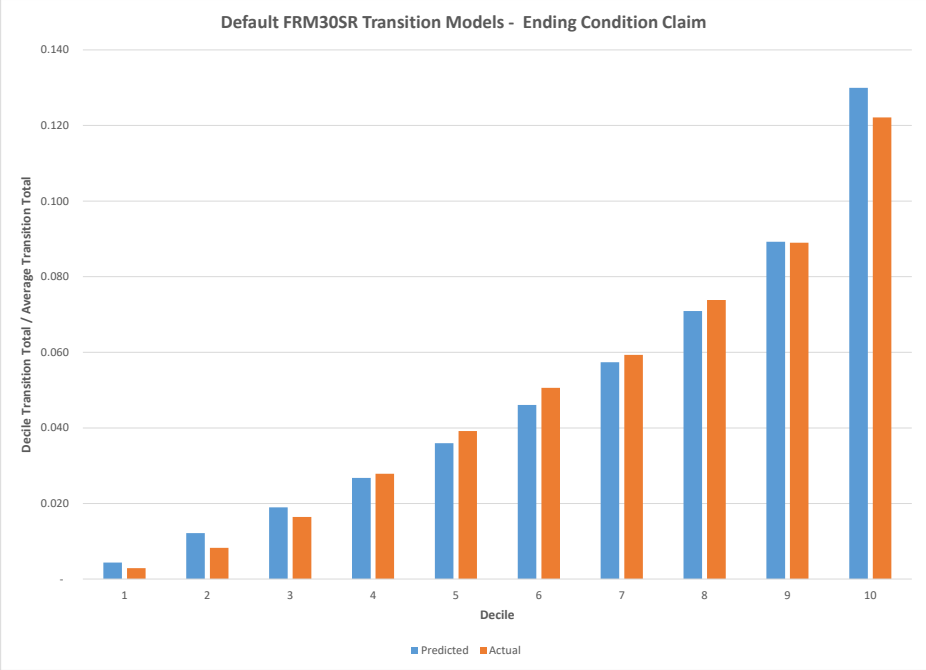


Figure 36: Default FRM30 Transition Model Validation - Ending Condition Cure with Modification

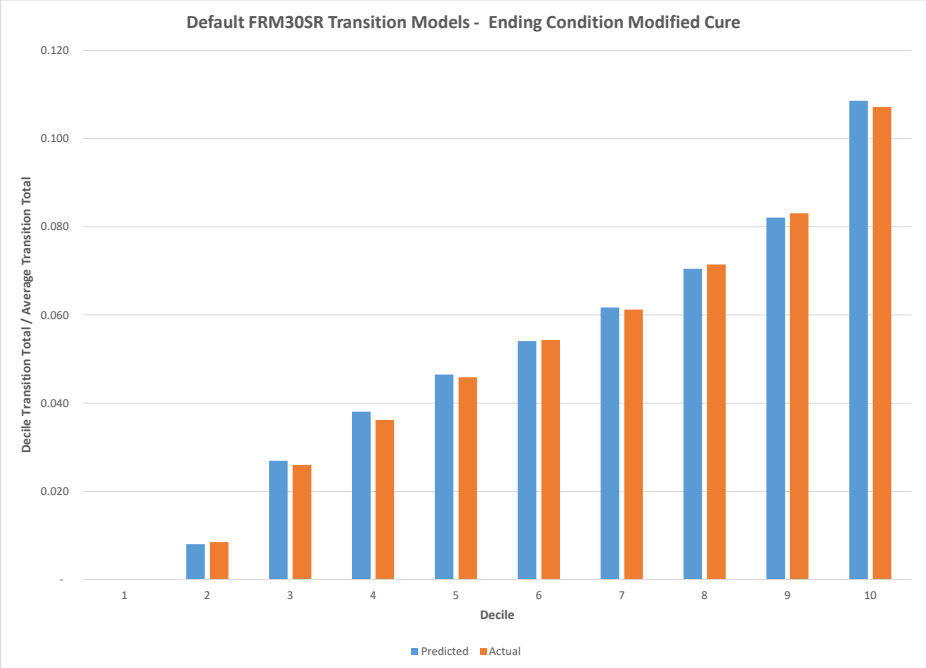


Figure 37: Default FRM30 Transition Model Validation - Ending Condition Self-Cure

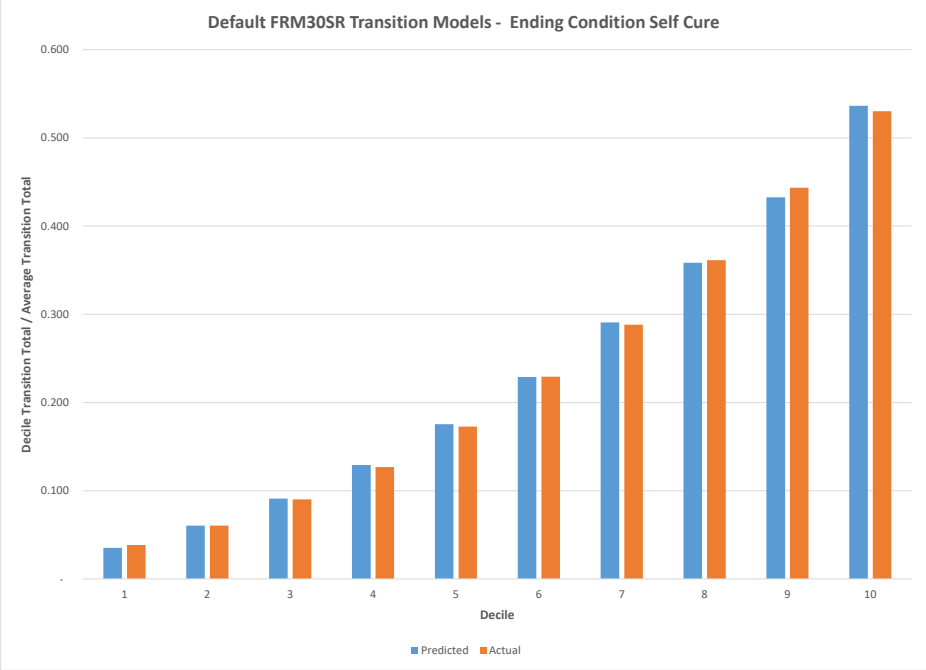
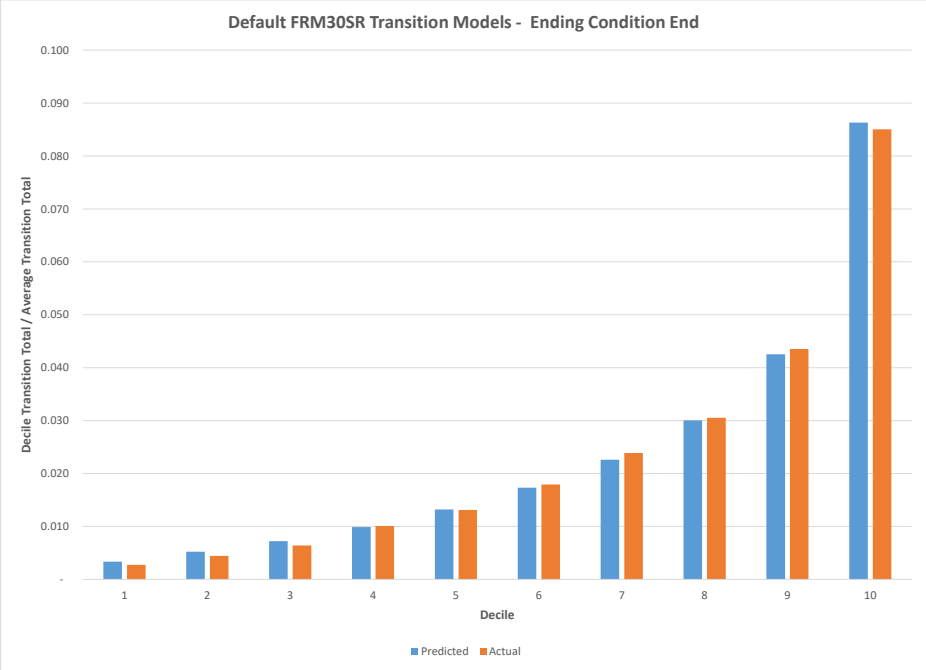


Figure 38: Default FRM30 Transition Model Validation - Ending Condition End



Default FRM15 Transition Models

The validation charts by ending condition for the FRM15 models are shown below.

Figure 39: Default FRM15 Transition Model Validation - Ending Condition Claim

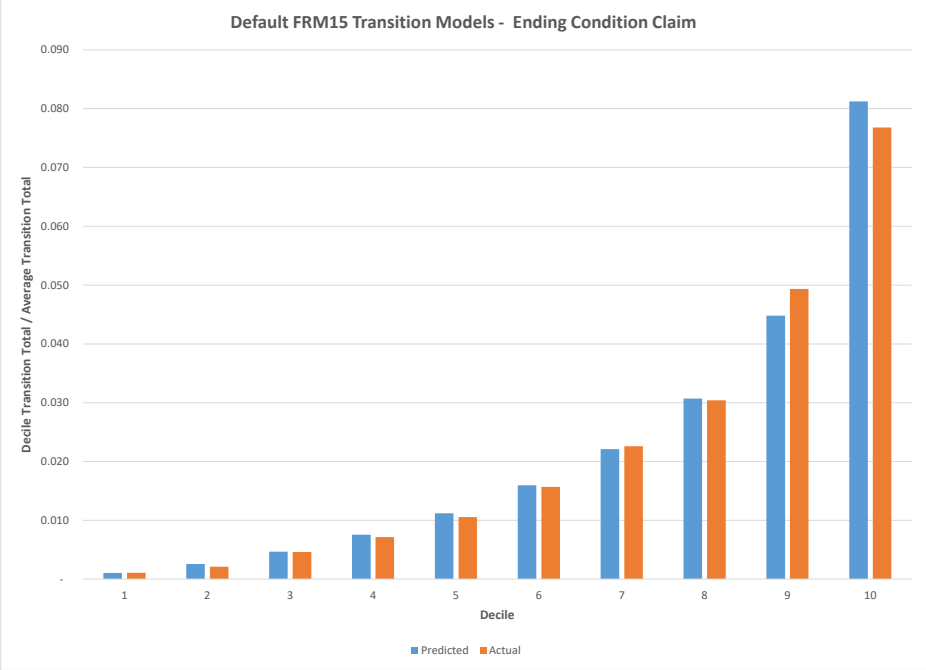


Figure 40: Default FRM15 Transition Model Validation - Ending Condition Cure with Modification

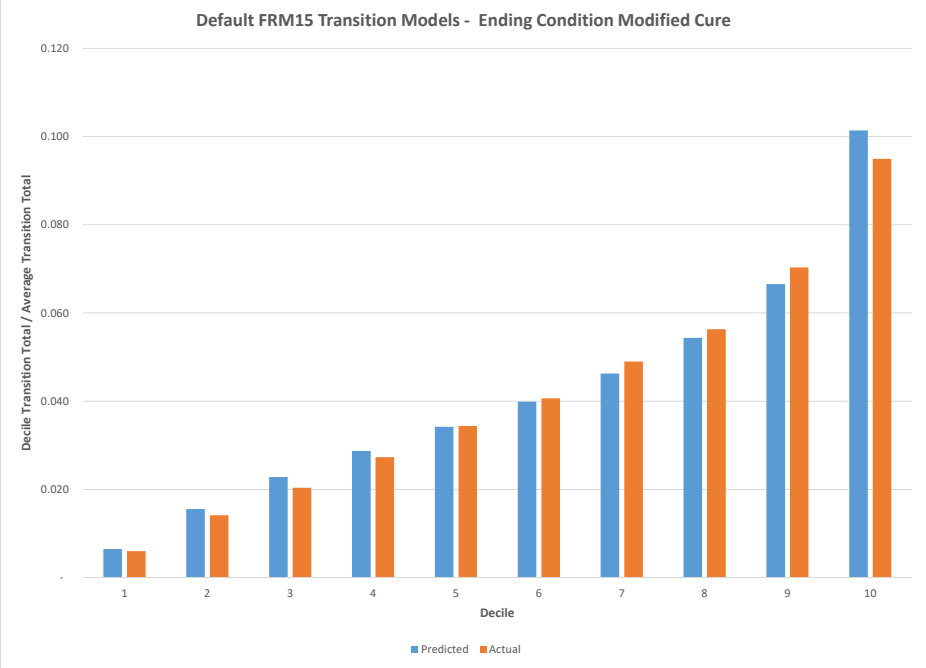


Figure 41: Default FRM15 Transition Model Validation - Ending Condition Self-Cure

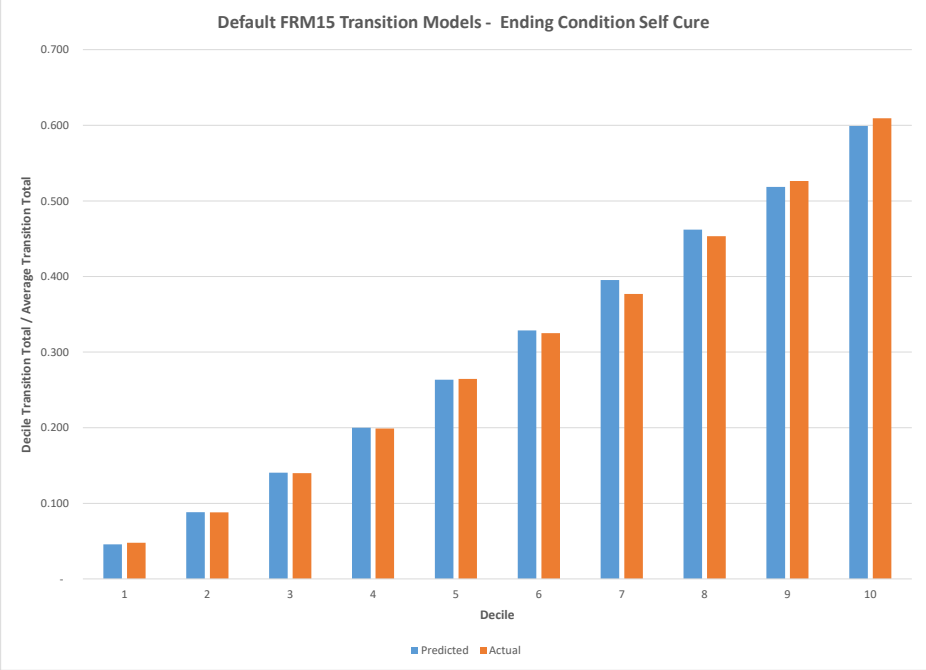
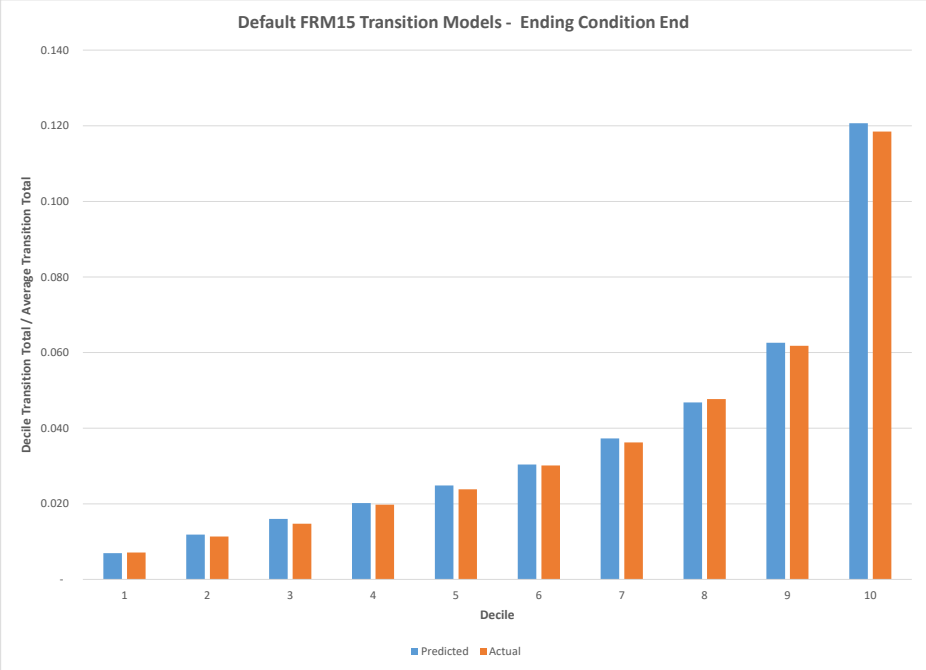


Figure 42: Default FRM15 Transition Model Validation - Ending Condition End



Default ARM Transition Models

The validation charts by ending condition for the ARM models are shown below.

Figure 43: Default ARM Transition Model Validation - Ending Condition Claim

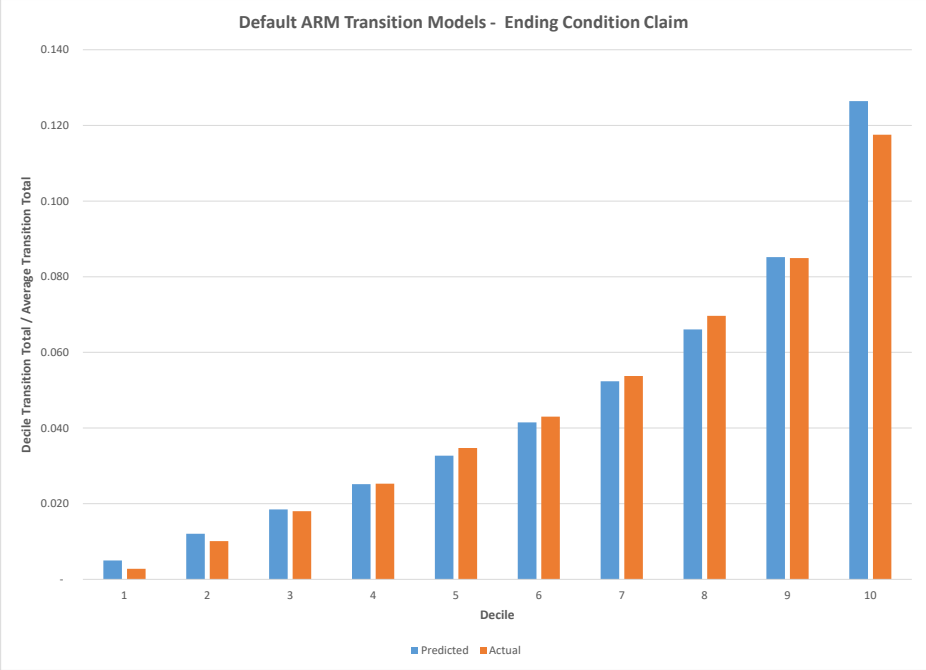


Figure 44: Default ARM Transition Model Validation - Ending Condition Cure with Modification

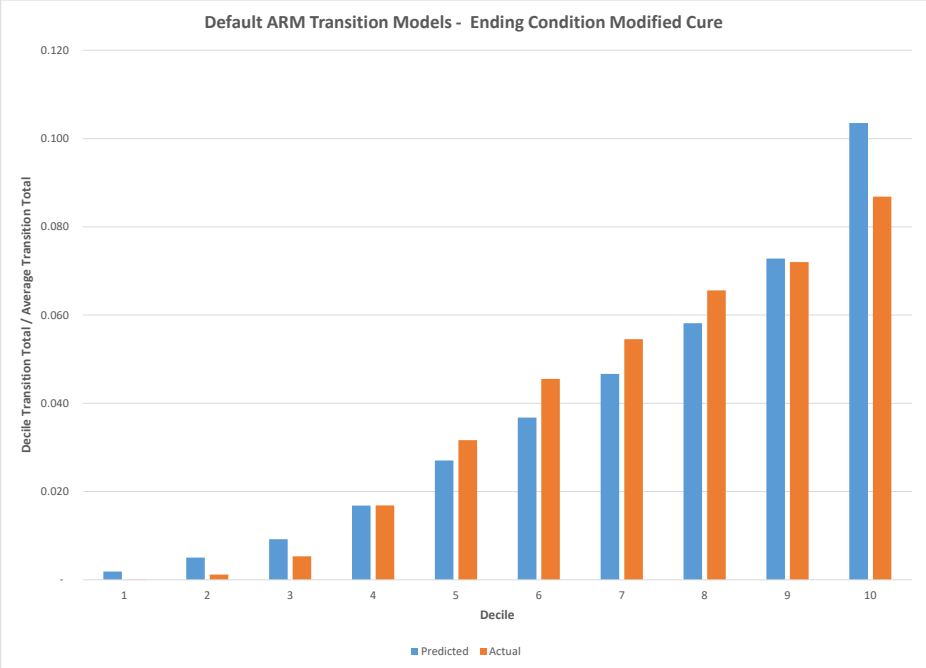


Figure 45: Default ARM Transition Model Validation - Ending Condition Self-Cure

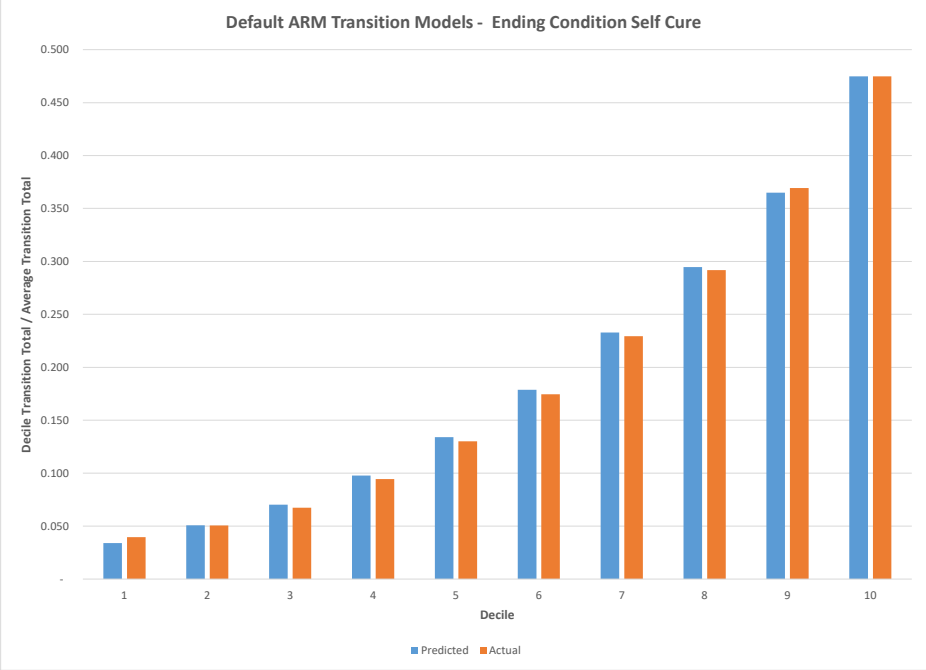
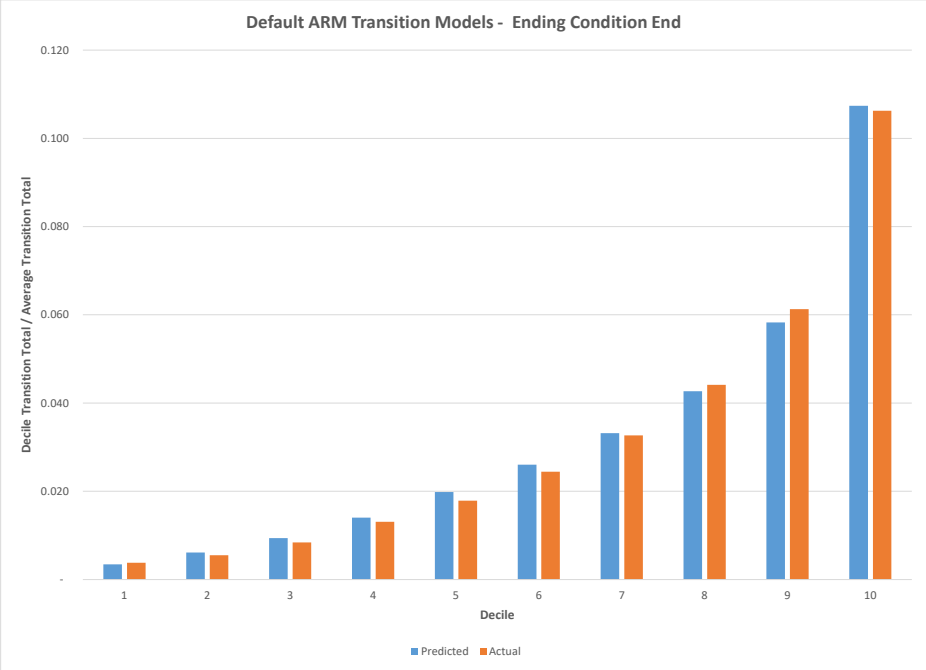


Figure 46: Default ARM Transition Model Validation - Ending Condition End



APPENDIX C: LOSS SEVERITY MODELS

This appendix describes the loss severity models used in this Actuarial Review. One of the primary sources of variation in the MMI performance has been the loss severity experienced on mortgages that terminate as claims. In the case of a single mortgage, net loss is defined as the difference between the acquisition cost to HUD (acq_cost_to_HUD) from the IDB table and the recoveries realized by FHA on properties owned. We predict the net loss by modeling the probability of the type of claim that develops, then modeling separately the loss for each type of claim and the recovery for real estate owned (REO) claims.

In this appendix, we also summarize the model specifications, describe the explanatory variables used, provide the model parameters and provide validation exhibits for the final models.

Model Specifications

Typically, when an FHA-endorsed mortgage terminates as a claim, the property is conveyed to FHA, and FHA makes a payment to the lender to settle the claim and acquire the underlying property. That is, the underlying house becomes REO. The claim payment FHA makes to the servicer, known as the acquisition cost, consists of three components:

1. the outstanding unpaid principal balance on the mortgage;
2. the foregone interest advanced by the servicer as a result of the mortgage default; and
3. legal and administrative costs paid by the servicer associated with foreclosure, including any expenses associated with the cost of repairing or maintaining the property prior to conveyance.

The formula for acquisition cost is:

Acquisition Cost = Unpaid Principal Balance + Foregone Interest + Foreclosure Expense

Following acquisition, FHA attempts to sell the property, sometimes at a reduced price in order to assist low-income prospective homebuyers in achieving homeownership. During the period when the property is held by FHA, but not yet sold, FHA incurs various holding costs associated with maintenance, repairs, tax payments and expenses incurred in preparing the property for sale. Upon sale of the collateral property, FHA receives the sale price less any sales expenses. In sum, the net loss amount is the net amount that FHA cannot recoup from this process:

Net Loss = Acquisition Cost + Holding Cost - Sale Price + Sale Expense

Table 61 shows the distribution of different types of FHA claim terminations. Conveyance refers to the foreclosure procedure discussed above, wherein the property is conveyed to FHA after foreclosure is completed. Until 2016, this was the most common type of claim.

FHA permits pre-foreclosure sales (PFS) as an alternative to the foreclosure process. In the case of a PFS, the property is sold by the borrower without the foreclosure process being completed, or even started in some cases. Instead of acquiring the foreclosed house, FHA directly pays the loss amount claimed by the lender. The loss amount of a PFS case is reported as an acquisition cost to FHA. By 2012, the percentage of PFS was just under 24%. The percentage of PFS decreased through 2017, but since then has increased to 17.5% in 2021.

There were a significant volume of note (non-performing mortgage) sales from claim Fiscal Year 2003 through claim Fiscal Year 2005. From claim Fiscal Year 2007 to claim Fiscal Year 2012, there were significantly fewer note sales. By 2014, however, the percentage of note sales rose above 27%. In these cases, the expenses of foreclosure procedures and subsequent house sales are avoided by FHA. Note sales are discretionary and highly unpredictable. We do not model note sales as a continuing program.

FHA changed its servicing guide in 2013 to allow foreclosure without conveyance. This consists of a Third Party Sale (TPS) during the foreclosure auction. A third party, instead of FHA, acquires the property directly from the foreclosure auction. This process allows FHA to avoid the process and expenses of property disposition after conveyance including any associated holding costs. TPSs have increased significantly since 2012, accounting for nearly 61% of claims in 2019 and 51% of claims in 2021.

Table 61: Percentage of Claim Termination Types by Fiscal Claim Year

Claim Year	Conveyance (REO)	Note Sales	Third Party Sales (TPS)	Pre Foreclosure Sale (PFS)
1999	94.86%	0.11%	0.00%	5.02%
2000	95.06%	0.09%	0.00%	4.85%
2001	95.03%	0.01%	0.00%	4.97%
2002	94.33%	0.00%	0.00%	5.66%
2003	86.74%	8.34%	0.00%	4.92%
2004	85.57%	8.41%	0.00%	6.02%
2005	83.29%	9.79%	0.00%	6.91%
2006	89.37%	2.83%	0.00%	7.80%
2007	92.80%	0.00%	0.00%	7.20%
2008	93.06%	0.00%	0.10%	6.84%
2009	90.06%	0.00%	0.01%	9.93%
2010	84.46%	0.31%	0.00%	15.22%
2011	76.29%	1.17%	0.02%	22.51%
2012	71.24%	1.32%	3.59%	23.86%
2013	56.72%	17.66%	6.87%	18.75%
2014	42.68%	27.29%	15.39%	14.63%
2015	54.25%	16.27%	18.25%	11.22%
2016	49.53%	11.51%	29.29%	9.66%
2017	38.11%	6.23%	46.99%	8.66%
2018	34.36%	0.11%	56.35%	9.18%
2019	30.67%	0.13%	61.07%	8.13%
2020	37.60%	0.00%	52.66%	9.74%
2021	30.59%	0.69%	51.18%	17.54%

Table 62 shows the average net loss for the combined foreclosure (REO and TPS) and PFS claims by claim Fiscal Year for 1991 to 2021. The average net loss increased from 1991 to 2012, reaching a high of almost $129,000 in Fiscal Year 2012. Since 2012, the average net loss had been decreasing through 2019, but increased slightly in 2020 before decreasing again in 2021.

Table 62: Historical Average Net Loss

Claim Year	Average Net Loss
1991	61,095
1992	62,389
1993	65,614
1994	68,850
1995	71,118
1996	73,864
1997	77,434
1998	81,185
1999	84,226
2000	85,883
2001	87,069
2002	88,206
2003	91,208
2004	93,004
2005	94,310
2006	97,606
2007	101,710
2008	110,001
2009	118,373
2010	127,977
2011	128,833
2012	128,883
2013	124,552
2014	112,670
2015	115,450
2016	107,392
2017	95,015
2018	86,906
2019	80,004
2020	85,215
2021	74,404

Loss Mitigation Expenses

FHA initiated a loss mitigation program in 1996 in an effort to provide opportunities for borrowers in financial difficulties to retain homeownership. Loss mitigation also reduces foreclosure costs. In the standard process, the mortgagees provide default counseling for borrowers who are behind in their payments, and offer appropriate loss mitigation options to prevent borrowers from losing their homes. In 2009, FHA started the HAMP program as a new loss mitigation option, and the program represented increasing percentages of loss mitigation assistance through the years. In 2016, Mortgage Modification as a standalone option was eliminated and combined into HAMP.

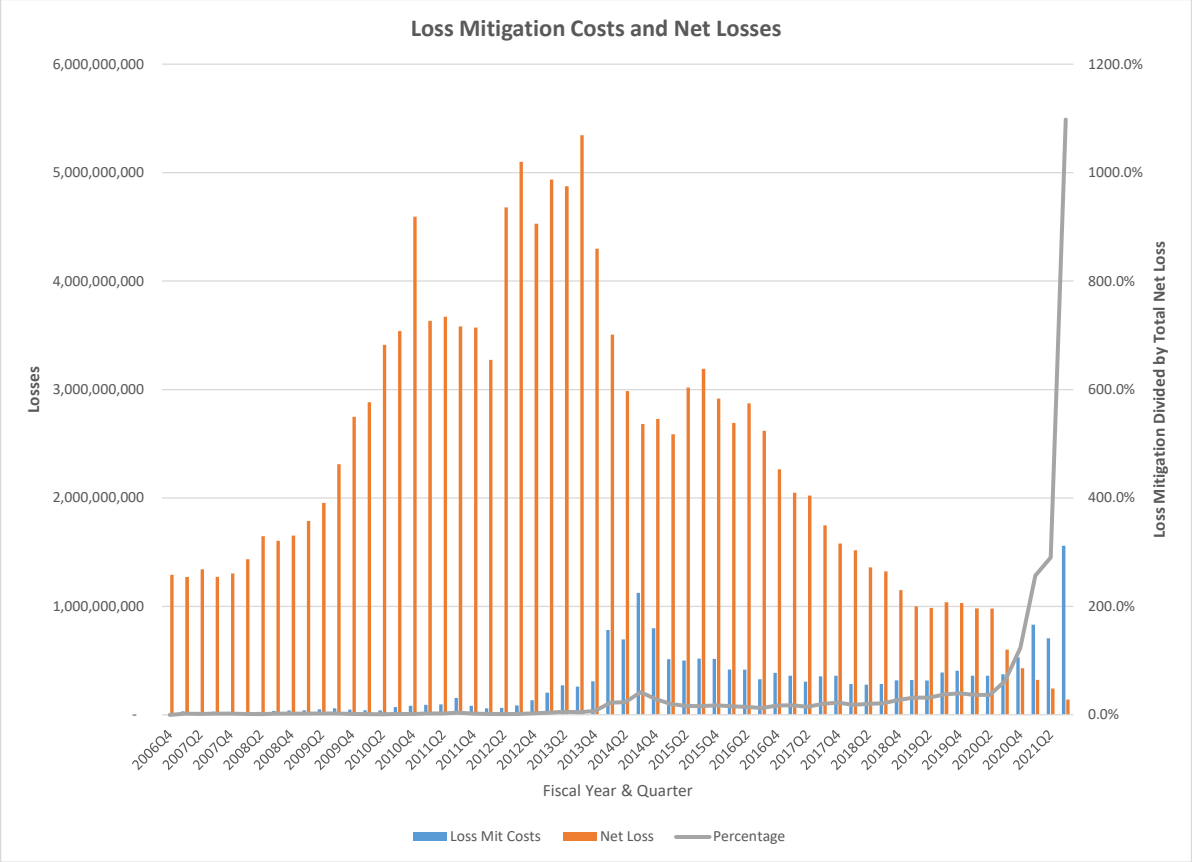
The loss mitigation program includes Forbearance and HAMP, which has Loan Modification and Partial Claim options. A Special Forbearance is a written repayment agreement between the mortgagee, acting on behalf of FHA, and the borrower that contains a plan to reinstate a mortgage. A Loan Modification modifies the contractual terms of the mortgage permanently, such as lowering the interest rate, or increasing the mortgage term. Under the partial claim option, a mortgagee will advance funds on behalf of a mortgagor in an amount necessary to reinstate a delinquent mortgage. The borrowers are required to sign a promissory note and a subordinated mortgage payable to FHA of the amount advanced.

Figure 47 shows the ratio of loss mitigation costs to overall net losses. Loan mitigation cases increased significantly from Fiscal Year 2007 to Fiscal Year 2014. There were just under 80,000 loss mitigation claims in Fiscal Year 2007 which grew to over 180,000 cases in Fiscal Year 2014. The amount FHA paid in these cases and curtailments was $116 million in Fiscal Year 2007, which increased to $3.41 billion in Fiscal Year 2014. From 2014 to 2018, loss mitigation payments decreased to $1.16 billion, but then increased in 2019 and 2020.

For Fiscal Year 2021, loss mitigation payments in total have been over four times higher than the total REO, TPS and PFS claim payments. This is due to the COVID forbearance rules that were implemented on March 1, 2020. All foreclosure proceedings had been halted until September 30, 2021, no new foreclosure proceedings could begin until September 30, 2021, and no foreclosure evictions could begin until September 30, 2021. Therefore, the non-loss mitigation claims had been delayed until normal foreclosure and claim processes resumed.

Loss mitigation payments made by FHA include administrative fees, costs of title searches and recording fees, and subordinated mortgage note amounts.

Figure 47: Loss Mitigation Expense



Net Loss Severity Model Specification

As described above, there are several components of the total loss amount, and each component is influenced by a number of factors. Foregone interest depends on the interest rate on the mortgage and on the length of the default-to-claim lag. Foreclosure expenses can vary depending on whether a judicial foreclosure process is used that can lengthen the time period of the foreclosure process. Repair expenses may be a function of the financial condition of the borrowers, which we proxy by credit scores. Sale prices are influenced by the house price appreciation since origination and by the prevailing local housing market conditions during the default and property disposition periods. Several components of the net loss amount involve expenses that are fixed across foreclosed properties. Hence, mortgages with lower values are more likely to realize higher net losses as a percentage of the sales amount, as the amount of the recovery will be smaller relative to higher value homes.

As shown in Table 61, the distribution between REO/TPS (foreclosure) and PFS was relatively stable through Fiscal Year 2009. Beginning in Fiscal Year 2010, there were widespread house price declines and a higher volume of defaults. As a result, the foreclosure claim process had been lengthened and foreclosure claims were delayed, while the PFS process has remained relatively stable. From Fiscal Year

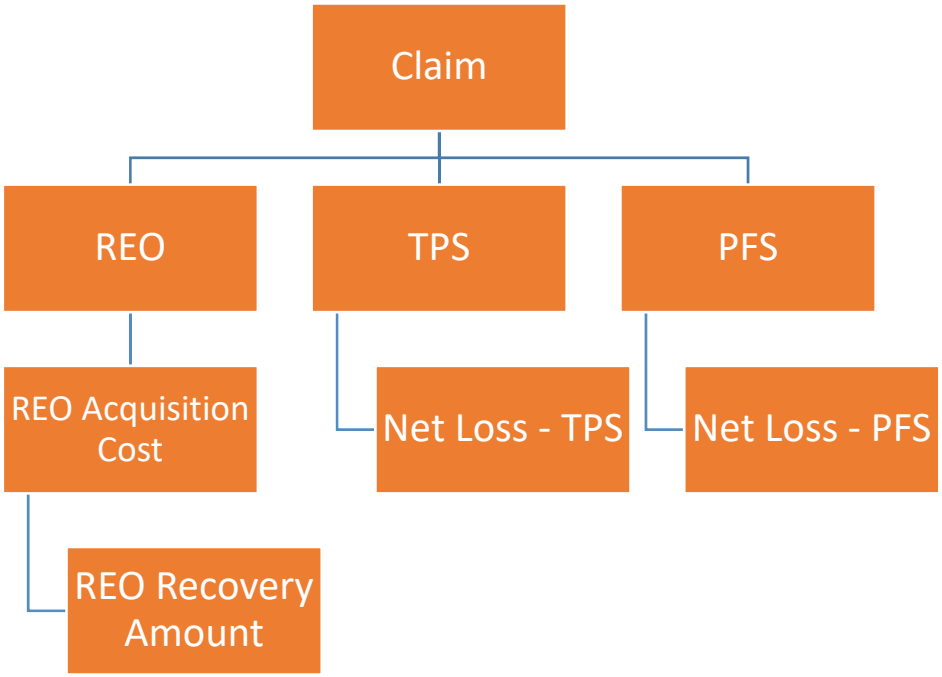
2008 to 2012, the PFS share increased significantly. Since Fiscal Year 2012, the PFS share has declined. Moreover, the proceeds recovered from REO and PFS sales differ significantly.

To achieve more accurate estimates of net loss severities, we adopted a three-stage model:

1. Model to predict the development of an REO, TPS or PFS claims
2. Model of REO acquisition cost and TPS and PFS net loss
3. Model of recovery amount conditional on claim being a foreclosure REO claim

The net loss severity model follows the flowchart in Figure 48.

Figure 48: Net Loss Severity Model Structure



First, we estimate the probability that a claim is settled by the REO, TPS, or PFS process. To model the first-stage choice event, we used a multinomial logistic model approach to estimate the probability of the claim settlement type.

Second, we estimate the REO Acquisition Amount, TPS net loss and PFS net loss as a function of all the same explanatory factors used in the multinomial model. The gross loss severity distribution is smooth and continuous with a long right tail. Thus, we use a GLM approach with a Gamma error structure and a log link function to develop the gross loss severity models. The Gamma structure is used for each loss severity model (REO, TPS, PFS). For REO claims, a recovery model estimating sales proceeds net of the Capital Income Expenses is built using a similar framework.

In addition to the loss severity models described above, we also developed a set of models to project loss mitigation costs. Implemented in 1996, the loss mitigation program was designed as a way to help financially stressed borrowers stay in their homes. Loss mitigation costs can be incurred from modifying the terms of the mortgage, allowing a borrower to refinance into a new mortgage and writing off a portion of the unpaid principal (partial claim), or a forbearance, which is a written agreement with the borrower which includes a plan to reinstate the mortgage. The loss mitigation cost is modeled using a GLM with a Gamma error structure.

Thus, the estimated net loss to the MMI is the expected value of net loss of the different claim types:

$$\text{Net Loss} = Probability\ of\ REO * (\text{GrossLoss}_{REO} - \text{Recovery}) + Probablity\ of\ TPS * \text{NetLoss}_{TPS} + Probablity\ of\ PFS * \text{NetLoss}_{PFS} + Probability\ of\ Loss\ Mitigation * \text{Net Loss Mitigation Cost}$$

Estimation Sample

The sample used to estimate the loss severity model consists of mortgage level data from the FHA single-family data warehouse. The available data covers the period from the first quarter of Fiscal Year 1975 to the third quarter of Fiscal Year 2021. In total, there are over 2.8 million claims in the FHA database.

The models were built using a traditional train/validate approach. A random sample of the data is used to train the models, and the remaining data is used to validate and refine the model parameters and to determine inclusion and exclusion of explanatory variables.

Explanatory Variables

Multiple categories of explanatory variables were used.

- Fixed initial mortgage characteristics: ARM adjustment period, mortgage product, interest rate, initial mortgage size, spread at origination
- Fixed initial borrower characteristics: down payment assistance, first time home buyer, credit score
- Property characteristics: the number of living units, initial home values
- Dynamic variables based on mortgage information: prior default indicator, prior mortgage modification, LTV ratio, interest rate spread, TEI, age of mortgage
- Dynamic variables derived by combining mortgage information and external economic data: spread, spread at origination

- Dynamic macroeconomic variables: 10-year average unemployment rate, change in the unemployment rate, prior year unemployment rate, HPI, state unemployment rate relative to countrywide unemployment rate, CMT rates, state unemployment rate
- Geographic variables: judicial state, collateral state

Most of the explanatory variables used in the loss severity model are the same as those used in the mortgage status transition models. The additional variables used in the loss severity models are defined below.

- Product: loan product type. This variable is incorporated as a categorical variable.
- Balance: outstanding mortgage balance. This variable is incorporated as a variate.
- Deltatm3: change in three-month CMT rate from policy inception to current. This variable is incorporated as a grouped categorical variable.
- Arm_ind: ARM product type indicator. This variable is incorporated as a grouped categorical variable.

Model Parameters[81, 82]

Loss Mitigation Binomial Model

The model parameters for the binomial model to estimate whether a claim is a loss mitigation (HAMP) claim are below.

Table 63: Loss Mitigation Binomial Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-0.1091	0.5962	0.8547
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	-0.0207	0.0119	0.0811
SVSBOI_pw2			median(0,SBOI-95,110-95)	-0.0307	0.0014	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	0.2500	0.0391	<.0001
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.1978	0.0632	0.0017
SMproduct	**FRM15**		15 year fixed rate mortgage	-1.1510	0.0473	<.0001
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	-1.1605	0.0943	<.0001
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	-0.1516	0.0280	<.0001
SVloansize_raw_grp		Variate version of loansize_raw	min(loansize/1000,600)	0.0023	0.0001	<.0001

[81] For categorical variable, only non_base levels are listed.
[82] The tables' footnotes are consistent among the tables. They are listed at the end of the section.

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMpriordef	**L01**	Categorical of prior defaults	prior_default_count = 1	-0.1255	0.0135	<.0001
SMpriordef	**L02**		prior_default_count = 2	-0.2264	0.0152	<.0001
SMpriordef	**L03**		prior_default_count >= 3	-0.3871	0.0150	<.0001
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 1	0.0693	0.0119	<.0001
SMpriormod	**L02**		prior_mod_cnt = 2	0.1610	0.0178	<.0001
SMpriormod	**L03**		prior_mod_cnt >= 3	0.2490	0.0240	<.0001
SVpriordef_pw1		Variate piecewise version of prior defaults	min(prior_default_cnt,15)-3	-0.1007	0.0314	0.0013
SVpriormod_pw1		Variate piecewise version of prior_mod_cnt	median(0,prior_mod_cnt-3,15-3)	-0.0782	0.0179	<.0001
SMseason	**L01**	Categorical of season	season = "winter"	-0.1339	0.0128	<.0001
SMseason	**L02**		season = "spring"	-0.1523	0.0122	<.0001
SMseason	**L03**		season = "summer"	-0.1620	0.0122	<.0001
SMperiodnbr_LML	**L01_04**	Categorical of period number	1 <= period_number <= 4	-3.6275	0.2387	<.0001
SMperiodnbr_LML	**L05**		period_number = 5	-2.2638	0.1221	<.0001
SMperiodnbr_LML	**L06**		period_number = 6	-1.1816	0.0674	<.0001
SMperiodnbr_LML	**L07**		period_number = 7	-0.2422	0.0352	<.0001
SVperiodnbr_pw1		Variate piecewise version of period number	median(0,period_number-8,40-8)	-0.0378	0.0006	<.0001
SVperiodnbr_pw2			median(0,period_number-40,53-40)	-0.0156	0.0019	<.0001
SVperiodnbr_pw3			median(0,period_number-53,68-53)	-0.0084	0.0023	0.0003
SVperiodnbr_pw4			median(0,period_number-68,108-68)	-0.0096	0.0018	<.0001
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	-0.0334	0.0089	0.0002
SMRatioTmpTei	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	1.1941	0.0465	<.0001
SVratiotmptei_pw1		Variate piecewise version of front end ratio	median(0,ratio_tmp_tei-0,24-0)	0.0363	0.0019	<.0001
SVratiotmptei_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0792	0.0013	<.0001
SVratiotmptei_pw3			max(0,ratio_tmp_tei-36)	0.0210	0.0025	<.0001
SVsato_pw1		Spread at origination	min(sato+0.1,0)	-0.0867	0.0224	0.0001
SVsato_pw2			median(0,sato+0.1,0.7+0.1)	-0.2016	0.0176	<.0001
SVsato_pw3			max(0,sato-0.7)	-0.1432	0.0318	<.0001
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	-0.0038	0.0068	0.573
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	-0.0088	0.0100	0.3799
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	-0.0141	0.0016	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0212	0.0025	<.0001
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0086	0.0044	0.0516
SMdurdefepi	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.3445	0.0147	<.0001
SMdurdefepi	**L03**		dur_def_episode = 3	0.4382	0.0155	<.0001
SMdurdefepi	**L04**		dur_def_episode = 4	0.4771	0.0166	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMdurdefepi	**L05**		dur_def_episode = 5	0.5234	0.0182	<.0001
SMdurdefepi	**L06**		dur_def_episode = 6	0.6001	0.0201	<.0001
SMdurdefepi	**L07**		dur_def_episode = 7	0.5800	0.0223	<.0001
SMdurdefepi	**L08**		dur_def_episode = 8	0.6055	0.0250	<.0001
SMdurdefepi	**L09**		dur_def_episode = 9	0.6492	0.0278	<.0001
SMdurdefepi	**L10**		dur_def_episode = 10	0.7250	0.0317	<.0001
SMdurdefepi	**L11**		dur_def_episode >= 11	0.7087	0.0252	<.0001
SVdurdefepi_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0119	0.0029	<.0001
SVdurdefepi_pw2			median(0,dur_def_episode-30,40-30)	0.0255	0.0124	0.039
SMDeltaTm3	**L01**	Categorical of DeltaTm3Init_r^2 (change in 3-month Treasury rate from policy inception to current)	DeltaTm3Init_r > 600	-0.1275	0.0123	<.0001
SMcredit	**L01**	Credit Score	credit_score = 0	0.0445	0.0331	0.1781
SMcredit	**L02**		credit_score<500	-0.0171	0.0744	0.8181
SVcredit_pw1		Variate piecewise of Credit Score	median(0,credit_score-500,625-500)	-0.0023	0.0003	<.0001
SVcredit_pw2			median(0,credit_score-625,680-625)	0.0021	0.0003	<.0001
SVcredit_pw3			max(0,credit_score - 680)	0.0009	0.00	0.0094
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	0.5084	0.01	<.0001

Loss Mitigation HAMP Severity Model

The model parameters for the HAMP claim severity model are shown below.

Table 64: Loss Mitigation HAMP Severity Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				6.0291	0.0575	<.0001
SVbalance_i_log		Variate version of log transformed outstanding balance at start of quarter	log(balance_i/1000)	0.9503	0.0035	<.0001
SVCCI_pw1		Consumer Confidence Index	median(0,CCI-30,91)	-0.0088	0.0008	<.0001
SVCCI_pw2			median(0,CCI-91,142-91)	0.0095	0.0007	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	0.0584	0.0138	<.0001
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	-0.0227	0.0246	0.3562
SMproduct	**FRM15**		15 year fixed rate mortgage	0.2606	0.0261	<.0001
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	0.3442	0.0520	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	-0.0636	0.0116	<.0001
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 1	-0.0997	0.0049	<.0001
SMpriormod	**L02**		prior_mod_cnt = 2	-0.0925	0.0077	<.0001
SMpriormod	**L03**		prior_mod_cnt >= 3	-0.0837	0.0111	<.0001
SVpriormod_pw1		Variate piecewise version of prior_mod_cnt	median(0,prior_mod_cnt-3,15-3)	0.0043	0.0097	0.6604
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	0.0485	0.0037	<.0001
SMRatioTmpTei	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.2482	0.0225	<.0001
SVratiotmptei_pw1		Variate piecewise version of front end ratio	median(0,ratio_tmp_tei-0,24-0)	0.0020	0.0009	0.0299
SVratiotmptei_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0115	0.0006	<.0001
SVratiotmptei_pw3			median(0,ratio_tmp_tei-36,50-36)	0.0110	0.0009	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	-0.0473	0.0056	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	-0.0391	0.0056	<.0001

Third Party Sale Claims Logistic Model

The model parameters for the binomial model to predict the TPS claim type are shown below.

Table 65: TPS Claim Binomial Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-6.3297	0.1021	<.0001
SVbalance_i		Outstanding balance at start of quarter		-0.0095	0.0006	<.0001
SVCCI_pw1		Consumer Confidence Index	median(0,CCI-30,91)	0.0517	0.0010	<.0001
SVCCI_pw2			median(0,CCI-91,142-91)	0.0021	0.0013	0.097
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	-0.0192	0.0071	0.007
SVSBOI_pw2			median(0,SBOI-95,110-95)	-0.0140	0.0029	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	0.2806	0.0379	<.0001
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.2541	0.0529	<.0001
SMproduct	**FRM15**		15 year fixed rate mortgage	-0.3161	0.0494	<.0001
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	0.0961	0.0971	0.3224
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	0.1714	0.0192	<.0001
SVloansize_raw_grp		Variate version of loansize_raw	min(loansize/1000,600)	0.0104	0.0006	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMseason	**L01**	Categorical of season	season = "winter"	-0.1083	0.0135	<.0001
SMseason	**L02**		season = "spring"	0.1535	0.0132	<.0001
SMseason	**L03**		season = "summer"	0.0296	0.0128	0.0209
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	-0.0254	0.0096	0.0083
SMdpa_govt	**LGovt**	Categorical of down payment assistance, government level indicator	dpa = "govt"	-0.0583	0.0316	0.0647
SMdpa_nprof	**LNPro**	Categorical of down payment assistance, non-profit level indicator	dpa = "nonprof"	0.1680	0.0158	<.0001
SMdpa_rel	**LRela**		dpa = "relative"	0.0565	0.0146	0.0001
SVsato_pw1		Spread at origination	min(sato+0.1,0)	0.1635	0.0229	<.0001
SVsato_pw2			median(0,sato+0.1,0.7+0.1)	0.0102	0.0188	0.5864
SVsato_pw3			max(0,sato-0.7)	-0.1812	0.0338	<.0001
SVhpa2yb_pw2		Variate piecewise of hpa2y_blended_r[1]	median(0,hpa2y_blended_r-85,95-85)	0.1207	0.0084	<.0001
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	0.0989	0.0016	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0029	0.0026	0.2776
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0175	0.0019	<.0001
SMycslope	**L01**	Categorical of yield curve slope	1<=ycslope<=2	0.1430	0.0203	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	frst_tm_by = "Y"	-0.1294	0.0132	<.0001
SMDeltaTY10	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	0.0353	0.0120	0.0033
SMDeltaTY10	**L02**		DeltaTy10Init_r > 130	0.1481	0.0256	<.0001
SMDeltaTm3	**L01**	Categorical of DeltaTm3Init_r[3] (change in 3-month Treasury rate from policy inception to current)	DeltaTm3Init_r > 600	0.0971	0.0158	<.0001
SMicredit_grp1	**L450**	Categorical of credit	0<credit_score<=450	-0.3180	0.1556	0.0409
SMicredit_grp2	**L500**		450<credit_score<=500	-0.1551	0.0668	0.0203
SMicredit_grp3	**L600**		500<credit_score<=600	-0.1683	0.0177	<.0001
SMicredit_grp4	**L630**		600<credit_score<=630	-0.0966	0.0176	<.0001
SMicredit_grp5	**L680**		630<credit_score<=680	-0.0174	0.0160	0.2779
SMicredit_grp6	**L720**		680<credit_score<=720	-0.0120	0.0203	0.5533
SMicredit_grp7	**L745**		720<credit_score<=745	0.0089	0.0302	0.7686
SMicredit_grp8	**L800**		745<credit_score<=800	0.0341	0.0293	0.2449
SMicredit_grp9	**L850**		800<credit_score	-0.0272	0.0873	0.7552

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	-0.6935	0.0223	<.0001

Pre-Foreclosure Sale Claims Logistic Model

The model parameters for the binomial model to predict the PFS claim type are shown below.

Table 66: PFS Claim Binomial Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				-4.1902	0.1463	<.0001
SVbalance_i		Outstanding balance at start of quarter		-0.0086	0.0009	<.0001
SVCCI_pw1		Consumer Confidence Index	median(0,CCI-30,91)	-0.0267	0.0008	<.0001
SVCCI_pw2			median(0,CCI-91,142-91)	0.0225	0.0017	<.0001
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	0.1149	0.0038	<.0001
SVSBOI_pw2			median(0,SBOI-95,110-95)	0.0322	0.0047	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	-0.0526	0.0305	0.0845
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.3384	0.0400	<.0001
SMproduct	**FRM15**		15 year fixed rate mortgage	-0.6125	0.0618	<.0001
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	-0.2496	0.1170	0.033
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	0.3612	0.0183	<.0001
SVloansize_raw_grp		Variate version of loansize_raw	min(loansize/1000,600)	0.0153	0.0008	<.0001
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 1	0.1218	0.0136	<.0001
SMpriormod	**L02**		prior_mod_cnt = 2	0.3514	0.0250	<.0001
SMpriormod	**L03**		prior_mod_cnt >= 3	0.6542	0.0413	<.0001
SVpriormod_pw1		Variate piecewise version of prior_mod_cnt	median(0,prior_mod_cnt-3,15-3)	0.2322	0.0432	<.0001
SMseason	**L01**	Categorical of season	season = "winter"	-0.0716	0.0127	<.0001
SMseason	**L02**		season = "spring"	0.0525	0.0124	<.0001
SMseason	**L03**		season = "summer"	-0.0094	0.0123	0.4469
SMperiodnbr_clm	**L01_04**	Categorical of period number	1 <= period_number <= 4	1.4206	0.0697	<.0001
SMperiodnbr_clm	**L05**		period_number = 5	0.7574	0.0476	<.0001
SMperiodnbr_clm	**L06**		period_number = 6	0.4162	0.0357	<.0001
SMperiodnbr_clm	**L07**		period_number = 7	0.2595	0.0302	<.0001
SVperiodnbr_pw1		Variate piecewise version of period number	median(0,period_number-8,40-8)	-0.0461	0.0009	<.0001
SVperiodnbr_pw2			median(0,period_number-40,53-40)	0.0040	0.0029	0.1733
SVperiodnbr_pw3			median(0,period_number-53,68-53)	-0.0304	0.0051	<.0001
SVperiodnbr_pw4			median(0,period_number-68,108-68)	-0.0208	0.0054	0.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	0.1710	0.0096	<.0001
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	0.0203	0.0017	<.0001
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	-0.0103	0.0021	<.0001
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	0.0155	0.0014	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0679	0.0030	<.0001
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0172	0.0017	<.0001
SMycslope	**L01**	Categorical of yield curve slope	1<=ycslope<=2	0.2249	0.0360	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	frst_tm_by = "Y"	-0.0358	0.0111	0.0013
SMDeltaTY10	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	0.2605	0.0115	<.0001
SMDeltaTY10	**L02**		DeltaTy10Init_r > 130	-0.0002	0.0333	0.9958
SMDeltaTm3	**L01**	Categorical of DeltaTm3Init_r[3] (change in 3-month Treasury rate from policy inception to current)	DeltaTm3Init_r > 600	-0.0369	0.0273	0.1762
SMicredit_grp1	**L450**	Categorical of credit	0<credit_score<=450	-0.3628	0.1419	0.0106
SMicredit_grp2	**L500**		450<credit_score<=500	-0.4690	0.0631	<.0001
SMicredit_grp3	**L600**		500<credit_score<=600	-0.3294	0.0184	<.0001
SMicredit_grp4	**L630**		600<credit_score<=630	-0.1382	0.0187	<.0001
SMicredit_grp5	**L680**		630<credit_score<=680	0.0755	0.0171	<.0001
SMicredit_grp6	**L720**		680<credit_score<=720	0.3531	0.0201	<.0001
SMicredit_grp7	**L745**		720<credit_score<=745	0.5106	0.0271	<.0001
SMicredit_grp8	**L800**		745<credit_score<=800	0.7359	0.0255	<.0001
SMicredit_grp9	**L850**		800<credit_score	0.6179	0.0778	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	-0.2660	0.0332	<.0001

Conveyance Severity Model

The model parameters for the Conveyance severity model are shown below.

Table 67: Conveyance Severity Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				9.1275	0.0532	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SVbalance_i_log		Variate version of log transformed outstanding balance at start of quarter	log(balance_i/1000)	0.3240	0.0013	<.0001
SVCCI_pw1		Consumer Confidence Index	median(0,CCI-30,91)	0.0006	0.0000	<.0001
SVCCI_pw2			median(0,CCI-91,142-91)	-0.0005	0.0000	<.0001
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	-0.0022	0.0001	<.0001
SVSBOI_pw2			median(0,SBOI-95,110-95)	0.0011	0.0000	<.0001
SVcredit_subsidy_cohort		Credit Subsidy Cohort	SVcredit_subsidy_cohort = credit_subsidy_cohort	-0.0003	0.0000	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	0.0101	0.0005	<.0001
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.0091	0.0012	<.0001
SMproduct	**FRM15**		15 year fixed rate mortgage	-0.0252	0.0009	<.0001
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	-0.0278	0.0019	<.0001
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	-0.0055	0.0006	<.0001
SVloansize_raw_grp		Variate version of loansize_raw	min(loansize/1000,600)	0.0287	0.0001	<.0001
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 0	0.0502	0.0005	<.0001
SMpriormod	**L02**		prior_mod_cnt = 1	0.1069	0.0009	<.0001
SMpriormod	**L03**		prior_mod_cnt = 2	0.1662	0.0015	<.0001
SVpriormod_pw1		Variate piecewise version of prior_mod_cnt	median(0,prior_mod_cnt-3,15-3)	0.0447	0.0017	<.0001
SMcredit	**L01**	Credit Score	SMcredit = "L01"	0.0113	0.0009	<.0001
SMcredit	**L02**		SMcredit = "L02"	0.0050	0.0020	0.0119
SVcredit_pw1		Variate piecewise of Credit Score	median(0,credit_score-500,625-500)	0.0000	0.0000	0.0014
SVcredit_pw2			median(0,credit_score-625,680-625)	0.0000	0.0000	<.0001
SMseason	**L01**	Categorical of season	season = "winter"	0.0009	0.0003	0.0015
SMseason	**L02**		season = "spring"	-0.0017	0.0003	<.0001
SMseason	**L03**		season = "summer"	-0.0015	0.0003	<.0001
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	0.0461	0.0002	<.0001
SMRatioTmpTei	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	0.0083	0.0008	<.0001
SVratiotmptei_pw1		Variate piecewise version of front end ratio	median(0,ratio_tmp_tei-0,24-0)	0.0003	0.0000	<.0001
SVratiotmptei_pw2			median(0,ratio_tmp_tei-24,36-24)	0.0005	0.0000	<.0001
SVratiotmptei_pw3			median(0,ratio_tmp_tei-36,50-36)	-0.0005	0.0001	<.0001
SVsato_pw1		Variate piecewise of sato (spread at origination)	min(sato+0.1,0)	-0.0010	0.0002	<.0001
SVsato_pw2			median(0,sato+0.1,0.7+0.1)	0.0268	0.0004	<.0001
SVsato_pw3			max(0,sato-0.7)	-0.0044	0.0001	<.0001
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	-0.0002	0.0000	<.0001
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	-0.0005	0.0001	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	-0.0014	0.0000	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0032	0.0001	<.0001
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0005	0.0001	<.0001
SMycslope	**L01**	Categorical of yield curve slope	Categorical of yield curve slope	0.0071	0.0003	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	-0.0047	0.0004	<.0001
SMdurdefepi	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.0255	0.0004	<.0001
SMdurdefepi	**L03**		dur_def_episode = 3	-0.0099	0.0004	<.0001
SMdurdefepi	**L04**		dur_def_episode = 4	0.0059	0.0004	<.0001
SMdurdefepi	**L05**		dur_def_episode = 5	0.0220	0.0005	<.0001
SMdurdefepi	**L06**		dur_def_episode = 6	0.0360	0.0005	<.0001
SMdurdefepi	**L07**		dur_def_episode = 7	0.0482	0.0005	<.0001
SMdurdefepi	**L08**		dur_def_episode = 8	0.0588	0.0006	<.0001
SMdurdefepi	**L09**		dur_def_episode = 9	0.0694	0.0006	<.0001
SMdurdefepi	**L10**		dur_def_episode = 10	0.0790	0.0007	<.0001
SMdurdefepi	**L11**		dur_def_episode >= 11	0.0826	0.0005	<.0001
SVdurdefepi_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0066	0.0001	<.0001
SVdurdefepi_pw2			median(0,dur_def_episode-30,40-30)	0.0049	0.0002	<.0001
SMDeltaTY10	**L01**	Categorical of DeltaTy10Init_r^2 (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	0.0000	0.0004	0.8899
SMDeltaTY10	**L02**		DeltaTy10Init_r > 130	0.0042	0.0008	<.0001
Smloansize	**L01**	Categorical loansize_raw	loansize_raw<32000	-0.0295	0.0007	<.0001
SVloanraw_pw1		Variate piecewise of loansize_raw	median(0,loansize_raw-32000,70000-32000)	0.0000	0.0000	<.0001
SVloanraw_pw2			median(0,loansize_raw-70000,98000-70000)	0.0000	0.0000	<.0001
SVloanraw_pw3			median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
SVloanraw_pw4			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	-0.0144	0.0013	<.0001

Conveyance Recovery Severity Model

The model parameters for the Conveyance Recovery severity model are shown below.

Table 68: Conveyance Recovery Severity Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				8.2148	0.0278	<.0001
SVbalance_i_log		Variate version of log transformed outstanding balance at start of quarter	log(balance_i/1000)	0.2862	0.0070	<.0001
SVCCI_pw1		Consumer Confidence Index	median(0,CCI-30,91)	-0.0010	0.0001	<.0001
SVCCI_pw2			median(0,CCI-91,142-91)	0.0006	0.0001	<.0001
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	0.0118	0.0005	<.0001
SVSBOI_pw2			median(0,SBOI-95,110-95)	0.0205	0.0003	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	-0.0889	0.0028	<.0001
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	-0.0323	0.0063	<.0001
SMproduct	**FRM15**		15 year fixed rate mortgage	0.0227	0.0060	0.0002
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	0.2198	0.0105	<.0001
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	0.0328	0.0028	<.0001
SVloansize_raw_grp		Variate version of loansize_raw	min(loansize/1000,600)	0.0162	0.0006	<.0001
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 1	-0.0392	0.0025	<.0001
SMpriormod	**L02**		prior_mod_cnt = 2	-0.0266	0.0047	<.0001
SMpriormod	**L03**		prior_mod_cnt >= 3	-0.0061	0.0082	0.4586
SVpriormod_pw1		Variate piecewise version of prior_mod_cnt	median(0,prior_mod_cnt-3,15-3)	0.0239	0.0094	0.0108
SMseason	**L01**	Categorical of season	season = "winter"	0.0248	0.0016	<.0001
SMseason	**L02**		season = "spring"	0.0167	0.0016	<.0001
SMseason	**L03**		season = "summer"	-0.0026	0.0016	0.1065
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	-0.0733	0.0013	<.0001
SMdpa_govt	**LGovt**	Categorical of down payment assistance, government level indicator	dpa = "govt"	-0.0978	0.0044	<.0001
SMdpa_nprof	**LNPro**	Categorical of down payment assistance, non-profit level indicator	dpa = "nonprof"	-0.1578	0.0021	<.0001
SVsato_pw1		Spread at origination	min(sato+0.1,0)	-0.0288	0.0014	<.0001
SVsato_pw2			median(0,sato+0.1,0.7+0.1)	-0.1235	0.0024	<.0001
SVsato_pw3			max(0,sato-0.7)	-0.0088	0.0039	0.0227
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	-0.0054	0.0000	<.0001
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	0.0271	0.0003	<.0001
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	0.0149	0.0002	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0095	0.0004	<.0001

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0101	0.0003	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	-0.1973	0.0022	<.0001
SMdurdefepi	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.0143	0.0033	<.0001
SMdurdefepi	**L03**		dur_def_episode = 3	0.0097	0.0032	0.0025
SMdurdefepi	**L04**		dur_def_episode = 4	-0.0045	0.0032	0.1622
SMdurdefepi	**L05**		dur_def_episode = 5	-0.0191	0.0033	<.0001
SMdurdefepi	**L06**		dur_def_episode = 6	-0.0276	0.0034	<.0001
SMdurdefepi	**L07**		dur_def_episode = 7	-0.0339	0.0036	<.0001
SMdurdefepi	**L08**		dur_def_episode = 8	-0.0313	0.0038	<.0001
SMdurdefepi	**L09**		dur_def_episode = 9	-0.0323	0.0039	<.0001
SMdurdefepi	**L10**		dur_def_episode = 10	-0.0331	0.0042	<.0001
SMdurdefepi	**L11**		dur_def_episode >= 11	-0.0376	0.0036	<.0001
SVdurdefepi_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0020	0.0003	<.0001
SVdurdefepi_pw2			median(0,dur_def_episode-10,30-10)	0.0118	0.0012	<.0001
SMDeltaTY10	**L01**	Categorical of DeltaTy10Init_r^2 (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	-0.1230	0.0019	<.0001
SMDeltaTY10	**L02**		DeltaTy10Init_r > 130	-0.0082	0.0068	0.2287
SMDeltaTm3	**L01**		DeltaTm3Init_r > 600	-0.0606	0.0044	<.0001
SMcredit	**L01**	Credit Score	credit_score = 0	0.1824	0.0047	<.0001
SMcredit	**L02**		credit_score<500	0.0065	0.0108	0.5472
SVcredit_pw1		Variate piecewise of Credit Score	median(0,credit_score-500,625-500)	0.0000	0.0000	0.7119
SVcredit_pw2			median(0,credit_score-625,680-625)	0.0005	0.0001	<.0001
SMloansize	**L01**	Categorical loansize_raw	loansize_raw<32000	-0.2375	0.0050	<.0001
SVloanraw_pw1		Loan amount	median(0,loansize_raw-32000,70000-32000)	0.0000	0.0000	<.0001
SVloanraw_pw2			median(0,loansize_raw-70000,98000-70000)	0.0000	0.0000	<.0001
SVloanraw_pw3			median(0,loansize_raw-98000,180000-98000)	0.0000	0.0000	<.0001
SVloanraw_pw4			median(0,loansize_raw-180000,500000-180000)	0.0000	0.0000	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	-0.1736	0.0075	<.0001

Third Party Sales Severity Model

The model parameters for the TPS severity model are shown below.

Table 69: TPS Severity Model Parameters

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				7.9561	0.0522	<.0001
SVbalance_i_log		Variate version of log transformed outstanding balance at start of quarter	log(balance_i/1000)	0.6325	0.0039	<.0001
SVSBOI_pw1		Small Business Optimism Index	median(0,SBOI-80,95-80)	-0.0292	0.0027	<.0001
SVSBOI_pw2			median(0,SBOI-95,110-95)	-0.0088	0.0006	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	0.0504	0.0174	0.0038
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.0603	0.0255	0.018
SMproduct	**FRM15**		15 year fixed rate mortgage	-0.0031	0.0221	0.887
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	-0.0196	0.0449	0.6631
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	0.0110	0.0111	0.3189
SMpriormod	**L01**	Categorical of Prior Loan Modifications	prior_mod_cnt = 1	0.0814	0.0056	<.0001
SMpriormod	**L02**		prior_mod_cnt = 2	0.1899	0.0090	<.0001
SMpriormod	**L03**		prior_mod_cnt >= 3	0.3023	0.0114	<.0001
SMseason	**L01**	Categorical of season	season = "winter"	0.0047	0.0060	0.4323
SMseason	**L02**		season = "spring"	-0.0011	0.0059	0.8574
SMseason	**L03**		season = "summer"	0.0107	0.0059	0.0714
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	0.2260	0.0047	<.0001
SMRatioTmpTei	**L00**	Categorical of ratio_tmp_tei (front-end ratio)	ratio_tmp_tei=0	-0.0365	0.0180	0.0424
SVratiotmptei_pw1		Variate piecewise version of front end ratio	median(0,ratio_tmp_tei-0,24-0)	-0.0029	0.0007	<.0001
SVratiotmptei_pw2			median(0,ratio_tmp_tei-24,36-24)	-0.0022	0.0007	0.001
SVratiotmptei_pw3			median(0,ratio_tmp_tei-36,50-36)	-0.0023	0.0013	0.0681
SVsato_pw1		Variate piecewise of sato (spread at origination)	min(sato+0.1,0)	0.0160	0.0100	0.1083
SVsato_pw2			median(0,sato+0.1,0.7+0.1)	0.0920	0.0086	<.0001
SVsato_pw3			max(0,sato-0.7)	0.1009	0.0159	<.0001
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	0.0063	0.0006	<.0001
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	-0.0101	0.0049	0.0405
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	-0.0266	0.0008	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	-0.0214	0.0012	<.0001
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0055	0.0010	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	0.1595	0.0057	<.0001
SMdurdefepi	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	-0.1521	0.0127	<.0001
SMdurdefepi	**L03**		dur_def_episode = 3	-0.1055	0.0123	<.0001
SMdurdefepi	**L04**		dur_def_episode = 4	-0.0447	0.0121	0.0002

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
SMdurdefepi	**L05**		dur_def_episode = 5	0.0052	0.0122	0.6699
SMdurdefepi	**L06**		dur_def_episode = 6	0.0661	0.0126	<.0001
SMdurdefepi	**L07**		dur_def_episode = 7	0.0901	0.0129	<.0001
SMdurdefepi	**L08**		dur_def_episode = 8	0.1392	0.0135	<.0001
SMdurdefepi	**L09**		dur_def_episode = 9	0.1812	0.0140	<.0001
SMdurdefepi	**L10**		dur_def_episode = 10	0.2065	0.0145	<.0001
SMdurdefepi	**L11**		dur_def_episode >= 11	0.2182	0.0122	<.0001
SVdurdefepi_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0233	0.0007	<.0001
SVdurdefepi_pw2			median(0,dur_def_episode-30,40-30)	0.0116	0.0025	<.0001
SMDeltaTm3	**L01**	Categorical of DeltaTm3Init_r^2 (change in 3-month Treasury rate from policy inception to current)	DeltaTm3Init_r > 600	-0.1771	0.0059	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	0.1749	0.0083	<.0001

Pre-Foreclosure Sale Severity Model[i]

The model parameters for the PFS severity model are shown below.

Table 70: PFS Severity Model

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
Intercept				6.6795	0.0547	<.0001
SVbalance_i_log		Variate version of log transformed outstanding balance at start of quarter	log(balance_i/1000)	0.7939	0.0039	<.0001
SMproduct	**ARM**	Categorical of product type	adjustable rate mortgage	-0.0091	0.0084	0.2811
SMproduct	**ARMSR**		adjustable rate mortgage - streamline refinance	0.1393	0.0134	<.0001
SMproduct	**FRM15**		15 year fixed rate mortgage	0.0142	0.0254	0.5753
SMproduct	**FRM15SR**		15 year fixed rate mortgage - streamline refinance	0.1321	0.0451	0.0034
SMproduct	**FRM30SR**		30 year fixed rate mortgage - streamline refinance	0.1854	0.0066	<.0001
SMseason	**L01**	Categorical of season	season = "winter"	0.0121	0.0050	0.0145
SMseason	**L02**		season = "spring"	-0.0200	0.0047	<.0001
SMseason	**L03**		season = "summer"	-0.0080	0.0048	0.092
SMjudicial	**L01**	Categorical of judicial (judicial state)	judicial = 1	0.0372	0.0037	<.0001
SMdpa_govt	**LGovt**	Categorical of down payment assistance,	dpa = "govt"	0.0511	0.0143	0.0003

Variable	Level	Description	Description Detail	Estimate	StdErr	PValue
		government level indicator				
SMdpa_nprof	**LNPro**	Categorical of down payment assistance, non-profit level indicator	dpa = "nonprof"	0.1379	0.0056	<.0001
SVhpa2yb_pw1		Variate piecewise of hpa2y_blended_r[1]	min(hpa2y_blended_r,85)	0.0003	0.0006	0.6295
SVhpa2yb_pw2			median(0,hpa2y_blended_r-85,95-85)	-0.0270	0.0008	<.0001
SVhpa2yb_pw3			median(0,hpa2y_blended_r-95,113-95)	-0.0158	0.0004	<.0001
SVhpa2yb_pw4			median(0,hpa2y_blended_r-113,120-113)	0.0108	0.0011	<.0001
SVhpa2yb_pw5			max(0,hpa2y_blended_r-120)	0.0008	0.0006	0.191
SMycslope	**L01**	Categorical of yield curve slope	Categorical of yield curve slope	-0.1919	0.0049	<.0001
SMfrst_tm_by	**1**	Categorical of frst_tm_by (first-time buyer)	frst_tm_by = "Y"	0.0653	0.0052	<.0001
SMrfncind	**LY**	Categorical of rfnc_ind (refinanced loan indicator)	rfnc_ind <> "N"	0.2265	0.0063	<.0001
SMdurdefepi	**L02**	Categorical of dur_def_episode (duration of default episode)	dur_def_episode = 2	0.1118	0.0054	<.0001
SMdurdefepi	**L03**		dur_def_episode = 3	0.1936	0.0057	<.0001
SMdurdefepi	**L04**		dur_def_episode = 4	0.2681	0.0063	<.0001
SMdurdefepi	**L05**		dur_def_episode = 5	0.3349	0.0072	<.0001
SMdurdefepi	**L06**		dur_def_episode = 6	0.4056	0.0081	<.0001
SMdurdefepi	**L07**		dur_def_episode = 7	0.4547	0.0091	<.0001
SMdurdefepi	**L08**		dur_def_episode = 8	0.4895	0.0101	<.0001
SMdurdefepi	**L09**		dur_def_episode = 9	0.5475	0.0115	<.0001
SMdurdefepi	**L10**		dur_def_episode = 10	0.5943	0.0128	<.0001
SMdurdefepi	**L11**		dur_def_episode >= 11	0.6150	0.0103	<.0001
SVdurdefepi_pw1		Variate piecewise of dur_def_episode (duration of default episode)	median(0,dur_def_episode-10,30-10)	0.0265	0.0015	<.0001
SVdurdefepi_pw2			median(0,dur_def_episode-30,40-30)	0.0108	0.0081	0.1784
SMDeltaTY10	**L01**	Categorical of DeltaTy10Init_r[2] (change in 10-year Treasury rate from policy inception to current)	DeltaTy10Init_r < 53	0.2691	0.0047	<.0001
SMDeltaTY10	**L02**		DeltaTy10Init_r > 130	-0.0620	0.0122	<.0001
SMcredit	**L01**	Credit Score	credit_score = 0	-0.2452	0.0126	<.0001
SMcredit	**L02**		credit_score<500	0.0076	0.0296	0.7964
SVcredit_pw1		Variate piecewise of Credit Score	median(0,credit_score-500,625-500)	-0.0007	0.0001	<.0001
SVcredit_pw2			median(0,credit_score-625,680-625)	-0.0007	0.0001	<.0001
Covid_ID	**N**	Indicator Covid period (Jan 2020+)	period lt 202001	0.3670	0.0135	<.0001

[1] cx_time[1] = time since last condition D

DeltaTy10Init_r[2] = round(DeltaTy10Init*100,1)

DeltaTy1Init_r[3] = round(DeltaTy1Init*100,1)

DeltaUEInit_r[4] = round(100*DeltaUEInit,1)

deltaueprs3_r[5] = round(delta_ue_sa_st*100,1)

hpa2y_blended_r[6] = round(hpa2y_blended*100,1); HPA2Y = 2 year house price appreciation

ltv_i_r[7] = round(ltv_i*100,1)

ue_blended_r[8] = round(ue_blended*100,1)

ycslope_r[9] = round(ycslope*100,1)

ue_sa_st_r[10] = round(ue_sa_st*100,1)

prior3_ue_r[11] = round(prior3_ue_sa_st*100,1) state unemployment 3rd prior quarter

DeltaTm3Init_r[12] = Round(DeltaTm3Init*100,1)

refi_incent2_r[13] = round(100*int_rt/frm30_rate,1); int_rt = loan interest rate; frm30_rate = current frm30 rate

Model Validation

Model validation was accomplished by applying the models developed using the training set to the validation dataset. The application of the models to the validation data produces the probability of each type of claim settlement type and a predicted net loss. The actual target variable is then compared to the predicted target variable to ensure the model fits the claim settlement process and net loss process without over-fitting the actual data.

Specifically, for the loss settlement models, for the final loss settlement type we calculate the predicted probability of the settlement type. The actual settlement type is 1 for the final type of claim and 0 for all other claim types. The probability of each claim type for each record in the validation dataset is derived from the model parameters. The sum of all predicted claim type probabilities is 1 for each record.

For the net loss severity models, we calculate a predicted net loss. We also summarize the actual net loss for each claim. The predicted loss severity for each record in the validation dataset is derived from the model parameters.

Decile charts are then created for each final claim type selection and each net loss. All records are sorted, or ranked, in ascending order by the predicted value. Ten equal-sized decile groups are created with 10% of the records in each group. The sum of the actual probability and the sum of the predicted probability for each claim type within each decile is calculated for the claim type models. The sum of

the actual net loss and the sum of the predicted net loss within each decile is calculated for the loss severity models. The actual and predicted numbers are then compared for consistency. The objective of a model is to have a significant spread in predicted values while maintaining a close relationship between the resulting actual and predicted values.

Loss Mitigation Model

The validation charts for the loss mitigation models are shown below.

Figure 49: Loss Mitigation Binomial Model Validation

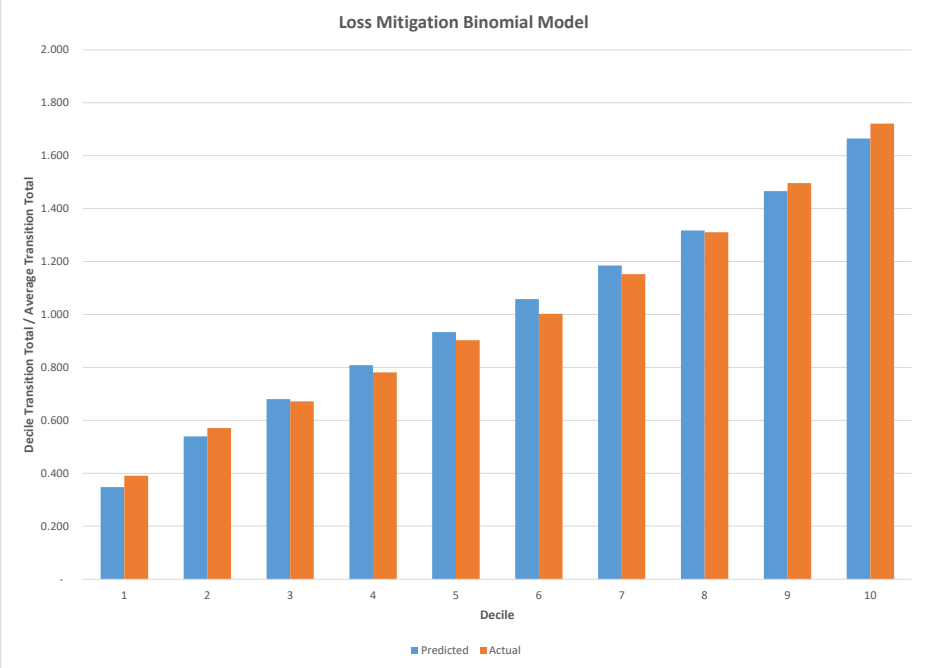
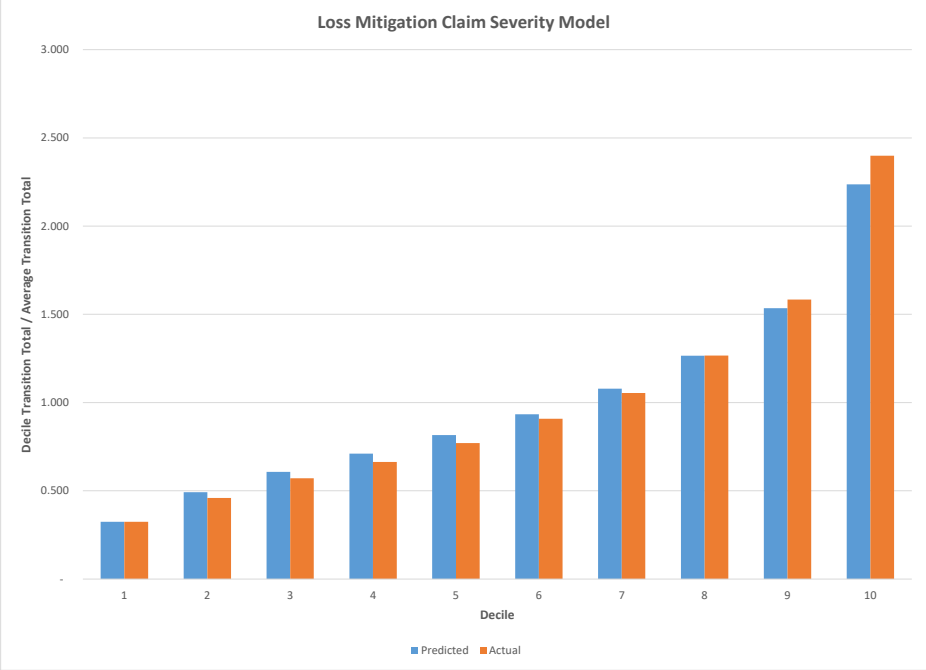


Figure 50: Loss Mitigation Claim Severity Model Validation



Claim Type Model

The validation charts for the Claim Type models are shown below.

Figure 51: Conveyance Claim Type Model Validation Chart

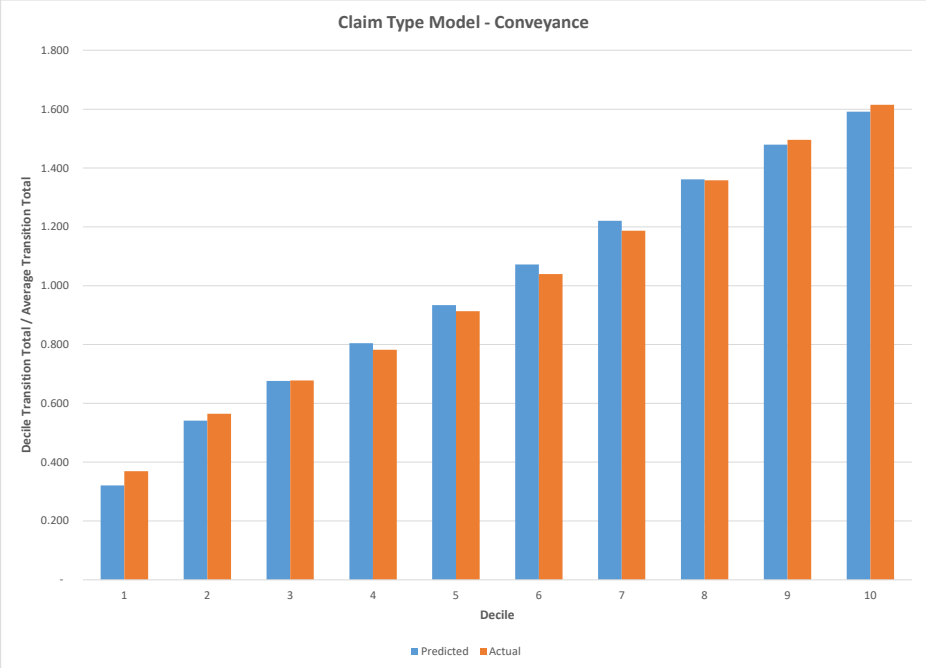


Figure 52: TPS Claim Type Model Validation Chart

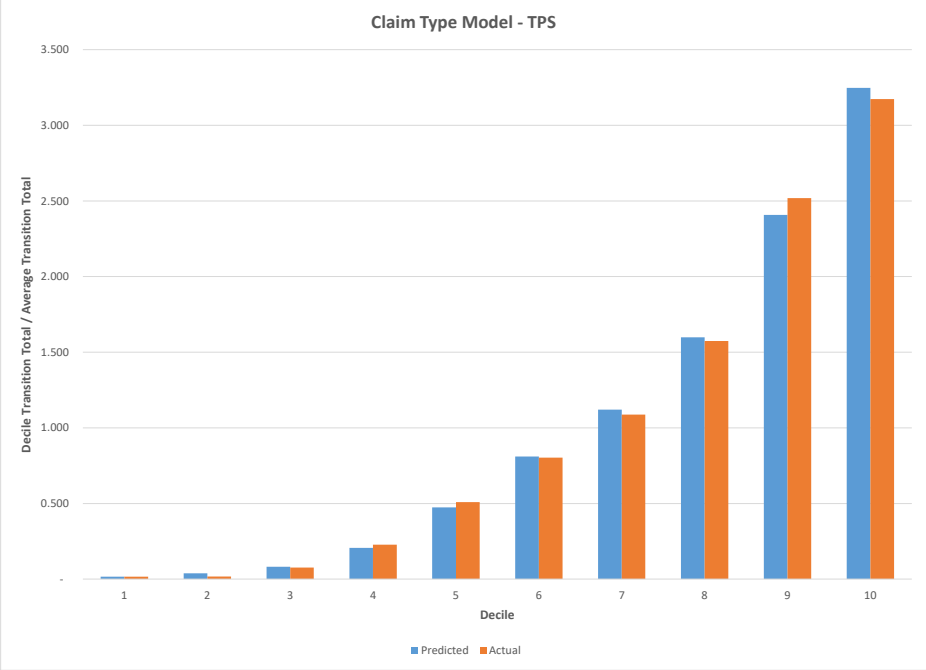
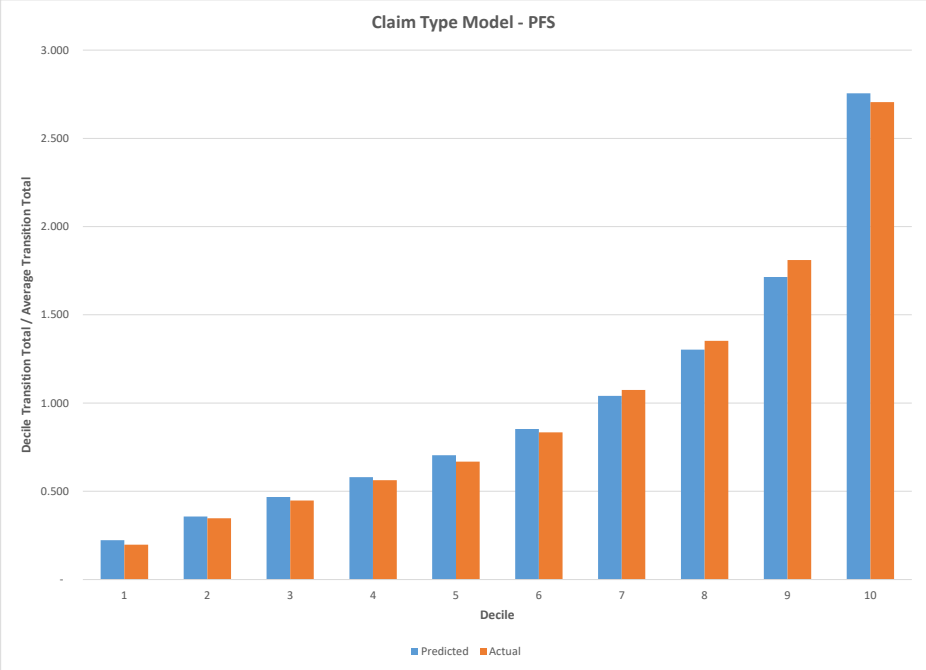


Figure 53: PFS Claim Type Model Validation Chart



Claim Type Severity Models

The validation charts for the Claim Type Severity models are shown below.

Figure 54: Conveyance Loss Severity Model Validation

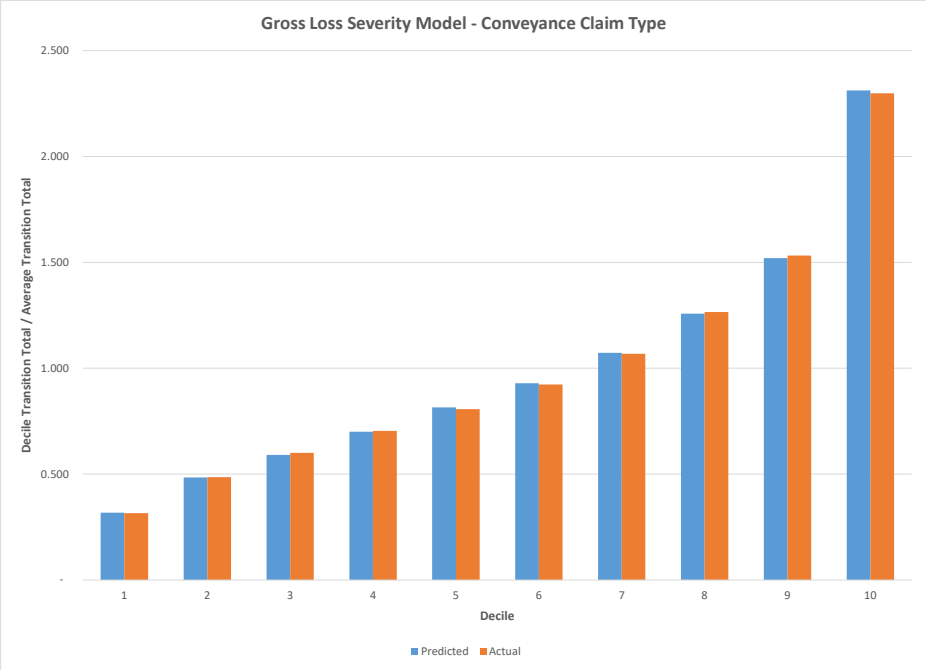


Figure 55: Conveyance Recovery Loss Severity Model Validation

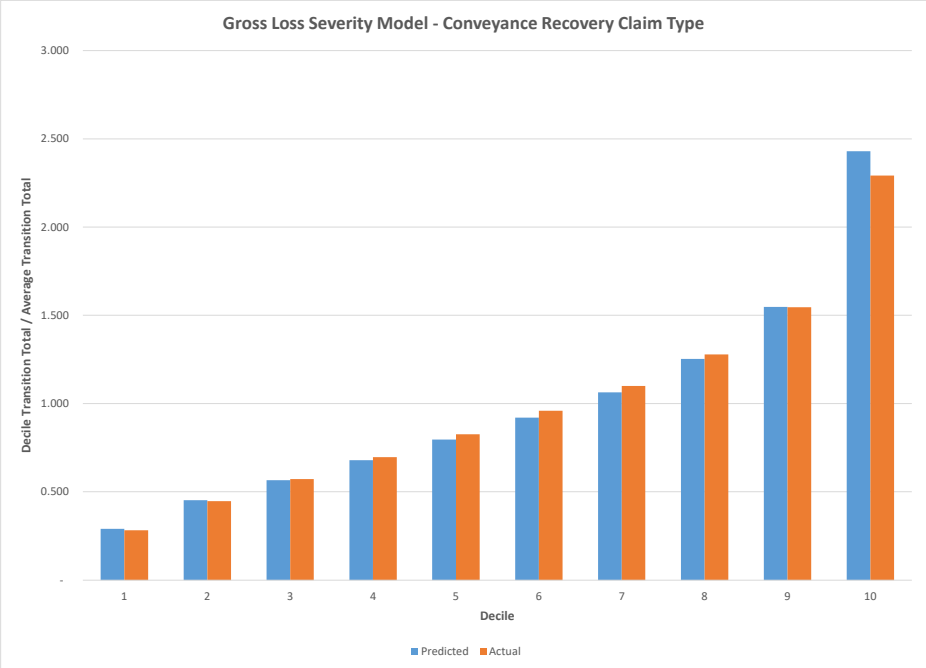


Figure 56: PFS Loss Severity Model Validation

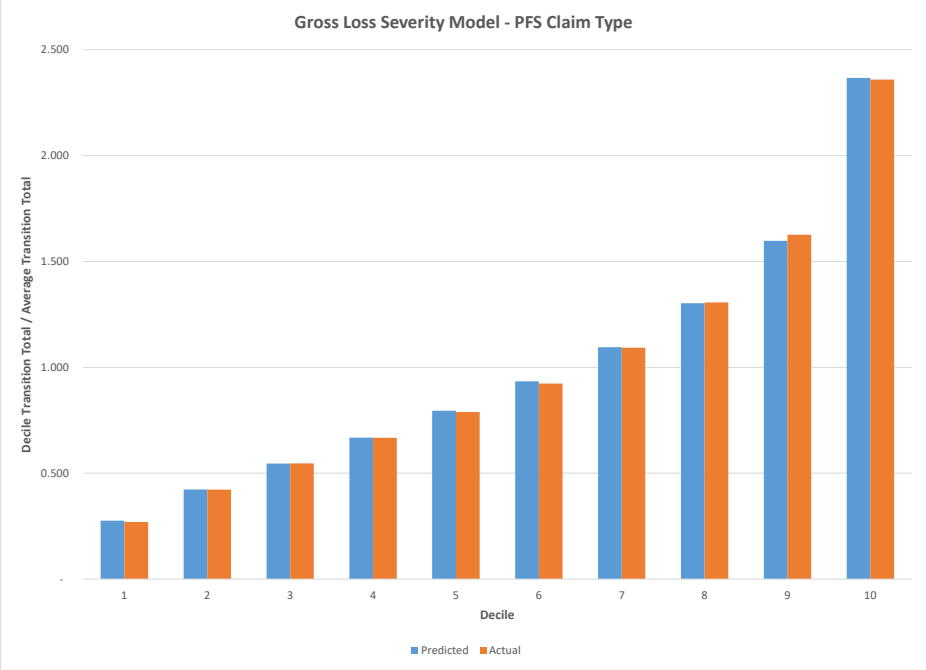
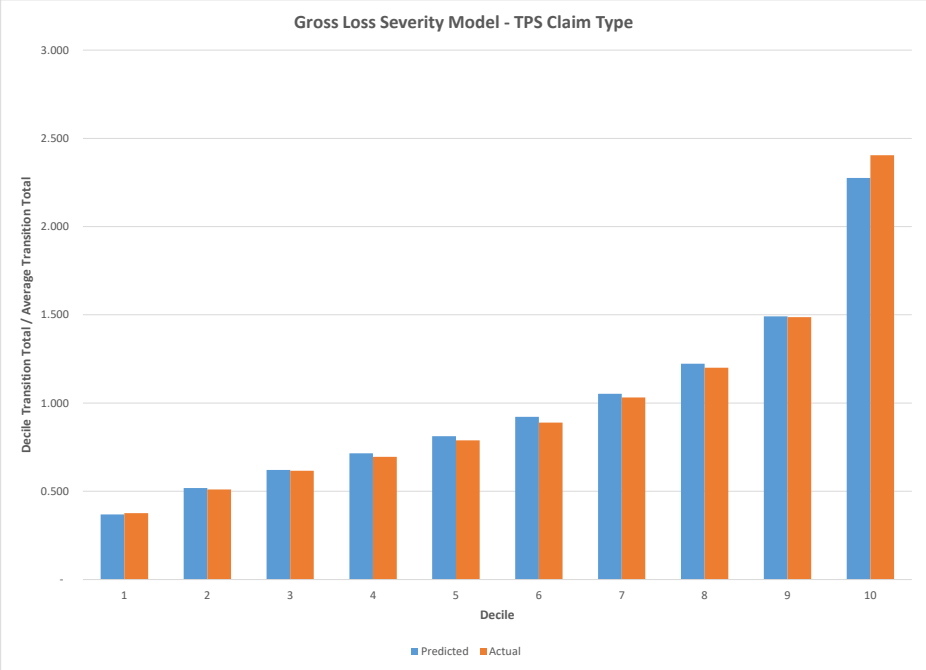


Figure 57: TPS Loss Severity Model Validation



APPENDIX D: ECONOMIC SCENARIOS

To measure the possible variation in MMI's Cash Flow NPV on the existing portfolio, we developed a baseline projection using OMB Economic Assumptions and also projections for ten additional deterministic economic scenarios from Moody's. For this analysis, we used the Moody's September 2021 forecast of the U.S. economy. For purposes of our analysis, the components of Moody's forecast include:

- HPI at the MSA, state, regional and national levels
- One-year CMT rate
- Three-year CMT rate
- Five-year CMT rate
- 10-year CMT rate
- 30-year CMT rate
- Commitment rate on 30-year fixed-rate mortgages
- Unemployment rates at the MSA, state, regional and national levels
- GDP

Alternative Scenarios

To assess the effect of alternative economic scenarios on the Cash Flow NPV, ten alternative scenarios from Moody's were used. The ten Moody's scenarios are:

- Baseline
- Alternative 0 – Upside (4th Percentile)
- Alternative 1 – Upside (10th Percentile)
- Alternative 2 – Downside (75th Percentile)
- Alternative 3 – Downside (90th Percentile)
- Alternative 4 – Downside (96th Percentile)
- Slower Trend Growth
- Stagflation
- Next-Cycle Recession
- Low Oil Price

The Moody's projections provide a range of better than expected economic assumptions and worse than expected economic assumptions. This range of assumptions produces a range of Cash Flow NPV projections.

Graphical Depiction of the Scenarios

Figure 58 shows the future movements of the HPI under the baseline and the alternative economic scenarios. In the Baseline scenario, the HPI increases throughout the entire projection period. The rate of increase is about 1.0% per year through 2028, and then increases to about 3.5% per year for the remainder of the projection period.

Figure 58: Paths of the Future National House Price Index in Different Scenarios

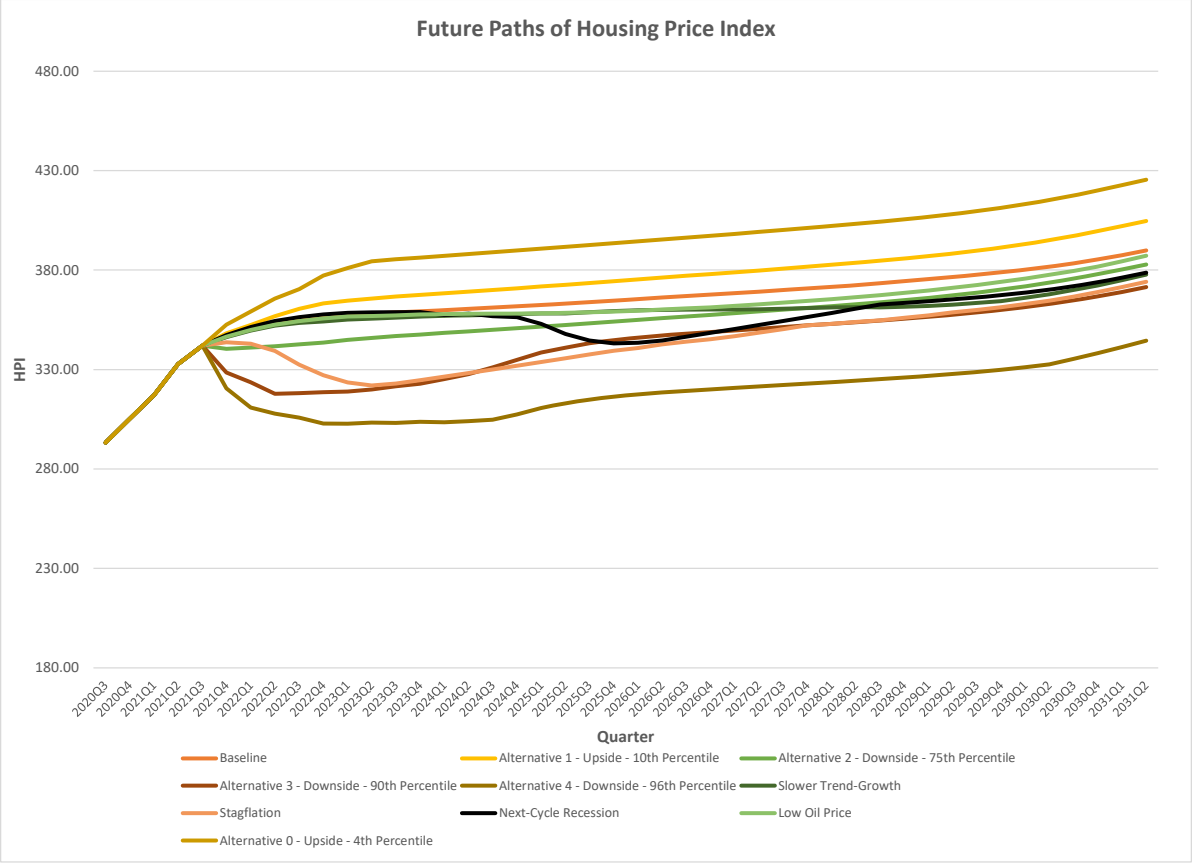


Figure 59 shows the forecasted mortgage rate of 30-year fixed-rate mortgages for the ten Moody's scenarios. For the Moody's Baseline Scenario, the mortgage interest rate increases through 2027 to about 4.9%, and then levels off near this rate.

Figure 59: Paths of the Future Mortgage Rate

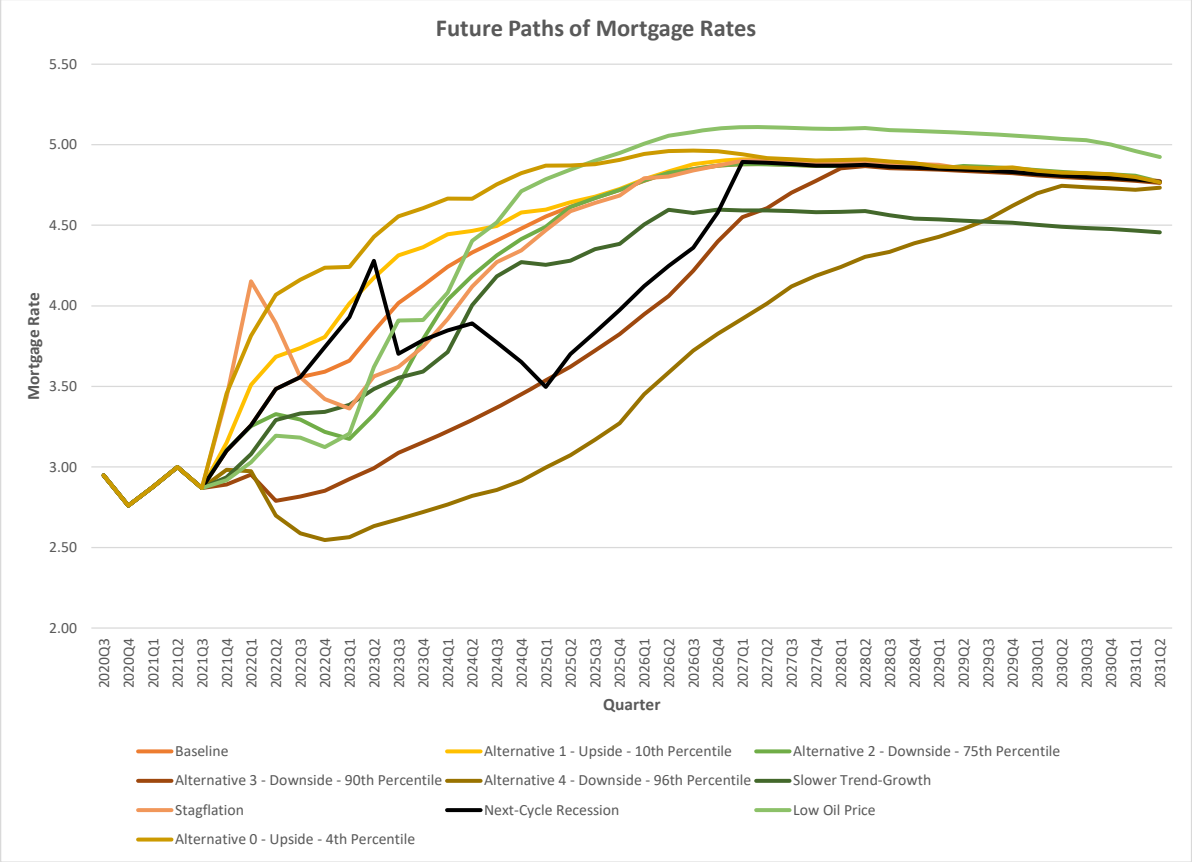
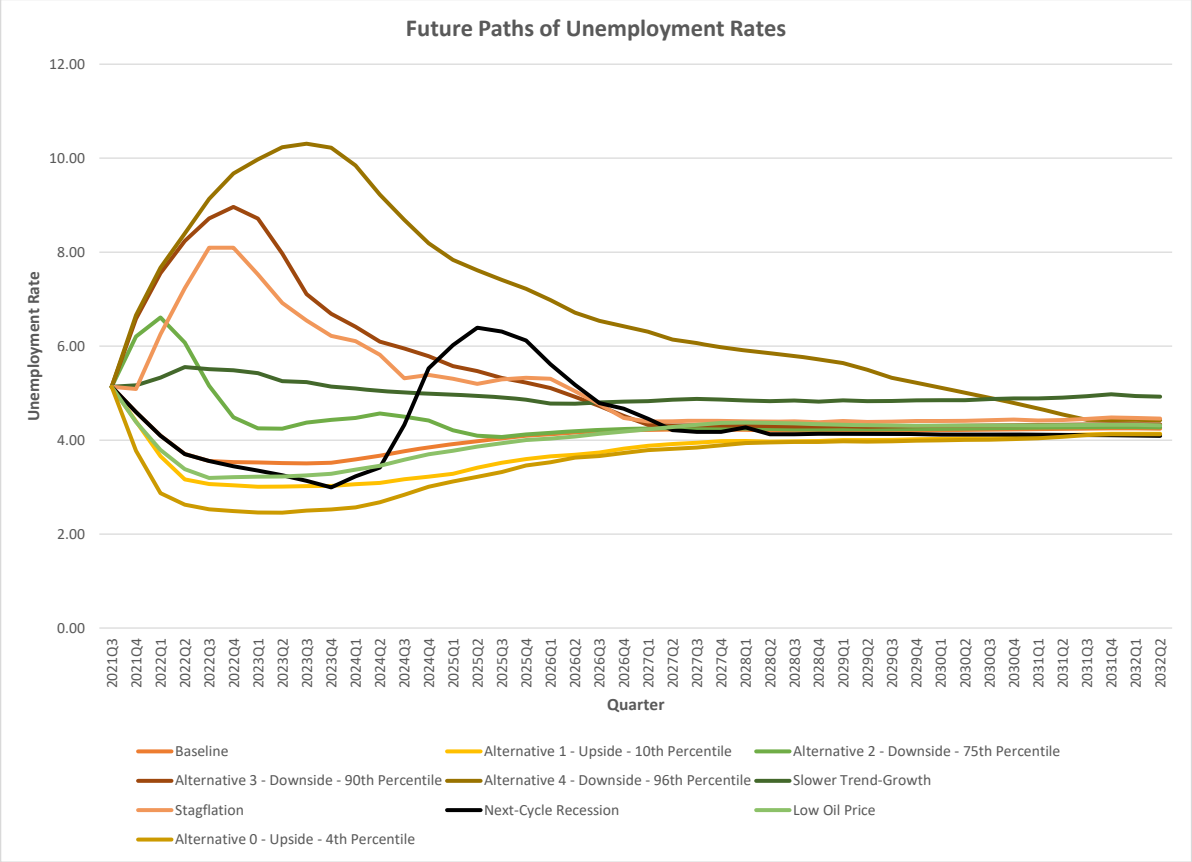


Figure 60 shows the forecasted unemployment rate under alternative economic scenarios. Under the Moody's Baseline forecast, the unemployment rate is projected to decrease through 2022 to approximately 3.5%, and then increases to 4.7% by 2026. The rate then remains steady at that level for the remainder of the projection period.

Figure 60: Paths of Future National Unemployment Rate



Stochastic Simulation

This section describes the stochastic models fitted to generate the economic variables simulations used in the projection of Cash Flow NPV.

The economic variables modeled herein as stochastic for computing expected present values include:

- Three month CMT rates
- Six month CMT rates
- 10-year CMT rates
- One rear CMT rates
- 30-year CMT rates
- 30-year FRMrates
- FHFA National Purchase Only House Price Index (HPI-PO)
- Unemployment Rates
- Gross Domestic Product (GDP)
- Small Business Normalized Optimism Index (NOI)

- Consumer Confidence Index (CCI)
- London Interbank Offered Rates (LIBOR)
- Secured Overnight Financing Rates (SOFR)

Historical Data

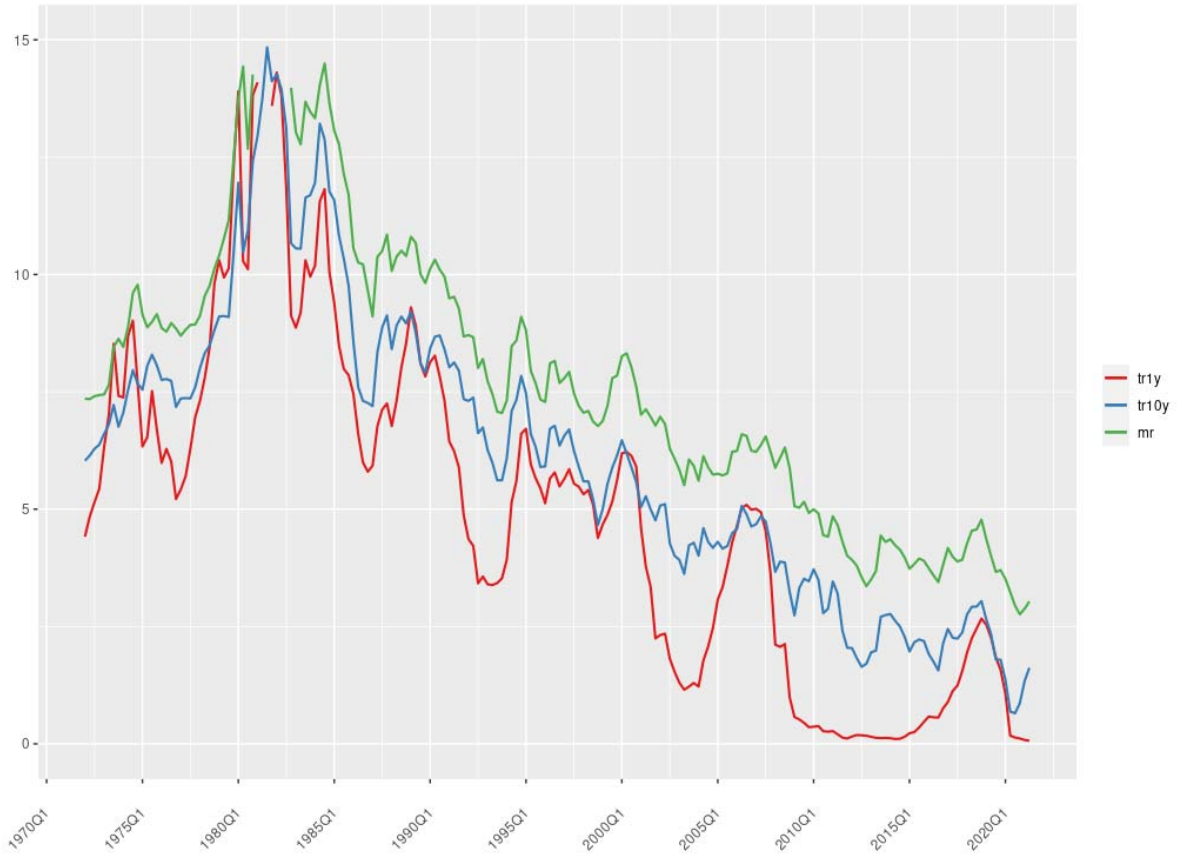
A. Interest Rates

Figure 61 and Figure 62 shows historical interest rates since 1971.

This graph illustrates the variability of interest rates over time and the consistent spread between rates. Shown are the one-year CMT rate (tr1y), 10-year CMT rate (tr10y) and the 30-year FRM rate (mr).

High inflation rates caused by the global oil crisis in the late 1970's was the major factor for the historically high level in early 1980's. The Federal Reserve shifted its monetary policy from managing interest rates to managing the money supply as a way to influence interest rates after this period of time. The one-year CMT rate was around 5% in calendar year 1971 and increased steadily to its peak of 16.31% in the third quarter of calendar year 1981. After that, it followed a decreasing trend and reached a low of 0.10% in second quarter of calendar year 2014. Since then rates had started a slow upward trend up until recently where there is a sharp downward trend reaching a historic low of 0.06% in 2021, a result of the COVID-19 pandemic.

Figure 61: Historical Interest Rates (%)



Multiple short-term rates were included in these simulations, including three, six and 12 month CMT rates, SOFR, and LIBOR. Figure 2 illustrates the close relationship between these rates with the most volatility in LIBOR.

Figure 62: Historical Shorter-Term Interest Rates (%)

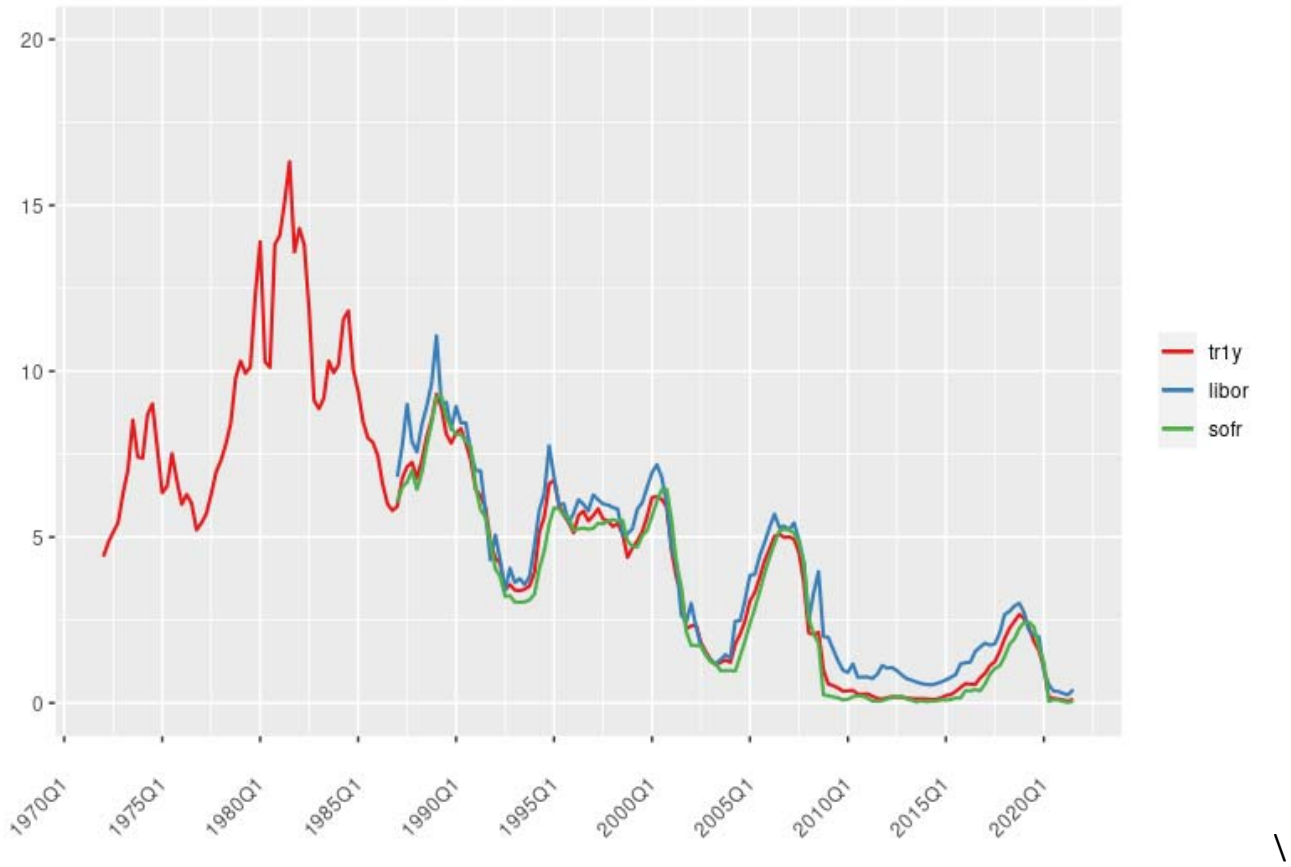
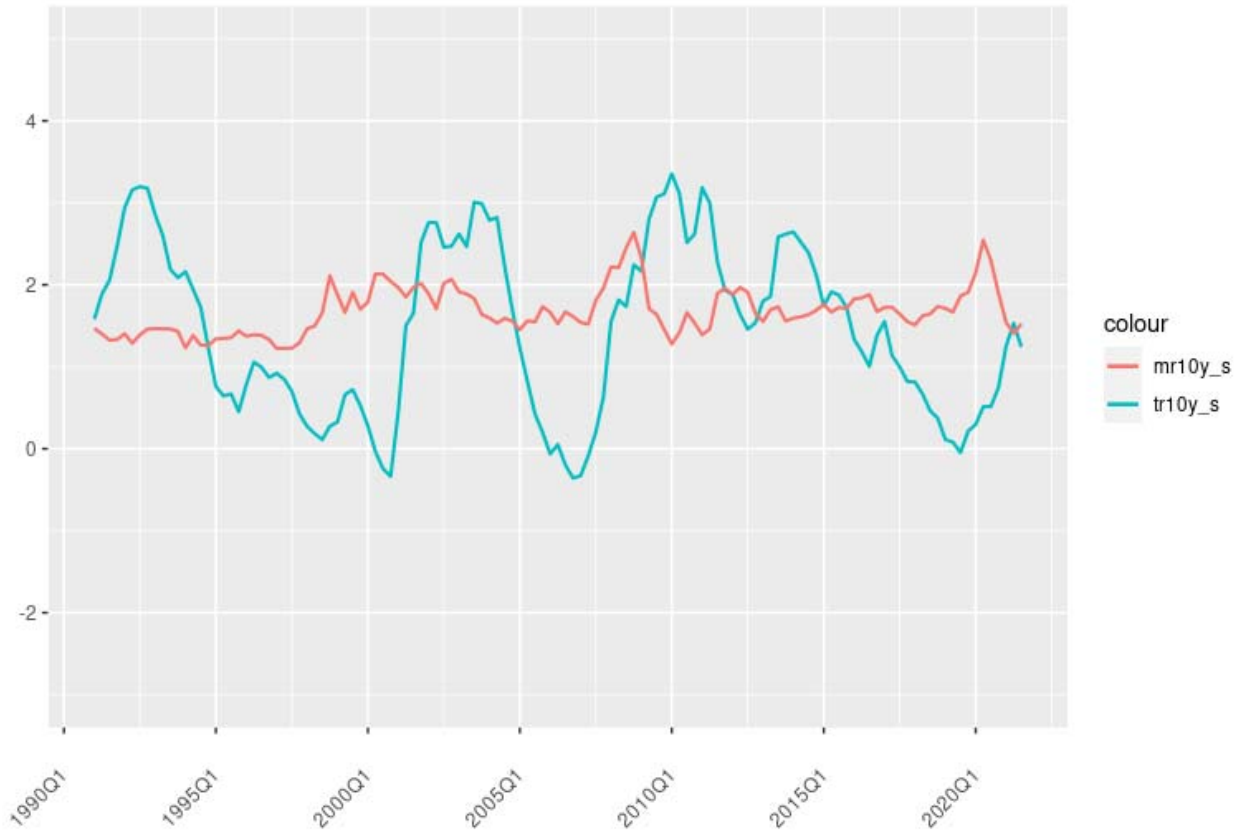


Figure 63 shows historical interest rate spreads, including the spread between 10-year and one-year CMT rates (tr10y_s) and the spread between the 30-year FRM rate and the 10-year CMT rate (mr10y_s). Both spreads are primarily positive with long cycles. Lower, negative spreads typically correspond with economic downturns, such as the downturn that occurred during the late 1970's through the early 1980's. Also note, the spread of the mortgage rate over the 10-year CMT rate is always positive, reflecting the premium for credit risk.

Both spreads turn sharply in the last three quarters.

Figure 63: Historical Interest Rate Spreads (%)



B. House Price Appreciation Rates

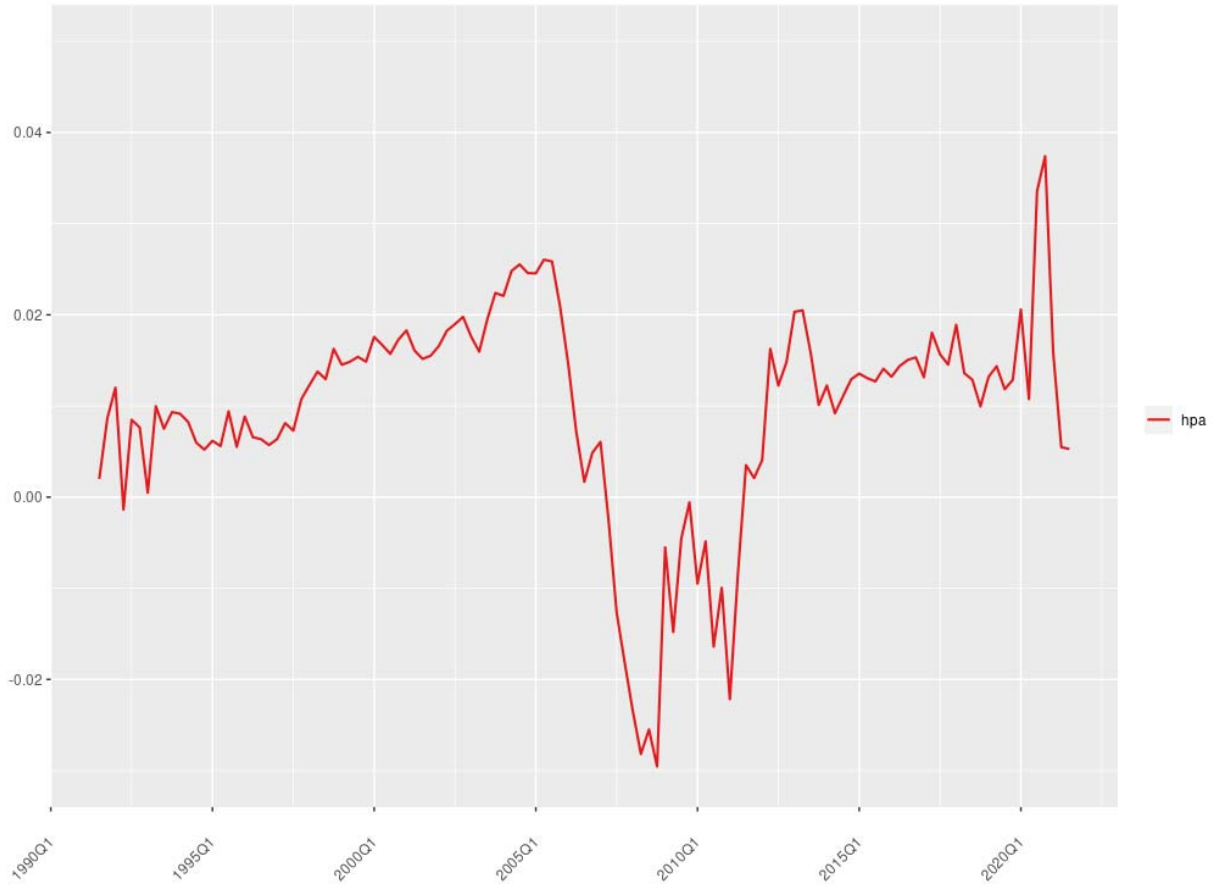
The national house price appreciation rate (HPA) is derived from the FHFA repeat sales house price indexes (HPIs) of purchase-only (PO) transactions. The PO HPI provides a reliable measure of housing market conditions, since it is based on repeat sales at market prices and does not use any appraised values.

The HPA series being modeled is defined as:

$$HPA_t = \ln(\frac{HPI_t}{HPI_{t-1}}) \qquad (1)$$

Figure 64 shows the national quarterly HPA from the first quarter of calendar year 1991 to the third quarter of calendar year 2021. The long-term average quarterly HPA is approximately 0.87% (3.30% annual rate).

Figure 64: Historical National HPI and Quarterly HPA



The HPI increased steadily before 2004, and the quarterly appreciation rate was around 1.14%. Then house prices rose sharply starting in 2004. The average quarterly home-price appreciation rate was 1.88% during the subprime mortgage expansion period from 2004 to 2006, and reached its peak of 2.59% in 2005 Q2. After 2006, the average growth rate of house prices became negative until 2011, when appreciation returns to a positive value. Following an almost eight quarter period of a nearly flat appreciation rate, the first two quarters of the COVID-19 shutdowns showed an sharp decrease to nearly 0% appreciation, followed by historic home appreciation not seen since the sub-prime bubble. Low inventory, low interest rates, prohibitively high construction costs, and more remote work options are all contributing factors to this recent home appreciation.

Table 71 shows the quarterly HPA by selected historical time-periods.

Table 71: Average Quarterly HPA by Time Span

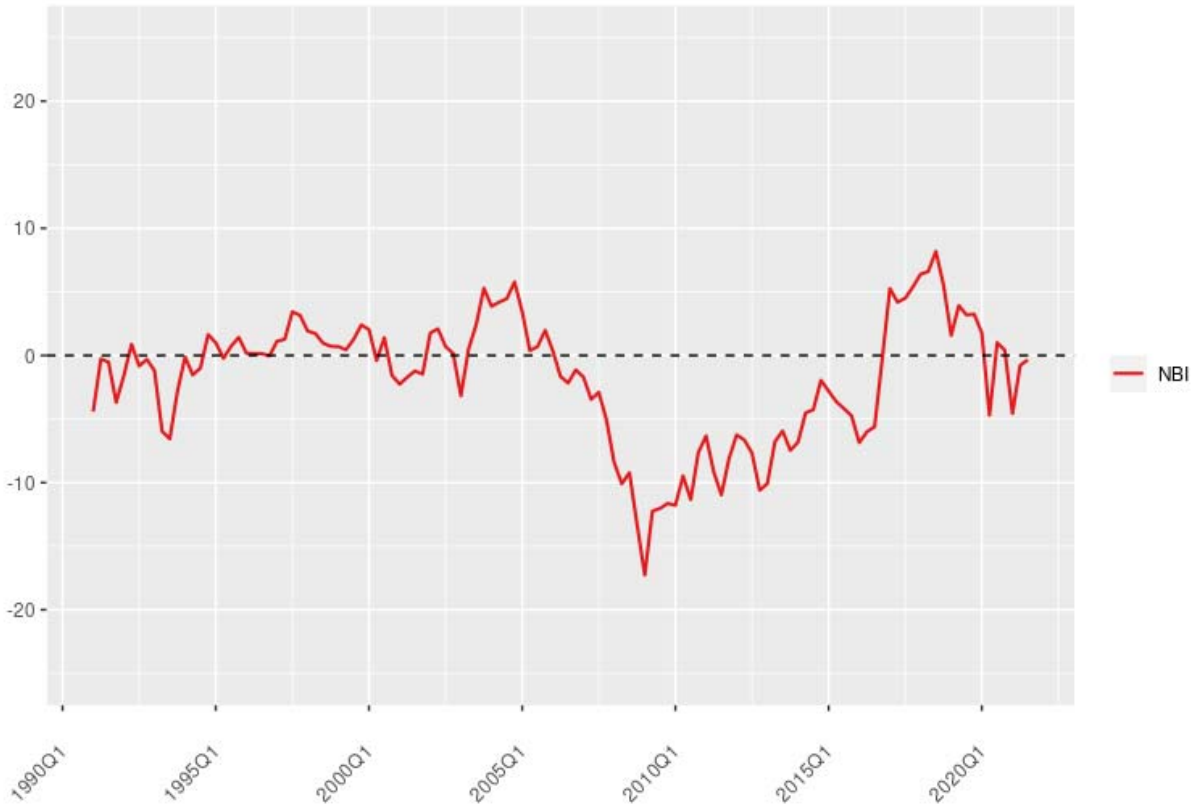
Period	Average Quarterly
1991 – 2003	1.15%
2004 – 2006	1.86%
2007 – 2010	-1.25%
2011 – 2019	1.15%
2020-2021-Q3	1.84%

C. Confidence Indices

The Small Business NOI and CCI are confidence indices based on surveys conducted throughout the year by The Conference Board. These indexes are designed to provide a relative measure of how optimistic or pessimistic consumers and small business are regarding their expected financial situation. Both indices are based around 100 points where indicators above 100 signal relative optimism for the future of the economy, values below 100, relative pessimism. Figure 65 and Figure 66 show historical CCI and NOI, with noted sharp drops in confidence associated to the 2008 mortgage crisis and the beginning of the COVID-19 shutdowns. The most recent quarter shows an upturn in these indices as COVID-19 restrictions are lifted.

Figure 65 – Consumer Confidence Index

Figure 66 - Small Business Normalized Optimism Index

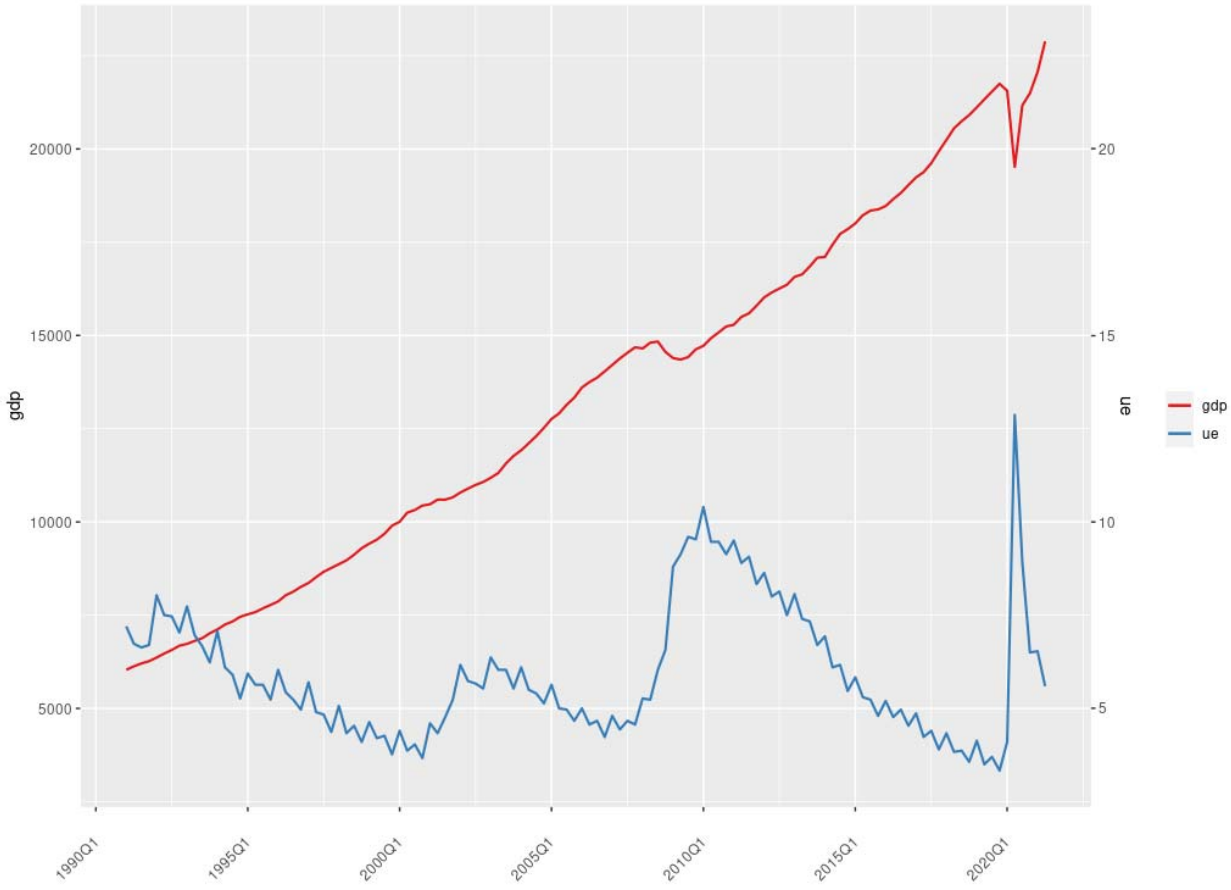


Modeling Method

In financial econometrics and management understanding, predicting the dependence in the co-movements of these series is important when simulating a set of economic factors. This is illustrated in Figure 61, where interest rates track closely.

Long periods of high unemployment will lead to lower GDP. In Figure 67, we can see two obvious examples of this following the mortgage crisis in 2008 and again with the recent COVID-19 pandemic. The most recent quarters illustrate how lockdown restrictions lessened, unemployment dropped, and GDP again begins to increase.

Figure 67 - Unemployement vs. GDP



Volatilities will also move together across these series. High levels of economic instability and uncertainty will lead to volatility in these measures, affecting all economic indicators. A modeling method that accounts for these factors will lead to models that are more relevant.

Recognizing and accounting for these features through a multivariate model should lead to more accurate empirical models than working with separate univariate models.

For these reasons a multivariate General Auto Regressive Conditional Heteroscedasticity (GARCH) modeling approach was chosen.

Univariate GARCH models are typically specified as GARCH(*p,q)* where *p* is the auto regressive (AR) component of σ_t^2, and *q* is the auto regressive component of the error term. Multivariate GARCH models are defined similarly to a standard GARCH model, where the univariate term is replaced with a vector of terms. Mezrich (1995) and Shephard (1996) provide a more detailed explanation of these models.

There are a number of implementations of multivariate GARCH models. One such implementation, Dynamic Conditional Correlation (DCC) estimators, have the flexibility of univariate GARCH but avoid the complexity of conventional multivariate GARCH algorithms. Engle and Sheppard (2000) detail descriptions and examples of using a DCC models for time series analysis.

The 'rmgarch' package implemented with the Cran-R project was specifically used for this modeling effort, developed by Ghalanos (2019), and based off the methods described by Engle (2000).

Data Transformation

The algorithms required to calculate maximum likelihood estimates in these families of models are prone to non-convergence. Variable scale, stationarity of the variables, and covariance within the variable vector set are often the underlying issue when dealing with non-convergence in these complex matrix calculations. Data transformation was performed on these variables to provide a more robust and consistent estimate.

Dickey-Fuller stationarity test were performed on all variables. GDP and HPA test as non-stationary. As a result, first difference transformations were applied to all variables to provide stationarity. Further scaling was required for index variables (*Ind*) using a log transformation:

$$Ind_{trans} = \ln(Ind + \sqrt{Ind^2 + 1}) \qquad (1)$$

Table 72 below provides a description of each variable transformation.

Model Specifications

Each variable is provided a univariate type specification, in a standard (p,q) format where p,q for the ARMA (mean) specification describes the number of autoregressive and moving average lags to include in the model, and (p,q) for the GARCH specification correspond to the autoregressive components and heteroskedastic components (auto regressive component of error term) respectively. See Table 72 for each variable specification.

Table 72 – Model Variable Transformations and specifications

VARIABLE	VARIABLE TRANSFORMATION	ARMA(P,Q)	GARCH(P,Q)	DISTRIBUTION
SOFR	First difference	(0,1)	(1,1)	Normal
LIBOR	First difference	(0,1)	(1,1)	Normal
3-MONTH	First difference	(0,1)	(1,1)	Normal
6-MONTH	First difference	(0,1)	(1,1)	Normal
1-YEAR	First difference	(1,0)	(1,1)	Normal
10-YEAR	First difference	(1,0)	(1,1)	Normal
30-YEAR	First difference	(1,0)	(1,1)	Normal

VARIABLE	VARIABLE TRANSFORMATION	ARMA(P,Q)	GARCH(P,Q)	DISTRIBUTION
30-YEAR FRM	First difference	(1,0)	(1,1)	Normal
UNEMPLOYMENT	First difference	(0,0)	(1,1)	Normal
GDP	First difference, log function transformation	(1,1)	(1,1)	Skewed generalized error
HPI	First difference, log function transformation	(1,1)	(1,0)	Skewed student-t
NOI	First difference, log function transformation	(0,0)	(0,1)	Normal
CCI	First difference, log function transformation	(0,0)	(0,1)	Normal

When fitting a DCC model, the dynamic correlation is fitted with an autoregressive parameter that is applied across all variables. This was set with a (p,q) value of (1,1), describing the correlation across all variables as one autoregressive and one moving average period. These parameters are then used in calculating the correlation matrix.

Table 73 provides all parameter estimates, where “mu” is the mean, “ar” represent the auto regressive and “ma” represent the moving average of the mean model.

Parameters ”omega”, “alpha” and “beta” are the mean, autoregressive, and heteroskedastic parameters of the variance model.

Parameters “skew” and “shape” are estimates to account for specified skewed distributions (GDP and HPI).

Table 73 – Parameter Estimates

VARIABLE	ESTIMATE
TR1YR.MU	0.01724
TR1YR.MA1	0.71714
TR1YR.OMEGA	0.00036
TR1YR.ALPHA1	0.34207
TR1YR.BETA1	0.65693
TR3M.MU	-0.22537
TR3M.AR1	0.86119
TR3M.OMEGA	0.00032

VARIABLE	ESTIMATE
TR3M.ALPHA1	0.28101
TR3M.BETA1	0.71799
TR6M.MU	-0.48917
TR6M.AR1	0.98503
TR6M.OMEGA	0.00012
TR6M.ALPHA1	0.22764
TR6M.BETA1	0.77136
TR10YR.MU	1.77300
TR10YR.AR1	0.97010
TR10YR.OMEGA	0.03891
TR10YR.ALPHA1	0.16538
TR10YR.BETA1	0.45318
TR30YR.MU	2.01786
TR30YR.AR1	0.97998
TR30YR.OMEGA	0.06930
TR30YR.ALPHA1	0.27234
TR30YR.BETA1	0.20642
MR.MU	3.15043
MR.AR1	0.97400
MR.OMEGA	0.04476
MR.ALPHA1	0.36413
MR.BETA1	0.21683
UE.OMEGA	0.00632
UE.ALPHA1	0.00000
UE.BETA1	0.99900
GDP.MU	5.55453
GDP.AR1	-0.19473
GDP.MA1	0.28420
GDP.OMEGA	0.00895
GDP.ALPHA1	0.08965
GDP.BETA1	0.88556
GDP.SKEW	0.75925
GDP.SHAPE	0.50449
HPI.MU	1.15621
HPI.OMEGA	0.57897
HPI.ALPHA1	0.78772
HPI.SKEW	0.36901
NOI.MU	0.04268
NOI.AR1	0.03006
NOI.OMEGA	0.61594
NOI.ALPHA1	0.13486

VARIABLE	ESTIMATE
NOI.BETA1	0.74107
CCI.MU	0.46589
CCI.AR1	0.05837
CCI.OMEGA	0.12328
CCI.ALPHA1	0.00000
CCI.BETA1	0.99900
LIBOR.MU	0.43774
LIBOR.AR1	0.76301
LIBOR.OMEGA	0.03109
LIBOR.ALPHA1	0.94492
LIBOR.BETA1	0.05408
SOFR.MU	-0.26516
SOFR.AR1	0.94074
SOFR.OMEGA	0.02250
SOFR.ALPHA1	0.85242
SOFR.BETA1	0.14658

COVID-19 Pandemic Considerations

The impact from the COVID-19 pandemic is noticeable and dramatic when analyzing these economic indicators. Dramatic, historic, and rapid changes to these economic measures provided additional challenges when fitting these models, and produced simulated results that were skewed and assumed to misrepresent historical data.

Because of the historic nature of this event, and its impact on the economy, it is unknown what the long-term impacts of this pandemic will have on the economy. Numerous research articles have been produced to estimate or predict these long-term impacts (Chudik, 2020; Malliet, 2020).

Based on this research, the current state of COVID-19 vaccine development, and an analysis of historical data, a randomized impact of the pandemic was applied.

As a result, two models were estimated, one basing estimates on pre-pandemic variables, and the second including the pandemic data. A continued impact of eighteen months to five years (six to 20 quarters) was applied randomly as a diminishing linear weight. The two model simulations were then combined using this weighting factor, where COVID-19 simulations were given the most weight, and then slowly removing the COVID-19 impacts to the simulations over the randomized period of time, until the COVID-19 simulations were given no weight, and the pre-COVID-19 simulations all the weight.

Simulation Generation

Model fit was performed through an iterative process, varying parameter specifications for both ARMA and GARCH model components.

Distributions were determined using standard distribution fitting techniques, including QQ-plots and Kolmogorov-Smirnov tests.

Further parameter selection and distribution adjustments were made based on comparative analysis of simulations to historical series, providing the most reasonable estimates and simulations possible.

One hundred simulations were generated for each of the economic variables. These variables were fully transformed back to the common form and scale as the original un-transformed versions.

Interest Rate Simulations

Table 74 shows the summary statistics of the historical 1-year Treasury rates for two different periods as well as the simulated series. We can see that in the last 50 or more years, interest rates have had a much broader range as compared to the last 25 years.

Table 74: Statistics for the 1-Year Treasury Rates

STATISTICS	SINCE 1953	SINCE 1991	SIMULATIONS
95-PERCENTILE	10.29%	6.12%	7.53%
90-PERCENTILE	8.90%	5.66%	6.49%
50-PERCENTILE	4.57%	2.26%	2.83%
25-PERCENTILE	2.25%	0.46%	1.45%
10-PERCENTILE	0.36%	0.14%	0.59%
5-PERCENTILE	0.15%	0.12%	0.24%
MEAN	4.69%	2.72%	3.26%
MAX	16.31%	6.71%	11.45%
MIN	0.06%	0.06%	0.01%
VARIANCE	10.98%	4.81%	1.53%

Figure 68 shows density distributions, comparing the distribution of the historical CMT rates, historic sample used for simulations, and the distributions of all the simulations.

Figure 68 – 1 Year Treasury Rate Densities, Historical and Simulations

To avoid negative interest rates, a lower bound of 0.01 percent was applied to all the simulated future interest rates.

Figure 69 graphs one of the one-hundred simulations, illustrating the co-movements and correlations between these variables and how the multivariate modeling method accounts for these interdependencies.

Figure 69: Interest Rate Sample Simulations

House Price Appreciation Rate (HPA)

A. National HPA

The national HPA is calculated by first estimating and simulating HPI. From the HPI simulation, these simulations are then transformed using formula (1) to simulate HPA.

Table 75 provides comparison of simulated HPI average trends and the historical sample trends. The analysis show a significant spread between the series when comparing the largest and smallest trends, but when simulated trends are averaged across all series they are very close to the historical trend used in model fitting.

Table 75 – HPI Simulation Statistics

	SIMULATED SERIES			HISTORICAL
	Max trend	Min trend	Mean trend	Trend
HPI	2.9748	2.0057	2.3137	0.0571

B. Geographic Dispersion

The MSA-level HPA forecasts were based on Moody's forecast of local and the national HPA forecasts. Specifically, at each time *t*, there is a dispersion ratio of HPAs between the *i*th MSA or State level and the national forecast:

$$Disp_{i,t}^{Base} = HPA_{i,t}^{Base} / HPA_{national,t}^{Base} \quad (6)$$

This dispersion forecast under Moody's base case was preserved for all local house price forecasts under individual future economic paths. That is, for economic path *j*, the HPA of the *i*th MSA at time t was computed as:

$$HPA_{i,t}^{j} = HPA_{national,t}^{j} * Disp_{i,t}^{Base} \quad (7)$$

This approach retains the relative current housing market cycle among different geographic locations and it allows us to capture the geographical concentration of FHA's current endorsement portfolio. This approach is also consistent with Moody's logic in creating local market HPA forecasts relative to the national HPA forecast under alternative economic scenario forecasts.[83]

We understand this approach is equivalent to assuming perfect correlation of dispersions among different locations across simulated national HPA paths, which creates systematic house price decreases during economic downturns and vice versa during booms. Due to Jensen's Inequality, this tends to generate a more conservative estimate of claim losses of the Fund.

Unemployment Rate

A. National Unemployment Rate

Table 76 provides statistics comparing series samples of unemployment rates to the simulated series.

Table 76 – Unemployment Historical and Simulation Statistics

STATISTICS	SINCE 1953	SINCE 1991	SIMULATIONS
95-PERCENTILE	9.13%	9.43%	10.22%
90-PERCENTILE	8.11%	8.77%	9.33%
50-PERCENTILE	5.57%	5.50%	5.98%
25-PERCENTILE	4.54%	4.65%	4.65%
10-PERCENTILE	3.70%	4.11%	3.98%
5-PERCENTILE	3.39%	3.84%	3.56%
MEAN	5.77%	5.92%	6.35%
MAX	12.87%	12.87%	15.95%

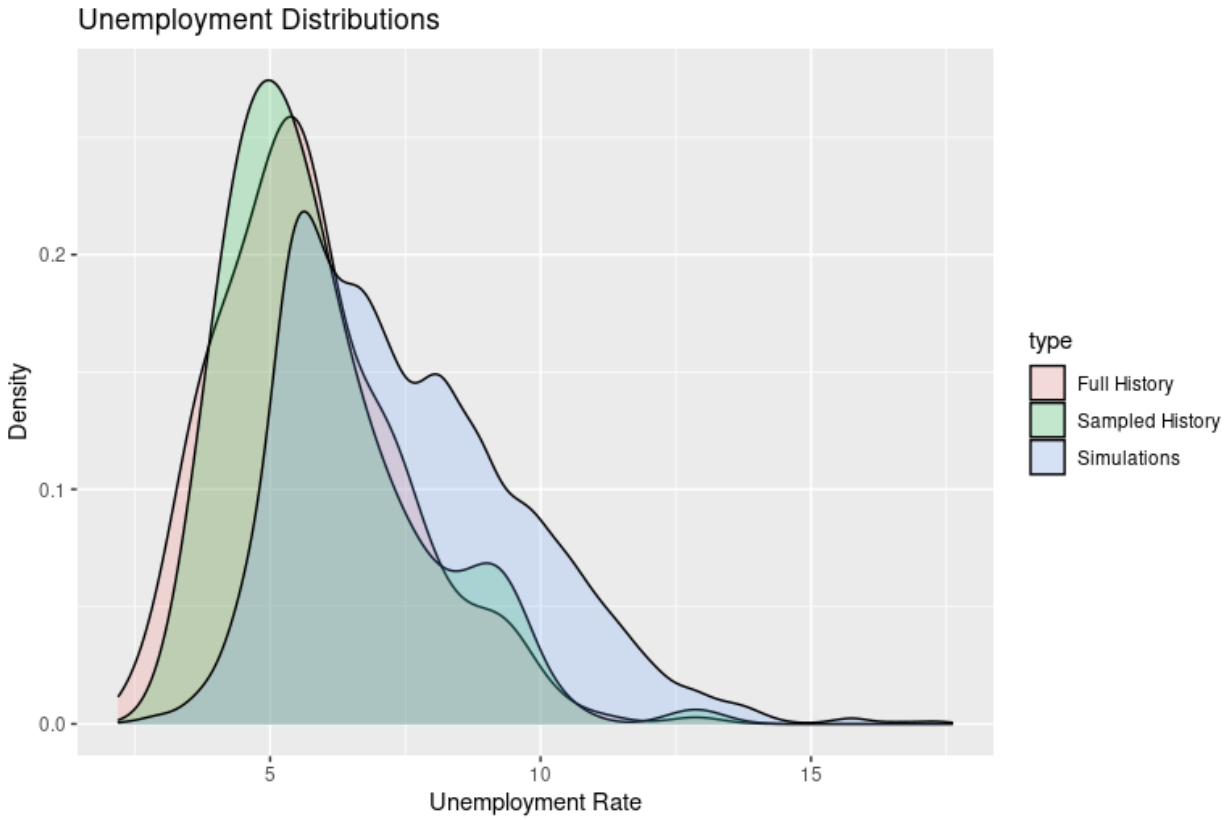
[83] The dispersion of each MSA remains constant among all alternative Moody's forecast scenarios.

MIN	2.47%	3.33%	1.53%
VARIANCE	2.97%	3.07%	1.74%

Based on historical statistics, the national unemployment rate limits were set at 20% maximum and a 2% minimum.

Figure 70 is a density plot comparison of the historical series and simulated sets.

Figure 70 - Unemployment Rate Densities Historical and Simulations



B. Geographic Dispersion

Following the same logic that we applied to the MSA-level HPA forecasts, we first obtained the dispersion of unemployment rates between the i^{th} MSA or State level and the national level from Moody's July base-case forecast at each time t:

$$Disp_{i,t}^{Base} = ue_{i,t}^{Base} / ue_{national,t}^{Base} \quad (9)$$

This dispersion forecast was preserved for all local unemployment rate forecasts under each individual future economic path. That is, for economic path *j*, the unemployment rate of the *i*th MSA at time *t* was computed as:

$$ue_{i,t}^{j} = ue_{national,t}^{j} * Disp_{i,t}^{Base} \quad (10)$$

For the simulation, we capped the unemployment rate at the local level at 30% with a floor at 1%.

Gross Domestic Product

Table 77 provides statistics comparing the historical GDP series trend to simulated trends. The analysis show a fairly small spread between the series when comparing the largest and smallest trends, and when simulated trends are averaged across all series they are very close to the historical GDP trend used in model fitting.

Table 77 – GDP Simulation Statistics

	SIMULATED SERIES			HISTORICAL
	Max trend	Min trend	Mean trend	Trend
GDP	2.6507	1.7513	1.9984	2.8513

Small Business Normalized Optimism Index/ Consumer Confidence Index

The Small Business NOI and CCI are based on a 100 point scale, where values under 100 represent less confidence in the economy, values over 100 indicate an increase in confidence.

Table 78 - Confidence Indices Statistics

	HISTORICAL NOI	SIMULATED NOI	HISTORICAL CCI	SIMULATED CCI
MAX	142.11	179.35	108.18	122.42
MIN	29.86	23.72	82.73	56.59
MEAN	94.38	98.41	98.15	107.79

Table 78 provides comparisons of range and means for both indices and the corresponding simulate data showing that the simulations provide reasonable ranges compared to historical data.

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APPENDIX E: CASH FLOW ANALYSIS

Introduction

The calculation of the Cash Flow NPV of the MMI involves the estimation of the present value of future cash flows generated by the existing portfolio. The analysis requires the projection of future prepayment and claim incidences, and severity and cash flow items associated with each type of outcome. The Cash Flow NPV represents future revenue and expenses associated with the existing book of mortgage guarantees. This appendix describes the components of these cash flow calculations.

To develop the estimated Cash Flow NPV, our model incorporates projections of mortgage performance and information about the existing portfolio composition to project the MMI's various cash flow sources. The cash flow projection model uses projections from predictive models as discussed in Appendix B (Transition Models), Appendix C (Loss Severity Models), and the economic scenarios described in Appendix D. We developed predictive models for conditional transition probabilities for individual mortgages depending on a number of mortgage and economic characteristics. From these models and using detailed mortgage-level characteristics, we estimated the various transition probabilities and then generated respective cash flows for individual mortgages.

Based on the mortgage termination rates projected by the predictive models, individual components of cash flows are projected into the future. These cash flows are discounted to present value based on the single discount rate provided by the OMB. Based on the specific characteristics of the mortgage, the probability of each transition is calculated. Then, a random number between 0 and 1 is generated, and based on this random draw a mortgage transition is determined. The projection process continues for each mortgage until the mortgage ends by prepayment, claim or reaches maturity.

The cash flow components are shown in the following table:

Table 79: Cash Flow Components

Cash Inflows	Cash Out Flows
Upfront MIP	Net Claim Payments
Annual MIP	Loss Mitigation Expenses
Interest Income	Refunded Upfront Premiums

These cash flows were projected quarterly for individual mortgages and then aggregated by product type and origination year. Below, we discuss the development of each of these cash flows.

Cash Flow Components

The components of cash flow are discussed below.

MIP

The primary source of MMI revenue is insurance premiums. If the MMI's mortgage insurance is priced to meet the expected liabilities, the MIP collected and interest earned on the MIP will cover all costs associated with mortgages insured by the MMI under a normal or expected economic environment. The MIP structure and the premium rates have changed over the period under evaluation. Details of MIP changes are as follows:

- For mortgages originated prior to September 1, 1983, the MIP was collected on a monthly basis at an annualized rate of 0.50% of the outstanding principal balance for the period. To align this change with fiscal quarters, we assumed that this annual MIP policy was in effect through September 30, 1983.

- Between September 1, 1983 and June 30, 1991, the MIP was charged only upon mortgage origination and was based on a percentage of the original mortgage amount at the time of origination. This amount was 3.80% for 30-year mortgages and 2.40% for 15-year mortgages.

- Effective July 1, 1991, NAHA implemented a new MIP structure. An upfront MIP of 3.80% was charged for all product types except for 15-year non-SR mortgages, for which the upfront MIP was set at 2.00%. An annual MIP of 0.50% per year on the outstanding balance was also implemented. The annual MIP would cease at different years of maturity depending on the initial LTV of the mortgage.

- On October 1, 1992, the upfront MIP for 30-year mortgages was reduced from 3.80% to 3.00%. The annual MIP for 30-year mortgages was extended for a longer time period, while for 15-year mortgages it was lowered to 0.25% for a shorter time period or completely waived if the initial LTV ratio was less than 90%.

- As of April 17, 1994, FHA lowered the upfront MIP rate on 30-year mortgages from 3.00% to 2.25%. To align this change with fiscal quarters, we applied this policy change on April 1, 1994.

- Starting from October 1, 1996, FHA lowered the upfront MIP rate on 30-year mortgages for first-time homebuyers who received homeowner counseling from 2.25% to 2.00%. This rate was further reduced to 1.75% for mortgages originated on or after September 22, 1997. This favorable treatment for borrowers with homeownership counseling was terminated shortly thereafter.

- Effective January 1, 2001, FHA lowered the upfront MIP rate for all mortgages to 1.50%. The annual MIP would be discontinued as soon as the current LTV ratio of the mortgage was below 78% according to the home price as of the mortgage origination date. The annual MIP was required to be paid for a minimum of five years for 30-year mortgages.

- Effective October 1, 2008, FHA charged an upfront premium rate of 1.75% for home purchase and full-credit qualifying refinances; and 1.50% for all types of streamline refinance mortgages. A varying annual MIP, collected on a monthly basis, was charged based on the initial LTV ratio and maturity of the mortgage.

- Effective April 1, 2010, FHA changed the upfront MIP to 2.25% for all mortgages executed after April 1, 2010.

- Effective October 4, 2010, FHA lowered the upfront MIP of all mortgages to 1.0%. The annual MIP for mortgages with 30-year terms was increased to 0.85% for LTV ratios up to 95 percent and to 0.90% for LTV ratios greater than 95%. For mortgages with 15-year terms, an annual MIP of 0.25% was set for LTV ratios greater than 90%. To align this change with fiscal quarters, we started applying this policy change on October 1, 2010.

- Effective April 18, 2011, the annual MIP for mortgages with 30-year terms was increased to 1.10% for LTV ratios up to 95% and to 1.15% for LTV ratios greater than 95%. For mortgages with 15-year terms, the annual MIP was increased to 0.25% for LTV ratios up to 90% and to 0.50% for LTV ratios greater than 90%. To align this change with fiscal quarters, we started applying this policy change on April 1, 2011.

- Effective April 9, 2012, FHA increased the upfront MIP of all mortgages to 1.75%. The annual MIP for mortgages with 30-years terms was increased to 1.20% for LTV ratios up to 95%, and to 1.25% for LTV ratios greater than 95%. For mortgages with 15-year terms, the annual MIP was increased to 0.35% for LTV ratios up to 90%, and to 0.60% for LTV ratios greater than 90%. To align this change with fiscal quarters, we started applying this policy change on April 1, 2012.

- Effective June 11, 2012, the annual MIP for mortgages with 30-year terms and base mortgage amounts above $625,500 was increased to 1.45% for LTV ratios up to 95%, and to 1.50% for LTV ratios greater than 95%. For mortgages with 15-year terms, and base mortgage amount above $625,500, the annual MIP was increased to 0.60% for LTV ratios up to 90%, and to 0.85% for LTV ratios greater than 90%. Also effective June 11, 2012, for all single family forward SR mortgages which are refinancing existing FHA mortgages that were endorsed on or before May 31, 2009, the upfront MIP decreased to 0.01% of the base mortgage amount, and the annual MIP was set at 0.55%, regardless of the base mortgage amount. To align this change with fiscal quarters, we started applying this policy change on July 1, 2012.

- Effective April 1, 2013, the annual MIP for mortgages with 30-year terms and base mortgage amounts below $625,500 was increased to 1.30% for LTV ratios up to 95%, and to 1.35% for LTV ratios greater than 95%. The annual MIP for mortgages with 30-year terms and base mortgage amounts above $625,500 was increased to 1.50% for LTV ratios up to 95%, and to 1.55% for LTV ratios greater than 95%. For mortgages with 15-year terms and base mortgage amounts below $625,500, the annual MIP was increased to 0.45% for LTV ratios up to 90%, and to 0.70% percent for LTV ratios greater than 90%. For mortgages with 15-year terms and base mortgage amounts above $625,500, the annual MIP was increased to 0.70% for LTV ratios up to 90%, and to 0.95% for LTV ratios greater than 90%. This increase was effective for all forward mortgages except single family forward SR transactions that refinance existing FHA mortgages that were endorsed on or before May 31, 2009.

- Effective June 3, 2013, the annual MIP rates for mortgages with an LTV of less than or equal to 78% and with terms of up to 15 years was 0.45%. The new payment period for annual MIP for mortgages with case numbers assigned on or after June 3, 2013 and with an LTV up to 90% was 11 years, and the annual MIP applied for the life of the mortgage for LTVs greater than 90%. To align this change with fiscal quarters, we started applying these policy changes on July 1, 2013.

- Effective January 26, 2015, the annual MIP rates for mortgages with a term greater than 15-years have been reduced by 50 basis points. To align this change with fiscal quarters, we applied these policy changes on January 1, 2015.

Upfront MIP

The upfront MIP is assumed to be fully paid at the mortgage origination date and the amount is calculated as follows:

*Upfront MIP = Origination Mortgage Amount * Upfront MIP Rate*

In practice, FHA allows qualified homeowners to finance the upfront MIP so that the upfront MIP does not add to the borrower's equity burden at the beginning of the contract. Instead, the borrower can add the upfront MIP to the original mortgage balance, in essence paying the upfront MIP on the same schedule as their principal balance. The annual MIP is charged based on the unpaid principal balance excluding the financed upfront MIP. Almost all borrowers finance their upfront MIP in this fashion. However, the LTV including refinanced upfront MIP cannot exceed 96.5%.

Annual Premium

The annual MIP is calculated as follows:

*Monthly MIP = UPB (excluding any upfront MIP) * Annual MIP Rate / 12*

The MIP is actually collected on a monthly basis. For purposes of the simulation, the monthly MIP is aggregated by quarter, and this quarterly premium is used to discount MIP for the simulation.

Refunded MIP

FHA first introduced the upfront MIP refund program in 1983. It specified that FHA would refund a portion of the upfront MIP when a household prepaid its mortgage. The upfront MIP was considered to be "earned" over the life of the mortgage. Upon prepayment, an approximation of the unearned upfront MIP is returned to the borrower. Therefore, the amount of the refund depends on the time from origination to when the mortgage is prepaid. For modeling purposes, the refund payments are calculated as follows:

*Refund Payments = Original UPB * Upfront MIP Rate* Refund Rate*

Refund payments at each quarter are calculated based on the number of mortgages prepaid in that quarter and the origination date of the mortgage. In the past, borrowers always received the upfront MIP refund when they prepaid their mortgages before the maturity of the mortgage contract. In 2000, FHA changed its policy so that borrowers would obtain refunds only if they prepaid within the first five years of their mortgage contracts. The most recent policy change at the end of 2004 eliminated refunds for early prepayments of any mortgages endorsed after that date, except for those borrowers who refinanced into a new FHA mortgage within three years following the original endorsement date.

Losses Associated with Claims

The MMI's largest expense component comes in the form of payments arising from claims. FHA pays the claim to the lender after a lender files a claim. This claim expense can be either a loss mitigation expense or a traditional claim. If it is a traditional claim, in most cases, FHA takes possession of the foreclosed property and sells the property to partially recover the loss. This particular type of claim is called a conveyance (REO).

Based on this practice, claim cash flows can be decomposed into two components:

1. Cash outflow of the claim payment at the claim date including expenses incurred, and
2. Cash inflow of any net proceeds received in selling the conveyed property at the property disposition date.

We have estimated the net loss as discussed in Appendix C separately for loss mitigation, PFS, TPS and REO claim types. Based on the specific characteristics of the mortgage, the net loss for each claim is calculated. Then, a random number between 0 and 1 is generated, and based on this random draw the predicted net loss is determined.

Net Present Value

Once all the above future cash flow components are estimated, their present value is computed by discounting them at an appropriate rate. The discount factors applied were provided by FHA and reflect the OMB discount factors and the expected timing of future cash flows. The rates are constant and vary by mortgage cohort year. The discount factors reflect the most recent Treasury yield curve, which captures the federal government's cost of capital in raising funds. These factors reflect the capital market's expectation of the consolidated interest risk of U.S. Treasury securities. Our simulations aggregated each future year's cash flows by quarter, and treat the cash flows as being received at the end of the quarter.

APPENDIX F: REVIEW OF HUD ANALYSIS OF ECONOMIC NET WORTH, COMPARISON OF HUD AND PINNACLE MODELS, AND ASSESSMENT OF VULNERABILITIES

Appendix F presents a high-level review of HUD models developed to project Economic Net Worth, compares the models developed by HUD with the models developed by Pinnacle, and assesses the vulnerabilities of the models developed. We have also identified potential areas of future research based on this assessment.

Deliverable 4 of the Actuarial Report states:

> **To promote transparency of the Studies' assessments, the Studies should identify methodological vulnerabilities that may occur in its actuarial models or in HUD's analyses of Economic Net Worth. This discussion should evaluate the scope and scale of such vulnerabilities in creating possible forecast risk and suggest possible lines of research in these areas. The Studies shall assess and comment upon HUD's own models that estimate Economic Net Worth for methodological vulnerabilities and compare HUD's methodologies with those in the Studies.**

There are several different aspects of forecast risk that can arise in the projection of Economic Net Worth, including:

- Process risk— actual results vary from projected results due to variability in the mortgage insurance process
- Parameter risk— the uncertainty related to the parameters selected for a given model
- Specification risk— the uncertainty related to the type of model that is selected for a forecast

The following discussion comments on these various types of forecast risk.

Forward Budget Model Commentary

Summit-Milliman (S-M) has developed a series of models consisting of the Single Family (Forward) Budget Model Schema that are used to forecast cash flows for the Forward mortgages in the FHA portfolio. The following discusses strengths and potential vulnerability of these models, as well as identifies potential areas for further research.

Model Schema

The Loan Performance Models consist of a Stage 1 model for loans that have never been seriously delinquent and a Stage 2 model for loans that have experienced a 90-day delinquency. Both models are used to predict the likelihood of a given loan becoming seriously delinquent or prepaying. This is reasonable as the two sub-populations exhibit different future transition behaviors.

The Stage 1 model uses a series of binomial logistic regressions to estimate the probabilities for non-claim termination and serious delinquency, incorporating the assumption of Independent Irrelevant Alternatives (IIA). The IIA assumption states that adding or removing termination events does not impact the odds of the original termination event. This is a potential vulnerability of the models if this assumption is violated. However, to the extent this assumption holds, then the S-M approach is mathematically equivalent to a multinomial logistic model, which would be a reasonable approach given the number and type of outcomes being predicted.

S-M built two Stage 1 models, one for purchase loans and one for refinance loans, as they exhibit different prepayment rates. This is also appears to be a reasonable assumption based on our independent analysis of purchase and refinance loans.

There are some potential vulnerabilities in the S-M modeling approach, which are acknowledged by S-M as well:

- The models were developed using a long period of data (1990-2020). For Stage 2 loss mitigation models, delinquencies from 2009 and subsequent were used. This may cause slower reflection of shorter term trends. As Pinnacle uses data from the beginning of the Forward Mortgage Guaranty program, this is potential vulnerability in the Pinnacle models as well.

- Only the Stage 2 model is used for a loan once it is 90 days delinquent, which can fail to fully reflect short-term changes if a loan quickly self-cures, for example.

- The historical data may not be reflective of future performance or of program changes. Again, these are potential shortcomings in the Pinnacle models as well. See section below regarding S-M adjustments due to COVID-19 impacts.

For these vulnerabilities, but in particular the first one, one area of potential future research is to refit the models on more recent data and evaluate the change in the model parameters. Also, results of the model could be validated against more recent data to test how well the models reflect more recent experience. One approach that Pinnacle has incorporated to account for this vulnerability is to include

credit subsidy cohort and loan period as variables in the models. An additional research step would be to test the interaction of these time related elements with other independent variables in the models. The Stage 2 Loan Performance Model was developed on a loan level basis. Due to different claim rates, S-M built two Stage 2 models depending on whether the loan received loss mitigation in the past or not. Once a loan enters a Stage 2 model it cannot revert back to Stage 1. The models used multinomial logistic regression given the number and type of different potential outcomes.

S-M used a few approaches to validate their Stage 1 and Stage 2 Loss Performance Models, including out-of-sample actual vs. expected results, Receiver Operating Characteristic (ROC) curves, and comparison of claim rates for loans that did or did not receive loss mitigation. S-M also reviewed the variable significance levels for the models. All of these are reasonable approaches. An additional approach to consider would be to use out of time data to validate the models, however if more recent data was left out of the initial model development, it would potentially increase the likelihood of shorter-term trends being missed.

The Loss Mitigation Models developed by S-M have two parts for Stage 2, one for loans with loss mitigation applied and one for loans without loss mitigation. This is done since the probabilities of claim vs. non-claim termination vary greatly depending on if a loan receives loss mitigation or not, and is consistent with the S-M approach for Stage 2 Loan Performance Models. However, due to changes in government programs and frequency of mitigation usage over the years, S-M notes there may not be enough data to develop a reliable model to predict which delinquent loans will receive loss mitigation. Therefore, actuarial methods were used to project these rates. S-M selected a 38% loss mitigation rate for the current models based on updated data, which represented no change from the prior models. While it is reasonable to use actuarial methods in this case, this does introduce an additional potential source of uncertainty in the results. Also, it is not clear what testing that S-M did to conclude there was not enough data to develop a loss mitigation prediction model. Future research could involve attempting to build models on the data that does exist and comparing the model results to recent actual results to determine if the accuracy is sufficient.

The Loss Severity Models developed by S-M predict the disposition and severity of a loan loss from Stage 2 in two parts. The disposition estimation model predicts the probability of a loan entering a specific disposition path (PFS, Single Family Loans Sales [SFLS], CWCOT, or REO). The loss severity model predicts the amount of loss given a default. The disposition model uses a waterfall approach.

The model first uses binomial logistic regression to estimate the probability of a PFS vs. other type of disposition. Data from 1995 and forward was used. Due to lower data volume, historical data from January 1, 2019 to December 31, 2020 is then used to determine if a non-PFS is estimated to be either

a SFLS or CWCOT. Finally, the conditional probability for REO is simply the remaining proportion of claims since it is the end of the process waterfall. Potential future research could be to test the two-year period for historical data to determine whether two years of data is sufficient, or to demonstrate how sensitive the results are to different lengths of time. Similarly, CWCOT severity, SFLS severity, and SFLS sales price are determined using this same two-year period. Future analysis should be considered to validate this length of time and its impact on results. Pinnacle uses the entire data history to build models determining the likelihood of an REO or TPS claim.

These three models (Loan Performance, Loss Mitigation, and Loss Severity) combine to produce cash flows to then calculate Liability of Loan Guarantee (LLG) and Return on Assets.

S-M then estimates acquisition costs separately from Net Loss using Ordinary Least-Squares (OLS) regression. They also estimate sale ratio using linear regression, whereas previously the ratio was calculated from sales price. While these can be improvements in sophistication of the modeling and results, this can also now add additional uncertainty from the additional model parameters.

With the FY 2021.1 model version, S-M introduced a 2.0% Quarterly Prepayment Rate Floor. While this could introduce some future variability in the results particularly considering the current economic conditions, S-M tested the selection using historical data to determine a reasonable floor, and also tested results with different (including no) floors. This was also the result of S-M's discussion with FHA on a reasonable prepayment rate floor to use. Note that as described below that due to COVID-19 impacts, S-M has increased the rate to 3.5% to reflect the recent increase in pre-payment activity.

S-M's process for selecting variables is reasonable. This process included performing exploratory data analyses and univariate analyses to better understand the data. Specifically, S-M reviewed how well a variable was populated, how the variable changes over time, and how well the variable relates to the target. S-M also considered collinearity between variables. Univariate regression analysis and backward selection stepwise regression were used, with a p-value threshold of 10% to determine which variable to include in the stepwise procedure. S-M also ran models across time to assess model stability. Splines were added to various models to improve performance, with the c-statistic measured to determine impact. Finally, when considering whether to include a variable in a model, S-M considered the intuitive relationship of the model variables and the predictive nature of the variable.

S-M notes that several variables such as credit score, borrower income, debt-to-income ratio, and loan-to-value ratio have an influence on mortgage performance yet are censored or have missing data in the datasets for various reasons. S-M made an explicit adjustment on the credit data to back-populate it, as is described in more detail below. An area for further research would be determining if

there are additional sources to better populate other types of variables for which a significant portion of the data is missing.

There are several additional potential areas for future research/testing of assumptions.

- The S-M report notes that the majority of FHA's endorsement volume is from post-2007 credit subsidy cohorts, and as a result, the data for the cohorts is not fully developed. The implicit assumption is that these younger cohorts will perform similarly to older cohorts. As more data is obtained over time, this assumption should be tested, and appropriate adjustments made if any differences in performance are seen.

- The method for calculating partial claims and incentive payments have changed, as back-testing showed an underestimation of partial claim payments. The new method incorporates both historical partial claims and predicted partion claims. The sensitivity of the results to this change should continue to be explored given the variation that has been seen in this parameter over time.

- The results use a two-year lookback period for the Return on Properties calculation. While not necessarily unreasonable, further exploration of different lookback periods and support for the two-year selection would be a reasonable approach to validate the selection.

Following are some additional sources of potential vulnerabilities in the methodology.

- Declining vs. Increasing Interest Rate Environment—while noted in the report, the historical data used in model development was collected in a generally declining interest rate environment. However, the forecast is for interest rates to increase. This introduces a potential source for uncertainty in the results since the historical data is not necessarily reflective of loan performance in the future expected interest rate environment.

- Sensitivity tests performed on HPA and interest rate factors assume independence of factors and so may impact the results that would actually be seen with multiple varying parameters.

- S-M selected 2012-2020 cohorts due to volume and availability of actual historical cash flows for performing back-testing of their model results. While this is not unreasonable, this could be a potential source of variability in results if different cohort years were selected.

- There are multiple models being used in combination, so there is the risk of error propagation across the multiple models.

COVID-19 Impact Adjustments

S-M made several adjustments to models due to expected impacts from COVID-19. These adjustments appear to be reasonable based on available data.

- Increase Roll Rates to Reflect COVID—30 and 60-day delinquency roll rates were developed to estimate the population of 90+ day delinquencies using data from the 2008-2011 financial crisis as guidance. This was only a temporary adjustment until September 2020 data was available.

- Increase Loss Mitigation rates to Reflect COVID—rates were increased for loans that have utilized forbearance based on data that shows delinquent loans during COVID that have used forbearance are more likely to also use loss mitigation.

- Implement Revised Loss Mitigation Waterfall—the waterfall pattern was updated based on mortgagee letter 2020-22 that was issued in July 2020.

- COVID PC Payments and Timing—S-M selected a multiplier of 9 for each loan's monthly PITI based on assumed number of missed payments for a 9-month forbearance period reflecting additional extensions. Also, S-M included an assumption that COVID PC payments will occur in Q2 of FY2021 with recoveries occurring with Stage 2 NCT events. Loans ineligible for the COVID PC will follow standard loss mitigation timing and be dependent on the HAMP loss mitigation module.

- Higher near-term Prepayment rates to Reflect Low-Interest Rate Outlook—S-M has adjusted the three-month prepayment floor from 2.0% to 3.5% to be in place through the end of FY2021 based on observed rates over the past 12 months.

Through their analysis of the data, S-M recognized that the credit score is a very important component of prediction, and also that a significant amount of credit scores were missing for loans prior to 2004 due to how the FHA program was administered. Therefore, S-M attempted to supplement the credit score data from additional sources. One source was a study completed by Fannie Mae, but upon review of the data that approach still resulted in a significant number of missing scores. Next, loan level data was then appended from a CoreLogic source. S-M compared aspects of this data to the existing scores for a time period that overlapped between the CoreLogic and FHA data (2005-2013) and determined that it was reasonable to use based on the average credit scores by year for each of the datasets. Based on Pinnacle's review of the summary statistics of the data, while this is not an unreasonable approach to take to supplement missing credit scores, some degree of caution should be exercised since there is a significant difference in the average credit scores between the two sources,

with the CoreLogic source showing higher scores. To help account for this, S-M included an indicator for score source in the models, which is reasonable.

Pinnacle Forward Budget Model Commentary

The following illustrates some of the similarities and differences in methodologies for the Forward budget models between the Pinnacle analysis and that done by S-M for HUD.

The Pinnacle models analyzed the forward book of loans based on separate products: 30-year FRM, 15-year FRM, refinances, and ARM. The S-M approach did not build models separately by product beyond the purchase loans vs. refinance loans for their Stage 1 model. Also, the Pinnacle models were built on an individual loan level. S-M used individual loans for their Stage 1 and Stage 2 models.

Model Schema

The schema of the models is different between the S-M process and that of Pinnacle. Both reflect models for Performing (Stage 1 or Current) vs. Non-Performing (Stage 2 or Default) loans. Pinnacle further develops separate models based on product (FRM30, FRM15, ARM). The HUD models predict the likelihood of prepayment or delinquency from each of the Stage 1 or Stage 2 starting points. Pinnacle's models reflect potential transition to multiple states.

- Transitions from Current mortgage: remain current, default/claim, prepay by SR, other prepayments, cure with mortgage modification, self-cure

- Transitions from Default mortgage: prepay, transition into a claim, self-cure, cure with mortgage modification, remain in default

Transition models for Pinnacle are used to project how a loan will move to a different status. Loss Severity Models are used to project the amount of loss given a claim.

Regarding the modeling process, for this year's analysis Pinnacle has continued to use multiple binomial models for the Forward transition models. Pinnacle researched reverting to a multinomial model but found no significant differences in the resulting parameter estimates, and thus decided to continue the same process.

The main vulnerability in the models is the general vulnerability of developing predictive models: the extent to which historical patterns between target and projected results are indeed predictive. We have attempted to mitigate this potential vulnerability through a training and validation construct. For

the Transition Models, we use 60% of the data to train the models and 40% of the data to validate the models. This is different than the split percentages used by S-M. For the Loss Severity Models, a train/validate approach also was used. Pinnacle did not do any out of time sample validation.

Pinnacle models were validated in general by comparing actual to predicted results in decile charts. This was done for both the transition models and loss severity models.

Pinnacle applied random sampling for FRM30 SR Current transition model types to improve efficiency of the modeling process. This could be a potential source of variability if not truly random, and a future area of refinement could be to test to see if using different sampling percentages result in a difference in the model results. Pinnacle used the full dataset for all other models.

For Loss Severity models, Pinnacle built a multinomial logistic model to predict claim disposition—PFS, REO, or CWCOT. S-M also included the Single Family Loan Sales (SFLS) as a type. Pinnacle also built models to predict loss severity (using Generalized Linear Models with a Gamma error structure and a log link function) for each of PFS, REO, and CWCOT, as well as a model for recovery amounts if the claim is a foreclosure REO. S-M does not separately specify a recovery amount model. Finally, Pinnacle also modeled loss mitigation costs.

S-M utilized data from Moody's in their loan projections. Pinnacle uses 10 economic scenarios from Moody's, and 100 random stochastic simulations of key economic variables to develop a range of Cash Flow NPV. Both S-M and Pinnacle utilized Moody's data on a state and MSA level when possible to provide for a greater reflection of differences in home prices, etc. across the country.

Simulation

Pinnacle ultimately utilized 100 random stochastic simulations to determine the range of Cash Flow NPV estimates. This compares to the S-M process which used 10,000 Monte Carlo simulations. Pinnacle developed simulations of key economic variables as inputs into the Cash Flow NPV simulations, while the S-M process used 10,000 simulations of target variables (default rate, prepayment rate).

APPENDIX G: SUMMARY OF HISTORICAL AND PROJECTED CLAIM RATES, NON-CLAIM TERMINATION RATES AND LOSS SEVERITIES

The following incremental annual summaries are shown by cohort for Fixed Rate 30, Fixed Rate 15, ARM products separately, and for all products combined.

1. **Conditional Claim Rate**: percentage of active Loans at the beginning of the evaluation year that end in claim during the evaluation year

2. **Cumulative Claim Rate**: cumulative claims as of evaluation year divided by active loans as of evaluation year 1

3. **Conditional Non-Claim Termination Rate**: percentage of active loans at the beginning of the evaluation year that end in termination by other than claim during the evaluation year

4. **Cumulative Non-Claim Termination Rate**: cumulative non-claim terminations as of evaluation year divided by active loans as of evaluation year 1

5. **Conditional Loss Rate**: claim cost net of recovery in each evaluation year divided by gross claim cost in each evaluation year

6. **Cumulative Loss Rate**: total losses net of recovery for each Fiscal Year as of the end of the evaluation year divided by total gross losses for each Fiscal Year as of the end of the evaluation year

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Active Loans
All Products Combined

Table 1: Number of Loans Active at the End of Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1990	718,750	699,744	622,676	427,200	291,370	258,835	219,891	191,998	155,928	122,759	107,525	91,993	73,780	56,823	45,483	36,835	29,664	26,906	24,997	23,260	21,724	20,382	19,323	18,225	17,039	15,749	14,679	13,598	12,109	9,537	708
1991	622,216	589,526	447,493	315,815	284,235	242,682	211,869	169,597	131,701	115,109	96,759	75,635	55,954	43,784	36,210	27,916	24,988	23,063	21,346	20,167	18,708	17,670	16,673	15,700	14,685	13,589	12,618	11,557	10,325	8,163	449
1992	612,450	558,348	469,058	432,903	379,283	335,760	269,995	208,011	182,211	150,687	113,804	77,582	58,277	47,008	38,848	31,573	28,422	26,310	24,588	23,043	21,425	19,978	18,630	17,313	15,904	14,453	13,095	11,666	10,076	7,500	703
1993	966,017	889,866	841,546	762,355	689,233	582,273	470,236	415,387	346,858	263,987	167,002	121,537	95,756	78,454	66,487	51,342	46,594	43,038	39,997	37,155	33,577	31,061	28,569	26,180	23,760	21,217	19,033	16,828	14,188	12,180	1,338
1994	1,107,079	1,058,815	970,204	883,187	751,019	618,524	549,227	462,248	361,035	238,262	175,507	138,833	114,737	98,522	83,435	66,582	61,584	57,322	53,274	48,678	44,150	40,879	37,484	34,252	30,942	27,606	24,867	21,654	19,810	16,619	1,128
1995	506,499	459,930	415,492	327,883	256,444	224,459	183,205	138,907	93,214	67,690	52,273	42,651	36,488	32,710	29,766	26,363	24,723	23,286	21,726	20,389	18,897	17,517	16,189	14,966	13,782	12,614	11,302	10,510	9,852	8,600	1,006
1996	760,526	726,280	595,377	466,702	410,632	333,433	250,939	163,230	116,388	88,810	71,938	61,442	54,852	50,218	46,021	40,971	38,372	35,639	33,290	30,971	28,504	26,347	24,409	22,587	20,844	18,778	17,532	16,631	15,368	13,310	1,596
1997	752,232	660,689	514,293	449,660	353,163	263,342	171,722	122,296	92,780	74,852	63,677	56,819	52,382	48,765	45,430	41,196	38,227	35,806	33,387	30,922	28,348	26,252	24,367	22,628	20,686	19,344	18,456	17,077	15,532	13,561	1,781
1998	996,905	899,553	829,749	703,904	543,407	331,097	226,475	167,242	134,173	114,188	101,664	92,406	85,118	78,791	72,468	63,340	58,434	53,983	49,521	45,356	41,504	38,473	35,539	32,414	30,188	28,480	26,203	23,774	21,258	18,598	2,738
1999	1,130,856	1,083,595	926,579	710,183	438,106	300,540	220,360	176,323	149,971	133,414	121,108	111,553	102,966	94,778	84,695	74,478	68,473	62,706	57,414	52,800	48,587	44,911	41,138	38,302	36,396	33,373	30,242	27,328	24,747	21,498	2,325
2000	807,096	604,185	399,392	240,118	161,397	115,729	90,094	74,814	65,766	59,810	55,124	51,480	47,995	43,990	40,661	36,996	33,972	31,391	29,059	27,135	25,199	23,265	21,923	21,054	19,763	18,280	16,858	15,509	14,170	12,393	1,570
2001	1,068,237	854,847	488,931	322,306	229,199	179,673	151,030	133,022	118,740	108,099	99,450	91,307	81,563	74,546	67,880	60,325	54,926	50,707	47,193	43,901	39,894	37,401	35,719	33,241	30,837	28,354	26,161	24,023	21,865	19,443	3,028
2002	1,118,499	734,759	517,430	376,806	299,441	251,931	222,327	197,175	178,425	163,245	148,156	129,670	117,314	105,921	94,707	81,816	74,624	68,911	63,829	57,743	53,552	50,660	47,226	43,811	40,645	37,638	34,942	32,292	29,662	25,988	3,834
2003	958,008	744,224	574,567	471,578	406,646	365,744	329,661	299,977	274,351	245,776	207,649	185,623	165,754	146,934	128,881	109,674	100,663	91,964	81,813	75,419	69,198	64,319	59,935	56,090	52,531	48,582	45,541	42,516	39,263	34,857	57
2004	892,354	689,515	572,383	492,534	442,971	399,661	364,199	334,565	300,557	254,086	226,786	203,098	181,078	161,013	141,670	125,073	114,621	102,258	95,122	89,697	81,572	76,393	71,608	67,451	63,434	58,704	54,999	51,350	47,284	35,146	128
2005	478,326	410,348	362,569	327,521	296,128	269,626	247,380	221,053	184,438	163,672	145,305	129,098	115,116	104,035	94,138	83,505	74,429	70,024	66,958	63,159	58,151	55,197	52,714	50,249	47,860	44,640	42,383	39,766	36,852	31,029	96
2006	399,863	363,265	325,584	279,768	247,189	222,400	193,798	155,998	135,237	117,873	103,141	91,157	82,101	75,051	68,159	59,294	55,906	53,745	50,976	48,224	45,288	43,191	41,356	39,483	37,621	35,477	33,345	30,927	28,428	22,986	122
2007	402,327	353,776	294,036	256,706	230,645	200,109	157,992	134,006	115,591	100,080	87,225	78,192	71,361	65,271	58,014	53,768	51,492	48,778	46,127	43,824	41,549	39,758	37,944	36,184	34,439	32,325	30,149	27,778	25,359	21,441	141
2008	1,031,571	815,165	702,790	626,628	530,957	399,748	330,934	281,768	240,796	207,947	184,975	167,602	151,992	133,575	123,901	114,967	108,181	102,214	97,049	92,373	87,690	83,767	79,977	76,124	72,050	67,340	62,606	57,522	52,393	45,087	363
2009	1,831,298	1,587,216	1,458,989	1,240,663	951,625	817,645	684,778	568,241	478,793	419,795	375,771	330,037	276,191	249,576	232,391	211,010	198,407	188,122	179,272	171,358	162,635	155,217	147,835	140,126	132,084	122,998	114,454	105,590	97,091	84,230	525
2010	1,666,894	1,571,290	1,426,641	1,200,042	1,066,997	890,852	737,620	619,013	539,291	479,515	412,603	337,231	300,753	279,368	254,880	231,243	218,805	208,991	200,037	191,481	182,539	174,545	166,149	157,146	148,014	138,061	128,474	118,795	109,328	93,767	673
2011	1,196,661	1,104,923	949,274	847,019	710,219	590,840	497,996	435,228	387,022	332,506	269,257	237,698	219,771	202,277	186,869	170,796	163,497	157,359	151,668	145,933	139,792	133,993	127,879	121,713	115,438	108,625	102,256	95,717	89,174	76,180	520
2012	1,184,497	1,080,330	984,468	841,421	714,690	609,850	536,237	479,627	416,134	339,159	299,864	279,110	259,841	244,486	229,419	212,517	206,188	200,332	194,758	189,053	182,324	176,043	169,481	162,736	156,112	148,585	141,646	134,579	127,572	115,883	622
2013	1,344,837	1,266,507	1,115,431	971,347	844,611	746,603	669,577	584,434	476,934	427,914	400,962	378,036	360,082	344,459	329,215	313,082	304,586	296,606	288,878	280,674	268,233	259,448	250,663	241,792	232,840	220,395	211,269	202,364	193,481	172,926	614
2014	786,347	607,598	501,657	420,300	362,985	317,684	268,671	212,268	186,706	172,486	159,944	150,549	142,981	136,586	130,501	123,603	119,719	116,188	112,550	108,593	103,714	99,805	95,795	91,719	87,581	82,340	78,374	74,078	70,074	61,713	544
2015	1,116,220	932,963	794,078	687,009	597,819	485,815	362,698	316,559	295,092	275,080	258,392	244,871	233,808	224,417	215,317	205,614	199,314	192,996	186,549	179,870	172,117	165,698	159,178	152,475	145,711	137,690	130,868	124,029	117,000	105,631	925
2016	1,258,036	1,103,020	985,878	867,795	704,118	514,287	443,067	411,235	383,429	360,491	340,476	323,831	309,886	297,216	285,260	272,921	263,386	254,172	245,022	235,639	224,790	215,868	207,072	197,463	188,550	177,975	168,791	159,357	149,524	131,987	1,289
2017	1,246,425	1,123,615	1,001,699	796,603	573,148	485,408	444,992	410,656	384,126	361,873	342,528	326,035	311,125	297,676	284,842	270,859	260,032	249,811	240,125	230,305	219,003	209,951	200,580	190,945	181,953	171,802	162,589	152,704	142,309	121,579	950
2018	1,014,596	880,333	675,698	475,018	386,416	344,693	309,704	284,146	264,109	247,256	232,686	219,817	208,356	198,032	187,692	177,146	168,607	161,044	153,954	146,944	139,269	132,842	126,113	119,761	113,635	106,651	100,112	93,315	86,436	74,036	418
2019	990,423	708,316	483,932	378,599	332,793	294,703	266,682	245,531	228,774	214,583	201,461	189,808	179,246	169,178	159,480	149,871	142,018	135,150	128,643	122,477	116,014	110,400	104,840	99,357	93,955	88,162	82,498	76,739	70,738	62,221	845
2020	1,333,144	939,264	806,814	742,814	683,973	635,963	596,590	564,418	536,934	511,834	487,939	466,291	445,836	426,117	407,474	389,811	374,519	360,804	347,741	334,736	320,312	308,036	295,953	283,764	271,368	256,980	243,713	229,173	214,923	192,821	3,326
2021	1,399,646	1,240,744	1,162,640	1,085,955	1,019,128	959,447	909,875	868,820	831,574	796,272	762,972	731,522	701,960	674,243	648,601	624,242	603,117	583,993	565,287	547,001	525,569	507,795	489,688	471,347	451,169	426,287	404,269	382,001	359,152	322,811	0

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Claim Rate
All Products Combined

Table 2: Number of Claims in Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	55	1,981	7,634	10,686	9,887	7,306	5,217	4,493	3,391	2,442	1,728	1,021	738	607	441	294	216	168	157	126	146	142	100	114	71	62	81	53	44	33
1991	42	1,593	6,098	7,633	6,675	5,196	4,705	3,733	2,657	1,921	1,102	784	563	439	303	203	126	139	114	131	136	120	116	73	84	104	58	42	39	19
1992	21	1,104	3,891	5,061	5,155	5,406	4,679	3,534	2,404	1,451	995	695	497	290	211	141	146	127	121	139	115	126	87	102	106	74	54	37	15	3
1993	40	1,456	5,019	7,266	9,290	8,394	6,510	4,442	2,525	1,758	1,314	876	529	337	242	203	207	243	245	190	239	173	212	221	162	91	64	37	9	21
1994	65	2,211	7,194	11,526	12,338	10,101	6,795	4,026	2,896	2,121	1,395	868	542	390	308	321	440	346	310	392	306	263	295	193	146	93	49	15	28	46
1995	36	1,216	5,525	8,839	8,282	5,818	3,711	2,580	2,322	1,528	873	560	394	324	324	357	314	248	277	210	235	261	181	135	91	40	16	26	40	39
1996	23	2,000	9,076	13,023	10,470	7,142	5,192	4,528	2,908	1,721	1,077	724	634	580	668	547	522	512	394	449	487	333	226	164	93	18	33	65	67	49
1997	37	2,325	9,105	11,128	8,621	7,078	5,976	3,840	2,369	1,452	982	847	724	820	687	608	669	518	531	571	408	278	196	126	27	49	74	70	70	54
1998	44	2,711	9,300	10,191	9,633	9,208	6,207	3,966	2,452	1,696	1,392	1,307	1,433	1,237	1,162	1,210	944	939	993	619	415	264	181	63	64	113	130	138	100	77
1999	45	2,937	9,879	13,609	15,407	10,914	6,766	3,983	2,662	2,196	2,000	2,131	2,006	1,743	1,846	1,337	1,309	1,321	870	657	389	250	69	84	153	194	164	163	120	99
2000	56	2,989	11,611	16,317	11,781	6,899	4,020	2,725	2,256	1,819	1,879	1,555	1,328	1,386	1,020	1,000	970	699	523	314	207	63	69	99	120	106	104	82	63	63
2001	18	3,500	14,759	16,551	11,509	7,098	4,720	3,849	3,272	3,539	3,108	2,617	2,663	1,915	1,858	1,704	1,170	733	504	312	99	81	133	162	142	114	113	113	79	67
2002	47	4,138	14,265	13,843	9,669	6,876	5,646	5,070	5,440	4,601	4,208	4,345	3,033	2,789	2,630	1,686	1,095	787	393	118	121	235	208	176	159	140	133	114	89	91
2003	44	4,751	10,542	9,280	7,421	6,949	6,662	7,887	6,629	6,601	7,104	5,058	4,012	3,494	2,184	1,359	842	465	120	181	288	255	197	175	178	163	145	124	129	119
2004	629	6,568	10,320	10,666	10,905	10,453	11,563	9,391	9,717	10,274	7,275	5,984	5,093	3,161	1,972	1,253	739	197	293	447	414	335	236	243	234	170	188	143	176	164
2005	238	3,186	7,538	9,242	10,021	10,830	8,956	8,930	9,504	6,818	5,583	4,651	3,012	1,831	1,203	675	191	288	381	352	305	213	163	145	161	152	142	142	155	138
2006	106	2,925	8,225	11,414	13,261	10,361	10,216	11,070	7,698	6,180	5,166	3,333	2,231	1,379	838	264	278	373	339	305	216	163	139	144	133	119	142	156	136	129
2007	105	3,628	11,302	15,622	11,700	12,909	16,328	10,385	7,730	6,614	4,432	2,751	1,879	1,087	350	354	533	461	462	276	184	166	169	161	157	152	173	181	167	147
2008	178	7,709	26,632	26,457	31,699	43,430	27,798	19,578	16,353	10,608	6,510	4,536	2,654	826	830	1,260	1,132	817	587	516	374	306	307	299	311	332	336	347	295	245
2009	310	9,271	20,765	30,939	47,607	35,605	26,234	21,700	14,532	9,268	6,118	3,655	1,144	1,207	1,837	1,594	1,085	855	682	491	434	323	273	271	264	279	241	275	242	212
2010	166	3,598	11,187	21,419	20,796	18,003	14,780	10,563	7,194	4,986	2,808	832	1,223	1,810	1,500	1,043	807	570	452	370	310	260	246	248	246	231	248	204	186	181
2011	118	2,317	6,993	8,225	8,118	7,373	5,873	3,998	2,777	1,614	475	1,180	1,527	1,270	983	750	569	411	336	287	257	237	219	221	231	214	209	175	140	136
2012	83	1,647	3,860	5,086	5,905	4,941	3,652	2,725	1,548	429	1,263	1,863	1,733	1,066	744	593	459	348	317	251	215	205	172	190	189	182	158	152	145	131
2013	97	1,472	3,799	5,566	5,815	4,619	3,524	2,122	636	1,941	2,901	2,332	1,720	1,276	1,093	890	750	657	531	474	404	331	333	305	323	246	243	235	212	203
2014	18	801	2,582	3,965	3,484	2,950	1,788	590	1,374	1,641	1,399	1,092	856	675	578	490	425	294	300	290	252	196	185	183	154	160	150	127	129	126
2015	18	728	3,090	4,110	4,203	2,800	889	2,061	3,022	2,576	2,090	1,628	1,265	1,005	832	775	564	504	451	422	326	274	253	219	228	231	216	164	152	179
2016	18	904	3,242	4,698	3,625	1,223	3,414	5,645	5,302	3,537	2,465	1,818	1,560	1,243	1,030	870	793	682	589	525	429	386	335	297	263	290	254	221	201	211
2017	25	934	3,598	3,978	1,397	4,011	6,780	6,779	5,413	4,331	3,490	2,955	2,396	1,905	1,768	1,569	1,440	1,168	1,038	816	706	600	519	524	491	459	444	400	344	304
2018	24	1,090	2,840	1,428	4,593	7,090	6,617	5,452	4,379	3,647	3,091	2,454	2,157	1,917	1,772	1,638	1,432	1,146	971	754	631	508	516	492	440	452	384	349	303	284
2019	30	634	761	4,701	7,291	7,086	5,826	4,099	3,384	2,780	2,423	2,172	1,808	1,624	1,603	1,425	1,136	930	787	644	520	419	371	372	328	320	284	287	243	196
2020	10	112	5,235	8,176	7,781	5,877	4,540	3,726	3,277	2,905	2,498	2,120	2,117	1,905	1,827	1,565	1,265	957	912	738	568	482	421	363	329	335	299	277	228	207
2021	1	2,668	6,900	6,491	5,626	4,960	4,320	3,802	3,314	3,010	2,751	2,598	2,429	2,260	2,032	1,756	1,492	1,198	973	746	652	489	460	357	410	323	351	291	242	216

Table 3: Conditional Claim Rate = Table 2 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Claim During the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.01%	0.28%	1.23%	2.50%	3.39%	2.82%	2.37%	2.34%	2.17%	1.99%	1.61%	1.11%	1.00%	1.07%	0.97%	0.80%	0.73%	0.62%	0.63%	0.54%	0.67%	0.70%	0.52%	0.63%	0.42%	0.39%	0.55%	0.39%	0.36%	0.35%
1991	0.01%	0.27%	1.36%	2.42%	2.35%	2.14%	2.22%	2.20%	2.02%	1.67%	1.14%	1.04%	1.01%	1.00%	0.84%	0.73%	0.50%	0.60%	0.53%	0.65%	0.73%	0.68%	0.70%	0.46%	0.57%	0.77%	0.46%	0.36%	0.38%	0.23%
1992	0.00%	0.20%	0.83%	1.17%	1.36%	1.61%	1.73%	1.70%	1.32%	0.96%	0.87%	0.90%	0.85%	0.62%	0.54%	0.45%	0.51%	0.48%	0.49%	0.60%	0.54%	0.63%	0.47%	0.59%	0.67%	0.51%	0.41%	0.32%	0.15%	0.04%
1993	0.00%	0.16%	0.60%	0.95%	1.35%	1.44%	1.38%	1.07%	0.73%	0.67%	0.79%	0.72%	0.55%	0.43%	0.36%	0.40%	0.44%	0.56%	0.61%	0.51%	0.71%	0.56%	0.74%	0.84%	0.68%	0.43%	0.34%	0.22%	0.06%	0.17%
1994	0.01%	0.21%	0.74%	1.31%	1.64%	1.63%	1.24%	0.87%	0.80%	0.89%	0.79%	0.63%	0.47%	0.40%	0.37%	0.48%	0.71%	0.60%	0.58%	0.81%	0.69%	0.64%	0.79%	0.56%	0.47%	0.34%	0.20%	0.07%	0.14%	0.28%
1995	0.01%	0.26%	1.33%	2.70%	3.23%	2.59%	2.03%	1.86%	2.49%	2.26%	1.67%	1.31%	1.08%	0.99%	1.09%	1.35%	1.27%	1.07%	1.27%	1.03%	1.24%	1.49%	1.12%	0.90%	0.66%	0.32%	0.14%	0.25%	0.41%	0.45%
1996	0.00%	0.28%	1.52%	2.79%	2.55%	2.14%	2.07%	2.77%	2.50%	1.94%	1.50%	1.18%	1.16%	1.15%	1.45%	1.34%	1.36%	1.44%	1.18%	1.45%	1.71%	1.26%	0.93%	0.73%	0.45%	0.10%	0.19%	0.39%	0.44%	0.37%
1997	0.00%	0.35%	1.77%	2.47%	2.44%	2.69%	3.48%	3.14%	2.55%	1.94%	1.54%	1.49%	1.38%	1.68%	1.51%	1.48%	1.75%	1.45%	1.59%	1.85%	1.44%	1.06%	0.80%	0.56%	0.13%	0.25%	0.40%	0.41%	0.45%	0.40%
1998	0.00%	0.30%	1.12%	1.45%	1.77%	2.78%	2.74%	2.37%	1.83%	1.49%	1.37%	1.41%	1.68%	1.57%	1.60%	1.91%	1.62%	1.74%	2.01%	1.36%	1.00%	0.69%	0.51%	0.19%	0.21%	0.40%	0.50%	0.58%	0.47%	0.41%
1999	0.00%	0.27%	1.07%	1.92%	3.52%	3.63%	3.07%	2.26%	1.78%	1.65%	1.65%	1.91%	1.95%	1.84%	2.18%	1.80%	1.91%	2.11%	1.52%	1.24%	0.80%	0.56%	0.17%	0.22%	0.42%	0.58%	0.54%	0.60%	0.48%	0.46%
2000	0.01%	0.49%	2.91%	6.80%	7.30%	5.96%	4.46%	3.64%	3.43%	3.04%	3.41%	3.02%	2.77%	3.15%	2.51%	2.70%	2.86%	2.23%	1.80%	1.16%	0.82%	0.27%	0.31%	0.47%	0.61%	0.58%	0.62%	0.53%	0.44%	0.51%
2001	0.00%	0.41%	3.02%	5.14%	5.02%	3.95%	3.13%	2.89%	2.76%	3.27%	3.13%	2.87%	3.26%	2.57%	2.74%	2.82%	2.13%	1.45%	1.07%	0.71%	0.25%	0.22%	0.37%	0.49%	0.46%	0.40%	0.43%	0.47%	0.36%	0.34%
2002	0.00%	0.56%	2.76%	3.67%	3.23%	2.73%	2.54%	2.57%	3.05%	2.82%	2.84%	3.35%	2.59%	2.63%	2.78%	2.06%	1.47%	1.14%	0.62%	0.20%	0.23%	0.46%	0.44%	0.40%	0.39%	0.37%	0.38%	0.35%	0.30%	0.35%
2003	0.00%	0.64%	1.83%	1.97%	1.82%	1.90%	2.02%	2.63%	2.42%	2.69%	3.42%	2.72%	2.42%	2.38%	1.69%	1.24%	0.84%	0.51%	0.15%	0.24%	0.42%	0.40%	0.33%	0.31%	0.34%	0.34%	0.32%	0.29%	0.33%	0.34%
2004	0.07%	0.95%	1.80%	2.17%	2.46%	2.62%	3.17%	2.81%	3.23%	4.04%	3.21%	2.95%	2.81%	1.96%	1.39%	1.00%	0.64%	0.19%	0.31%	0.50%	0.51%	0.44%	0.33%	0.36%	0.37%	0.29%	0.34%	0.28%	0.37%	0.47%
2005	0.05%	0.78%	2.08%	2.82%	3.38%	4.02%	3.62%	4.04%	5.15%	4.17%	3.84%	3.60%	2.62%	1.76%	1.28%	0.81%	0.26%	0.41%	0.57%	0.56%	0.52%	0.39%	0.31%	0.29%	0.34%	0.34%	0.34%	0.36%	0.42%	0.44%
2006	0.03%	0.81%	2.53%	4.08%	5.36%	4.66%	5.27%	7.10%	5.69%	5.24%	5.01%	3.66%	2.72%	1.84%	1.23%	0.45%	0.50%	0.69%	0.67%	0.63%	0.48%	0.38%	0.34%	0.36%	0.35%	0.34%	0.43%	0.50%	0.48%	0.56%
2007	0.03%	1.03%	3.84%	6.09%	5.07%	6.45%	10.33%	7.75%	6.69%	6.61%	5.08%	3.52%	2.63%	1.67%	0.60%	0.66%	1.04%	0.95%	1.00%	0.63%	0.44%	0.42%	0.45%	0.44%	0.46%	0.47%	0.57%	0.65%	0.66%	0.69%
2008	0.02%	0.95%	3.79%	4.22%	5.97%	10.86%	8.40%	6.95%	6.79%	5.10%	3.52%	2.71%	1.75%	0.62%	0.67%	1.10%	1.05%	0.80%	0.60%	0.56%	0.43%	0.37%	0.38%	0.39%	0.43%	0.49%	0.54%	0.60%	0.56%	0.54%
2009	0.02%	0.58%	1.42%	2.49%	5.00%	4.35%	3.83%	3.82%	3.04%	2.21%	1.63%	1.11%	0.41%	0.48%	0.79%	0.76%	0.55%	0.45%	0.38%	0.29%	0.27%	0.21%	0.18%	0.19%	0.20%	0.23%	0.21%	0.26%	0.25%	0.25%
2010	0.01%	0.23%	0.78%	1.78%	1.95%	2.02%	2.00%	1.71%	1.33%	1.04%	0.68%	0.25%	0.41%	0.65%	0.59%	0.45%	0.37%	0.27%	0.23%	0.19%	0.17%	0.15%	0.15%	0.16%	0.17%	0.17%	0.19%	0.17%	0.17%	0.19%
2011	0.01%	0.21%	0.74%	0.97%	1.14%	1.25%	1.18%	0.92%	0.72%	0.49%	0.18%	0.50%	0.69%	0.63%	0.53%	0.44%	0.35%	0.26%	0.22%	0.20%	0.18%	0.18%	0.17%	0.18%	0.20%	0.20%	0.20%	0.18%	0.16%	0.18%
2012	0.01%	0.15%	0.39%	0.60%	0.83%	0.81%	0.68%	0.57%	0.37%	0.13%	0.42%	0.67%	0.67%	0.44%	0.32%	0.28%	0.22%	0.17%	0.16%	0.13%	0.12%	0.12%	0.10%	0.12%	0.12%	0.12%	0.11%	0.11%	0.11%	0.11%
2013	0.01%	0.12%	0.34%	0.57%	0.69%	0.62%	0.53%	0.36%	0.13%	0.45%	0.72%	0.62%	0.48%	0.37%	0.33%	0.28%	0.25%	0.22%	0.18%	0.17%	0.15%	0.13%	0.13%	0.13%	0.14%	0.11%	0.12%	0.12%	0.11%	0.12%
2014	0.00%	0.13%	0.51%	0.94%	0.96%	0.93%	0.67%	0.28%	0.74%	0.95%	0.87%	0.73%	0.60%	0.49%	0.44%	0.40%	0.35%	0.25%	0.27%	0.27%	0.24%	0.20%	0.19%	0.20%	0.18%	0.19%	0.19%	0.17%	0.18%	0.20%
2015	0.00%	0.08%	0.39%	0.60%	0.70%	0.58%	0.25%	0.65%	1.02%	0.94%	0.81%	0.66%	0.54%	0.45%	0.39%	0.38%	0.28%	0.26%	0.24%	0.23%	0.19%	0.17%	0.16%	0.14%	0.16%	0.17%	0.17%	0.13%	0.13%	0.17%
2016	0.00%	0.08%	0.33%	0.54%	0.51%	0.24%	0.77%	1.37%	1.38%	0.98%	0.72%	0.56%	0.50%	0.42%	0.36%	0.32%	0.30%	0.27%	0.24%	0.22%	0.19%	0.18%	0.16%	0.15%	0.14%	0.16%	0.15%	0.14%	0.13%	0.16%
2017	0.00%	0.08%	0.36%	0.50%	0.24%	0.83%	1.52%	1.65%	1.41%	1.20%	1.02%	0.91%	0.77%	0.64%	0.62%	0.58%	0.55%	0.47%	0.43%	0.35%	0.32%	0.29%	0.26%	0.27%	0.27%	0.27%	0.27%	0.26%	0.24%	0.25%
2018	0.00%	0.12%	0.42%	0.30%	1.19%	2.06%	2.14%	1.92%	1.66%	1.47%	1.33%	1.12%	1.04%	0.97%	0.94%	0.92%	0.85%	0.71%	0.63%	0.51%	0.45%	0.38%	0.41%	0.41%	0.39%	0.42%	0.38%	0.37%	0.35%	0.38%
2019	0.00%	0.09%	0.16%	1.24%	2.19%	2.40%	2.18%	1.67%	1.48%	1.30%	1.20%	1.14%	1.01%	0.96%	1.01%	0.95%	0.80%	0.69%	0.61%	0.53%	0.45%	0.38%	0.35%	0.37%	0.35%	0.36%	0.34%	0.37%	0.34%	0.32%
2020	0.00%	0.01%	0.65%	1.10%	1.14%	0.92%	0.76%	0.66%	0.61%	0.57%	0.51%	0.45%	0.47%	0.45%	0.45%	0.40%	0.34%	0.27%	0.26%	0.22%	0.18%	0.16%	0.14%	0.13%	0.12%	0.13%	0.12%	0.12%	0.11%	0.11%
2021	0.00%	0.22%	0.59%	0.60%	0.55%	0.52%	0.47%	0.44%	0.40%	0.38%	0.36%	0.36%	0.35%	0.34%	0.31%	0.28%	0.25%	0.21%	0.17%	0.14%	0.12%	0.10%	0.09%	0.08%	0.09%	0.08%	0.09%	0.08%	0.07%	0.07%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Claim Rate
All Products Combined

Table 4: Cumulative Number of Claims as of Each Evaluation Year
Total Number of Claims for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	55	2,036	9,670	20,356	30,243	37,549	42,766	47,259	50,650	53,092	54,820	55,841	56,579	57,186	57,627	57,921	58,137	58,305	58,462	58,588	58,734	58,876	58,976	59,090	59,161	59,223	59,304	59,357	59,401	59,434
1991	42	1,635	7,733	15,366	22,041	27,237	31,942	35,675	38,332	40,253	41,355	42,139	42,702	43,141	43,444	43,647	43,773	43,912	44,026	44,157	44,293	44,413	44,529	44,602	44,686	44,790	44,848	44,890	44,929	44,948
1992	21	1,125	5,016	10,077	15,232	20,638	25,317	28,851	31,255	32,706	33,701	34,396	34,893	35,183	35,394	35,535	35,681	35,808	35,929	36,068	36,183	36,309	36,396	36,498	36,604	36,678	36,732	36,769	36,784	36,787
1993	40	1,496	6,515	13,781	23,071	31,465	37,975	42,417	44,942	46,700	48,014	48,890	49,419	49,756	49,998	50,201	50,408	50,651	50,896	51,086	51,325	51,498	51,710	51,931	52,093	52,184	52,248	52,285	52,294	52,315
1994	65	2,276	9,470	20,996	33,334	43,435	50,230	54,256	57,152	59,273	60,668	61,536	62,078	62,468	62,776	63,097	63,537	63,883	64,193	64,585	64,891	65,154	65,449	65,642	65,788	65,881	65,930	65,945	65,973	66,019
1995	36	1,252	6,777	15,616	23,898	29,716	33,427	36,007	38,329	39,857	40,730	41,290	41,684	42,008	42,332	42,689	43,003	43,251	43,528	43,738	43,973	44,234	44,415	44,550	44,641	44,681	44,697	44,723	44,763	44,802
1996	23	2,023	11,099	24,122	34,592	41,734	46,926	51,454	54,362	56,083	57,160	57,884	58,518	59,098	59,766	60,313	60,835	61,347	61,741	62,190	62,677	63,010	63,236	63,400	63,493	63,511	63,544	63,609	63,676	63,725
1997	37	2,362	11,467	22,595	31,216	38,294	44,270	48,110	50,479	51,931	52,913	53,760	54,484	55,304	55,991	56,599	57,268	57,786	58,317	58,888	59,296	59,574	59,770	59,896	59,923	59,972	60,046	60,116	60,186	60,240
1998	44	2,755	12,055	22,246	31,879	41,087	47,294	51,260	53,712	55,408	56,800	58,107	59,540	60,777	61,939	63,149	64,093	65,032	66,025	66,644	67,059	67,323	67,504	67,567	67,631	67,744	67,874	68,012	68,112	68,189
1999	45	2,982	12,861	26,470	41,877	52,791	59,557	63,540	66,202	68,398	70,398	72,529	74,535	76,278	78,124	79,461	80,770	82,091	82,961	83,618	84,007	84,257	84,326	84,410	84,563	84,757	84,921	85,084	85,204	85,303
2000	56	3,045	14,656	30,973	42,754	49,653	53,673	56,398	58,654	60,473	62,352	63,907	65,235	66,621	67,641	68,641	69,611	70,310	70,833	71,147	71,354	71,417	71,486	71,585	71,705	71,811	71,915	71,997	72,060	72,123
2001	18	3,518	18,277	34,828	46,337	53,435	58,155	62,004	65,276	68,815	71,923	74,540	77,203	79,118	80,976	82,680	83,850	84,583	85,087	85,399	85,498	85,579	85,712	85,874	86,016	86,130	86,243	86,356	86,435	86,502
2002	47	4,185	18,450	32,293	41,962	48,838	54,484	59,554	64,994	69,595	73,803	78,148	81,181	83,970	86,600	88,286	89,381	90,168	90,561	90,679	90,800	91,035	91,243	91,419	91,578	91,718	91,851	91,965	92,054	92,145
2003	44	4,795	15,337	24,617	32,038	38,987	45,649	53,536	60,165	66,766	73,870	78,928	82,940	86,434	88,618	89,977	90,819	91,284	91,404	91,585	91,873	92,128	92,325	92,500	92,678	92,841	92,986	93,110	93,239	93,358
2004	629	7,197	17,517	28,183	39,088	49,541	61,104	70,495	80,212	90,486	97,761	103,745	108,838	111,999	113,971	115,224	115,963	116,160	116,453	116,900	117,314	117,649	117,885	118,128	118,362	118,532	118,720	118,863	119,039	119,203
2005	238	3,424	10,962	20,204	30,225	41,055	50,011	58,941	68,445	75,263	80,846	85,497	88,509	90,340	91,543	92,218	92,409	92,697	93,078	93,430	93,735	93,948	94,111	94,256	94,417	94,569	94,711	94,853	95,008	95,146
2006	106	3,031	11,256	22,670	35,931	46,292	56,508	67,578	75,276	81,456	86,622	89,955	92,186	93,565	94,403	94,667	94,945	95,318	95,657	95,962	96,178	96,341	96,480	96,624	96,757	96,876	97,018	97,174	97,310	97,439
2007	105	3,733	15,035	30,657	42,357	55,266	71,594	81,979	89,709	96,323	100,755	103,506	105,385	106,472	106,822	107,176	107,709	108,170	108,632	108,908	109,092	109,258	109,427	109,588	109,745	109,897	110,070	110,251	110,418	110,565
2008	178	7,887	34,519	60,976	92,675	136,105	163,903	183,481	199,834	210,442	216,952	221,488	224,142	224,968	225,798	227,058	228,190	229,007	229,594	230,110	230,484	230,790	231,097	231,396	231,707	232,039	232,375	232,722	233,017	233,262
2009	310	9,581	30,346	61,285	108,892	144,497	170,731	192,431	206,963	216,231	222,349	226,004	227,148	228,355	230,192	231,786	232,871	233,726	234,408	234,899	235,333	235,656	235,929	236,200	236,464	236,743	236,984	237,259	237,501	237,713
2010	166	3,764	14,951	36,370	57,166	75,169	89,949	100,512	107,706	112,692	115,500	116,332	117,555	119,365	120,865	121,908	122,715	123,285	123,737	124,107	124,417	124,677	124,923	125,171	125,417	125,648	125,896	126,100	126,286	126,467
2011	118	2,435	9,428	17,653	25,771	33,144	39,017	43,015	45,792	47,406	47,881	49,061	50,588	51,858	52,841	53,591	54,160	54,571	54,907	55,194	55,451	55,688	55,907	56,128	56,359	56,573	56,782	56,957	57,097	57,233
2012	83	1,730	5,590	10,676	16,581	21,522	25,174	27,899	29,447	29,876	31,139	33,002	34,735	35,801	36,545	37,138	37,597	37,945	38,262	38,513	38,728	38,933	39,105	39,295	39,484	39,666	39,824	39,976	40,121	40,252
2013	97	1,569	5,368	10,934	16,749	21,368	24,892	27,014	27,650	29,591	32,492	34,824	36,544	37,820	38,913	39,803	40,553	41,210	41,741	42,215	42,619	42,950	43,283	43,588	43,911	44,157	44,400	44,635	44,847	45,050
2014	18	819	3,401	7,366	10,850	13,800	15,588	16,178	17,552	19,193	20,592	21,684	22,540	23,215	23,793	24,283	24,708	25,002	25,302	25,592	25,844	26,040	26,225	26,408	26,562	26,722	26,872	26,999	27,128	27,254
2015	18	746	3,836	7,946	12,149	14,949	15,838	17,899	20,921	23,497	25,587	27,215	28,480	29,485	30,317	31,092	31,656	32,160	32,611	33,033	33,359	33,633	33,886	34,105	34,333	34,564	34,780	34,944	35,096	35,275
2016	18	922	4,164	8,862	12,487	13,710	17,124	22,769	28,071	31,608	34,073	35,891	37,451	38,694	39,724	40,594	41,387	42,069	42,658	43,183	43,612	43,998	44,333	44,630	44,893	45,183	45,437	45,658	45,859	46,070
2017	25	959	4,557	8,535	9,932	13,943	20,723	27,502	32,915	37,246	40,736	43,691	46,087	47,992	49,760	51,329	52,769	53,937	54,975	55,791	56,497	57,097	57,616	58,140	58,631	59,090	59,534	59,934	60,278	60,582
2018	24	1,114	3,954	5,382	9,975	17,065	23,682	29,134	33,513	37,160	40,251	42,705	44,862	46,779	48,551	50,189	51,621	52,767	53,738	54,492	55,123	55,631	56,147	56,639	57,079	57,531	57,915	58,264	58,567	58,851
2019	30	664	1,425	6,126	13,417	20,503	26,329	30,428	33,812	36,592	39,015	41,187	42,995	44,619	46,222	47,647	48,783	49,713	50,500	51,144	51,664	52,083	52,454	52,826	53,154	53,474	53,758	54,045	54,288	54,484
2020	10	122	5,357	13,533	21,314	27,191	31,731	35,457	38,734	41,639	44,137	46,257	48,374	50,279	52,106	53,671	54,936	55,893	56,805	57,543	58,111	58,593	59,014	59,377	59,706	60,041	60,340	60,617	60,845	61,052
2021	1	2,669	9,569	16,060	21,686	26,646	30,966	34,768	38,082	41,092	43,843	46,441	48,870	51,130	53,162	54,918	56,410	57,608	58,581	59,327	59,979	60,468	60,928	61,285	61,695	62,018	62,369	62,660	62,902	63,118

Table 5: Cumulative Claim Rate = Table 4 / Table 1 (Evaluation Year 1)
Cumulative Claims as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.01%	0.28%	1.35%	2.83%	4.21%	5.22%	5.95%	6.58%	7.05%	7.39%	7.63%	7.77%	7.87%	7.96%	8.02%	8.06%	8.09%	8.11%	8.13%	8.15%	8.17%	8.19%	8.21%	8.22%	8.23%	8.24%	8.25%	8.26%	8.26%	8.27%
1991	0.01%	0.26%	1.24%	2.47%	3.54%	4.38%	5.13%	5.73%	6.16%	6.47%	6.65%	6.77%	6.86%	6.93%	6.98%	7.01%	7.04%	7.06%	7.08%	7.10%	7.12%	7.14%	7.16%	7.17%	7.18%	7.20%	7.21%	7.21%	7.22%	7.22%
1992	0.00%	0.18%	0.82%	1.65%	2.49%	3.37%	4.13%	4.71%	5.10%	5.34%	5.50%	5.62%	5.70%	5.74%	5.78%	5.80%	5.83%	5.85%	5.87%	5.89%	5.91%	5.93%	5.94%	5.96%	5.98%	5.99%	6.00%	6.00%	6.01%	6.01%
1993	0.00%	0.15%	0.67%	1.43%	2.39%	3.26%	3.93%	4.39%	4.65%	4.83%	4.97%	5.06%	5.12%	5.15%	5.18%	5.20%	5.22%	5.24%	5.27%	5.29%	5.31%	5.33%	5.35%	5.38%	5.39%	5.40%	5.41%	5.41%	5.41%	5.42%
1994	0.01%	0.21%	0.86%	1.90%	3.01%	3.92%	4.54%	4.90%	5.16%	5.35%	5.48%	5.56%	5.61%	5.64%	5.67%	5.70%	5.74%	5.77%	5.80%	5.83%	5.86%	5.89%	5.91%	5.93%	5.94%	5.95%	5.96%	5.96%	5.96%	5.96%
1995	0.01%	0.25%	1.34%	3.08%	4.72%	5.87%	6.60%	7.11%	7.57%	7.87%	8.04%	8.15%	8.23%	8.29%	8.36%	8.43%	8.49%	8.54%	8.59%	8.64%	8.68%	8.73%	8.77%	8.80%	8.81%	8.82%	8.82%	8.83%	8.84%	8.85%
1996	0.00%	0.27%	1.46%	3.17%	4.55%	5.49%	6.17%	6.77%	7.15%	7.37%	7.52%	7.61%	7.69%	7.77%	7.86%	7.93%	8.00%	8.07%	8.12%	8.18%	8.24%	8.29%	8.31%	8.34%	8.35%	8.35%	8.36%	8.36%	8.37%	8.38%
1997	0.00%	0.31%	1.52%	3.00%	4.15%	5.09%	5.89%	6.40%	6.71%	6.90%	7.03%	7.15%	7.24%	7.35%	7.44%	7.52%	7.61%	7.68%	7.75%	7.83%	7.88%	7.92%	7.95%	7.96%	7.97%	7.97%	7.98%	7.99%	8.00%	8.01%
1998	0.00%	0.28%	1.21%	2.23%	3.20%	4.12%	4.74%	5.14%	5.39%	5.56%	5.70%	5.83%	5.97%	6.10%	6.21%	6.33%	6.43%	6.52%	6.62%	6.69%	6.73%	6.75%	6.77%	6.78%	6.78%	6.80%	6.81%	6.82%	6.83%	6.84%
1999	0.00%	0.26%	1.14%	2.34%	3.70%	4.67%	5.27%	5.62%	5.85%	6.05%	6.23%	6.41%	6.59%	6.75%	6.91%	7.03%	7.14%	7.26%	7.34%	7.39%	7.43%	7.45%	7.46%	7.46%	7.48%	7.49%	7.51%	7.52%	7.53%	7.54%
2000	0.01%	0.38%	1.82%	3.84%	5.30%	6.15%	6.65%	6.99%	7.27%	7.49%	7.73%	7.92%	8.08%	8.25%	8.38%	8.50%	8.62%	8.71%	8.78%	8.82%	8.84%	8.85%	8.86%	8.87%	8.88%	8.90%	8.91%	8.92%	8.93%	8.94%
2001	0.00%	0.33%	1.71%	3.26%	4.34%	5.00%	5.44%	5.80%	6.11%	6.44%	6.73%	6.98%	7.23%	7.41%	7.58%	7.74%	7.85%	7.92%	7.97%	7.99%	8.00%	8.01%	8.02%	8.04%	8.05%	8.06%	8.07%	8.08%	8.09%	8.10%
2002	0.00%	0.37%	1.65%	2.89%	3.75%	4.37%	4.87%	5.32%	5.81%	6.22%	6.60%	6.99%	7.26%	7.51%	7.74%	7.89%	7.99%	8.06%	8.10%	8.11%	8.12%	8.14%	8.16%	8.17%	8.19%	8.20%	8.21%	8.22%	8.23%	8.24%
2003	0.00%	0.50%	1.60%	2.57%	3.34%	4.07%	4.76%	5.59%	6.28%	6.97%	7.71%	8.24%	8.66%	9.02%	9.25%	9.39%	9.48%	9.53%	9.54%	9.56%	9.59%	9.62%	9.64%	9.66%	9.67%	9.69%	9.71%	9.72%	9.73%	9.75%
2004	0.07%	0.81%	1.96%	3.16%	4.38%	5.55%	6.85%	7.90%	8.99%	10.14%	10.96%	11.63%	12.20%	12.55%	12.77%	12.91%	13.00%	13.02%	13.05%	13.10%	13.15%	13.18%	13.21%	13.24%	13.26%	13.28%	13.30%	13.32%	13.34%	13.36%
2005	0.05%	0.72%	2.29%	4.22%	6.32%	8.58%	10.46%	12.32%	14.31%	15.73%	16.90%	17.87%	18.50%	18.89%	19.14%	19.28%	19.32%	19.38%	19.46%	19.53%	19.60%	19.64%	19.68%	19.71%	19.74%	19.77%	19.80%	19.83%	19.86%	19.89%
2006	0.03%	0.76%	2.81%	5.67%	8.99%	11.58%	14.13%	16.90%	18.83%	20.37%	21.66%	22.50%	23.05%	23.40%	23.61%	23.67%	23.74%	23.84%	23.92%	24.00%	24.05%	24.09%	24.13%	24.16%	24.20%	24.23%	24.26%	24.30%	24.34%	24.37%
2007	0.03%	0.93%	3.74%	7.62%	10.53%	13.74%	17.79%	20.38%	22.30%	23.94%	25.04%	25.73%	26.19%	26.46%	26.55%	26.64%	26.77%	26.89%	27.00%	27.07%	27.12%	27.16%	27.20%	27.24%	27.28%	27.32%	27.36%	27.40%	27.44%	27.48%
2008	0.02%	0.76%	3.35%	5.91%	8.98%	13.19%	15.89%	17.79%	19.37%	20.40%	21.03%	21.47%	21.73%	21.81%	21.89%	22.01%	22.12%	22.20%	22.26%	22.31%	22.34%	22.37%	22.40%	22.43%	22.46%	22.49%	22.53%	22.56%	22.59%	22.61%
2009	0.02%	0.52%	1.66%	3.35%	5.95%	7.89%	9.32%	10.51%	11.30%	11.81%	12.14%	12.34%	12.40%	12.47%	12.57%	12.66%	12.72%	12.76%	12.80%	12.83%	12.85%	12.87%	12.88%	12.90%	12.91%	12.93%	12.94%	12.96%	12.97%	12.98%
2010	0.01%	0.23%	0.90%	2.18%	3.43%	4.51%	5.40%	6.03%	6.46%	6.76%	6.93%	6.98%	7.05%	7.16%	7.25%	7.31%	7.36%	7.40%	7.42%	7.45%	7.46%	7.48%	7.49%	7.51%	7.52%	7.54%	7.55%	7.56%	7.58%	7.59%
2011	0.01%	0.20%	0.79%	1.48%	2.15%	2.77%	3.26%	3.59%	3.83%	3.96%	4.00%	4.10%	4.23%	4.33%	4.42%	4.48%	4.53%	4.56%	4.59%	4.61%	4.63%	4.65%	4.67%	4.69%	4.71%	4.73%	4.75%	4.76%	4.77%	4.78%
2012	0.01%	0.15%	0.47%	0.90%	1.40%	1.82%	2.13%	2.36%	2.49%	2.52%	2.63%	2.79%	2.93%	3.02%	3.09%	3.14%	3.17%	3.20%	3.23%	3.25%	3.27%	3.29%	3.30%	3.32%	3.33%	3.35%	3.36%	3.37%	3.39%	3.40%
2013	0.01%	0.12%	0.40%	0.81%	1.25%	1.59%	1.85%	2.01%	2.06%	2.20%	2.42%	2.59%	2.72%	2.81%	2.89%	2.96%	3.02%	3.06%	3.10%	3.14%	3.17%	3.19%	3.22%	3.24%	3.27%	3.28%	3.30%	3.32%	3.33%	3.35%
2014	0.00%	0.10%	0.43%	0.94%	1.38%	1.75%	1.98%	2.06%	2.23%	2.44%	2.62%	2.76%	2.87%	2.95%	3.03%	3.09%	3.14%	3.18%	3.22%	3.25%	3.29%	3.31%	3.34%	3.36%	3.38%	3.40%	3.42%	3.43%	3.45%	3.47%
2015	0.00%	0.07%	0.34%	0.71%	1.09%	1.34%	1.42%	1.60%	1.87%	2.11%	2.29%	2.44%	2.55%	2.64%	2.72%	2.79%	2.84%	2.88%	2.92%	2.96%	2.99%	3.01%	3.04%	3.06%	3.08%	3.10%	3.12%	3.13%	3.14%	3.16%
2016	0.00%	0.07%	0.33%	0.70%	0.99%	1.09%	1.36%	1.81%	2.23%	2.51%	2.71%	2.85%	2.98%	3.08%	3.16%	3.23%	3.29%	3.34%	3.39%	3.43%	3.47%	3.50%	3.52%	3.55%	3.57%	3.59%	3.61%	3.63%	3.65%	3.66%
2017	0.00%	0.08%	0.37%	0.68%	0.80%	1.12%	1.66%	2.21%	2.64%	2.99%	3.27%	3.51%	3.70%	3.85%	3.99%	4.12%	4.23%	4.33%	4.41%	4.48%	4.53%	4.58%	4.62%	4.66%	4.70%	4.74%	4.78%	4.81%	4.84%	4.86%
2018	0.00%	0.11%	0.39%	0.53%	0.98%	1.68%	2.33%	2.87%	3.30%	3.66%	3.97%	4.21%	4.42%	4.61%	4.79%	4.95%	5.09%	5.20%	5.30%	5.37%	5.43%	5.48%	5.53%	5.58%	5.63%	5.67%	5.71%	5.74%	5.77%	5.80%
2019	0.00%	0.07%	0.14%	0.62%	1.35%	2.07%	2.66%	3.07%	3.41%	3.69%	3.94%	4.16%	4.34%	4.51%	4.67%	4.81%	4.93%	5.02%	5.10%	5.16%	5.22%	5.26%	5.30%	5.33%	5.37%	5.40%	5.43%	5.46%	5.48%	5.50%
2020	0.00%	0.01%	0.40%	1.02%	1.60%	2.04%	2.38%	2.66%	2.91%	3.12%	3.31%	3.47%	3.63%	3.77%	3.91%	4.03%	4.12%	4.19%	4.26%	4.32%	4.36%	4.40%	4.43%	4.45%	4.48%	4.50%	4.53%	4.55%	4.56%	4.58%
2021	0.00%	0.19%	0.68%	1.15%	1.55%	1.90%	2.21%	2.48%	2.72%	2.94%	3.13%	3.32%	3.49%	3.65%	3.80%	3.92%	4.03%	4.12%	4.19%	4.24%	4.29%	4.32%	4.35%	4.38%	4.41%	4.43%	4.46%	4.48%	4.49%	4.51%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Non-Claim Termination Rate
All Products Combined

Table 6: Number of Non-Claim Terminations in Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	2,405	14,565	69,434	184,790	125,943	25,228	33,727	23,399	32,677	30,726	13,481	14,506	17,473	16,339	10,757	6,566	6,803	2,583	1,747	1,581	1,111	1,180	953	962	1,065	998	963	1,011	1,340	1,945
1991	1,803	29,252	135,935	124,045	24,905	36,357	26,108	38,538	35,239	14,667	17,230	20,336	19,117	11,722	7,170	6,535	2,687	1,781	1,598	1,022	1,121	898	879	894	905	876	901	1,004	1,138	1,698
1992	3,503	49,474	85,399	31,094	48,465	38,117	61,086	58,450	23,395	30,070	35,849	35,527	18,803	10,976	7,880	4,942	2,783	1,961	1,596	1,393	1,258	1,307	1,259	1,213	1,286	1,254	1,289	1,383	1,556	2,256
1993	13,016	61,639	43,302	71,925	63,831	98,563	105,526	50,404	65,996	81,109	95,529	44,575	25,233	16,955	11,384	7,750	3,928	3,290	2,767	2,609	2,668	2,312	2,276	2,159	2,188	2,109	2,061	2,143	2,582	1,213
1994	10,915	35,073	81,417	75,491	119,827	122,390	62,489	82,936	98,281	120,537	60,985	35,753	23,473	15,756	12,593	6,839	4,322	3,846	3,663	3,913	3,226	2,974	3,073	3,015	3,025	2,704	2,636	3,135	1,724	1,144
1995	6,875	38,442	38,913	78,770	63,157	26,165	37,542	41,714	43,370	23,976	14,478	9,049	5,764	3,387	2,195	1,771	1,216	1,182	1,272	1,083	1,154	1,111	1,143	1,081	1,075	1,064	1,286	761	548	728
1996	3,846	28,377	121,828	115,652	45,600	70,057	77,302	83,181	43,934	25,853	15,722	9,764	5,947	4,034	3,417	2,664	1,986	2,217	1,953	1,860	1,836	1,815	1,711	1,656	1,640	1,955	1,206	832	1,166	1,354
1997	5,216	83,965	137,291	53,505	87,876	82,741	85,644	45,585	27,145	16,470	10,072	6,005	3,688	2,783	2,501	2,299	2,178	1,902	1,885	1,883	2,016	1,803	1,687	1,613	1,907	1,243	794	1,306	1,447	1,351
1998	14,111	80,486	60,504	115,654	150,864	203,102	98,414	55,265	30,615	18,275	11,064	7,940	5,848	5,078	5,046	5,765	3,677	3,512	3,468	3,536	3,129	2,729	2,753	3,058	2,154	1,430	2,098	2,287	2,320	2,026
1999	8,413	35,866	147,137	202,787	256,670	126,652	73,414	40,053	23,685	14,354	10,164	7,413	6,567	6,435	8,081	5,598	4,587	4,446	4,419	3,924	3,543	3,412	3,702	2,751	1,738	2,622	2,948	2,719	2,398	2,150
2000	5,056	194,810	193,182	142,957	66,940	38,769	21,614	12,555	6,791	4,132	2,784	2,083	2,157	2,616	2,231	2,105	2,011	1,882	1,809	1,598	1,584	1,849	1,273	769	1,164	1,341	1,309	1,262	1,246	1,091
2001	32,498	177,374	351,157	150,074	81,598	42,428	23,923	14,159	11,010	7,101	5,499	5,516	7,078	5,100	4,771	4,682	3,996	3,486	3,009	2,969	3,511	2,341	1,549	2,316	2,260	2,264	2,055	2,020	2,044	1,911
2002	35,874	343,681	203,064	126,781	67,696	40,634	23,958	20,080	13,309	10,575	10,740	14,109	9,318	8,601	8,481	8,093	5,652	4,924	4,687	5,933	3,387	2,488	3,222	3,236	2,994	2,682	2,479	2,522	2,484	2,372
2003	61,064	147,925	159,115	93,709	57,511	33,953	29,421	21,797	18,996	21,966	30,681	16,965	15,848	15,305	15,710	12,057	8,168	8,231	10,018	6,182	4,107	4,613	4,177	3,653	3,363	2,907	2,873	2,866	2,937	3,149
2004	45,770	149,872	106,811	69,183	38,657	32,857	23,899	20,241	24,290	36,036	19,667	17,697	16,911	16,880	15,290	10,744	9,711	12,161	6,833	4,498	5,359	4,810	4,534	3,899	3,541	3,473	3,483	3,412	3,670	3,756
2005	20,203	44,351	40,241	25,806	21,370	15,670	13,288	17,389	27,105	13,922	12,469	11,542	10,955	9,202	8,350	7,693	8,870	4,099	2,654	3,242	2,954	2,711	2,299	2,299	2,121	2,075	2,063	2,411	2,604	2,645
2006	6,313	27,254	29,456	34,402	19,317	14,428	18,386	26,730	13,063	11,167	9,424	8,650	6,820	5,669	5,832	7,395	3,109	1,786	2,426	2,368	2,210	1,928	1,689	1,724	1,667	1,714	1,967	2,211	2,333	2,265
2007	6,148	38,670	48,438	21,708	14,360	17,627	25,789	13,601	10,685	8,894	8,394	6,282	4,951	5,002	6,816	3,137	1,742	2,253	2,189	2,011	1,823	1,620	1,641	1,596	1,569	1,850	1,990	2,186	2,230	2,215
2008	22,138	186,381	85,743	49,705	63,972	87,779	41,016	29,588	24,619	22,237	16,399	12,836	12,955	17,590	8,744	5,413	5,638	5,150	4,578	4,137	3,780	3,611	3,479	3,547	3,748	4,165	4,389	4,728	4,818	4,918
2009	101,679	132,822	107,462	187,387	241,431	98,375	106,633	94,836	74,916	49,711	37,798	42,077	52,693	25,405	15,064	15,013	11,483	9,429	8,166	7,363	7,149	7,082	7,093	7,426	7,744	8,040	8,278	8,562	8,191	8,245
2010	23,715	68,125	133,462	205,180	112,249	158,141	138,452	108,043	72,528	54,770	63,956	74,536	35,250	19,567	22,413	16,455	11,602	9,244	8,502	8,071	7,820	7,717	8,138	8,733	8,820	9,053	9,319	9,459	9,210	8,929
2011	6,004	83,299	148,656	94,030	128,682	112,006	86,971	58,770	45,429	52,885	62,595	30,379	16,397	16,222	14,150	9,930	6,682	5,727	5,354	5,373	5,273	5,552	5,891	5,943	5,981	6,166	6,142	6,349	6,343	6,061
2012	10,273	92,164	92,002	137,961	120,826	99,899	69,961	53,885	61,944	76,535	37,831	18,888	17,523	14,284	14,031	9,649	5,852	5,508	5,256	5,409	5,803	6,058	6,363	6,513	6,380	6,455	6,726	6,850	6,792	6,808
2013	12,987	63,774	147,277	138,518	120,921	93,389	73,502	83,021	106,864	47,063	23,816	20,574	16,212	14,324	13,781	10,118	7,677	7,310	7,177	7,498	8,065	8,191	8,149	8,235	8,106	8,423	8,195	8,412	8,525	8,274
2014	12,279	165,651	103,359	77,392	53,830	42,351	47,225	55,813	24,188	12,571	11,032	8,285	6,696	5,698	5,290	4,293	3,433	3,225	3,324	3,508	3,620	3,645	3,728	3,604	3,652	3,727	3,757	4,129	3,832	3,908
2015	34,404	148,107	135,795	102,959	84,987	109,204	122,228	44,078	18,444	17,426	14,516	11,885	9,788	8,374	8,137	6,797	5,689	5,812	5,977	6,122	6,119	6,070	6,140	6,141	6,158	6,365	6,498	6,604	6,780	6,803
2016	35,508	118,586	113,900	113,385	160,052	188,608	67,806	26,187	22,502	19,390	17,479	14,821	12,378	11,420	10,817	9,245	8,711	8,531	8,549	8,737	8,371	8,445	8,240	8,423	8,282	8,527	8,772	9,038	9,158	9,115
2017	21,938	99,913	118,318	201,118	222,058	83,729	33,636	27,556	21,115	17,918	15,762	13,529	12,504	11,529	10,914	10,244	9,373	9,048	8,637	8,733	8,330	8,235	8,321	8,304	8,155	8,183	8,518	8,978	8,924	8,905
2018	14,501	118,648	201,795	199,252	84,009	34,633	28,372	20,106	15,658	13,200	11,426	10,409	9,293	8,399	8,444	7,819	7,090	6,415	6,102	6,093	5,851	5,764	6,026	5,726	5,577	5,972	6,054	6,308	6,416	6,294
2019	41,269	240,174	223,623	100,632	38,515	31,004	22,195	17,052	13,373	11,403	10,643	9,479	8,750	8,437	8,027	7,519	6,711	5,937	5,716	5,475	5,306	5,154	5,168	5,096	5,048	5,122	5,352	5,439	5,658	5,659
2020	56,050	337,708	127,215	55,824	51,060	42,133	34,833	28,446	24,206	22,192	21,356	19,524	18,327	17,797	16,773	15,579	14,019	12,754	12,143	12,131	11,903	11,654	11,521	11,567	11,674	11,534	11,837	12,383	12,174	12,013
2021	42,491	113,742	71,204	70,194	61,201	54,719	45,252	37,252	33,931	32,291	30,440	28,819	27,087	25,432	23,554	21,644	19,632	17,924	17,705	17,242	16,733	16,865	16,892	16,809	16,681	16,746	17,130	17,201	17,240	16,882

Table 7: Non-Claim Termination Rate = Table 6 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Termination by Other Than Claim During the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.33%	2.08%	11.15%	43.26%	43.22%	9.75%	15.34%	12.19%	20.96%	25.03%	12.54%	15.77%	23.68%	28.75%	23.65%	17.83%	22.93%	9.60%	6.99%	6.80%	5.11%	5.79%	4.93%	5.28%	6.25%	6.34%	6.56%	7.43%	11.07%	20.39%
1991	0.29%	4.96%	30.38%	39.28%	8.76%	14.98%	12.32%	22.72%	26.76%	12.74%	17.81%	26.89%	34.17%	26.77%	19.80%	23.41%	10.75%	7.72%	7.49%	5.07%	5.99%	5.08%	5.27%	5.69%	6.16%	6.45%	7.14%	8.69%	11.02%	20.80%
1992	0.57%	8.86%	18.21%	7.18%	12.78%	11.35%	22.62%	28.10%	12.84%	19.96%	31.50%	45.79%	32.26%	23.35%	20.28%	15.65%	9.79%	7.45%	6.49%	6.05%	5.87%	6.54%	6.76%	7.01%	8.09%	8.68%	9.84%	11.85%	15.44%	30.08%
1993	1.35%	6.93%	5.15%	9.43%	9.26%	16.93%	22.44%	12.13%	19.03%	30.72%	57.20%	36.68%	26.35%	21.61%	17.12%	15.09%	8.43%	7.64%	6.92%	7.02%	7.95%	7.44%	7.97%	8.25%	9.21%	9.94%	10.83%	12.73%	18.20%	9.96%
1994	0.99%	3.31%	8.39%	8.55%	15.96%	19.79%	11.38%	17.94%	27.22%	50.59%	34.75%	25.75%	20.46%	15.99%	15.09%	10.27%	7.02%	6.71%	6.88%	8.04%	7.31%	7.28%	8.20%	8.80%	9.78%	9.79%	10.60%	14.48%	8.70%	6.88%
1995	1.36%	8.36%	9.37%	24.02%	24.63%	11.66%	20.49%	30.03%	46.53%	35.42%	27.70%	21.22%	15.80%	10.35%	7.37%	6.72%	4.92%	5.08%	5.85%	5.31%	6.11%	6.34%	7.06%	7.22%	7.80%	8.44%	11.38%	7.24%	5.56%	8.47%
1996	0.51%	3.91%	20.46%	24.78%	11.10%	21.01%	30.81%	50.96%	37.75%	29.11%	21.85%	15.89%	10.84%	8.03%	7.42%	6.50%	5.18%	6.22%	5.87%	6.01%	6.44%	6.89%	7.01%	7.33%	7.87%	10.41%	6.88%	5.00%	7.59%	10.17%
1997	0.69%	12.71%	26.70%	11.90%	24.88%	31.42%	49.87%	37.27%	29.26%	22.00%	15.82%	10.57%	7.04%	5.71%	5.51%	5.58%	5.70%	5.31%	5.65%	6.09%	7.11%	6.87%	6.92%	7.13%	9.22%	6.43%	4.30%	7.65%	9.32%	9.96%
1998	1.42%	8.95%	7.29%	16.43%	27.76%	61.34%	43.45%	33.04%	22.82%	16.00%	10.88%	8.59%	6.87%	6.44%	6.96%	9.10%	6.29%	6.51%	7.00%	7.80%	7.54%	7.09%	7.75%	9.43%	7.14%	5.02%	8.01%	9.62%	10.91%	10.89%
1999	0.74%	3.31%	15.88%	28.55%	58.59%	42.14%	33.32%	22.72%	15.79%	10.76%	8.39%	6.65%	6.38%	6.79%	9.54%	7.52%	6.70%	7.09%	7.70%	7.43%	7.29%	7.60%	9.00%	7.18%	4.78%	7.86%	9.75%	9.95%	9.69%	10.00%
2000	0.63%	32.24%	48.37%	59.54%	41.48%	33.50%	23.99%	16.78%	10.33%	6.91%	5.05%	4.05%	4.49%	5.95%	5.49%	5.69%	5.92%	6.00%	6.23%	5.89%	6.29%	7.95%	5.81%	3.65%	5.89%	7.34%	7.76%	8.14%	8.79%	8.80%
2001	3.04%	20.75%	71.82%	46.56%	35.60%	23.61%	15.84%	10.64%	9.27%	6.57%	5.53%	6.04%	8.68%	6.84%	7.03%	7.76%	7.28%	6.87%	6.38%	6.76%	8.80%	6.26%	4.34%	6.97%	7.33%	7.98%	7.86%	8.41%	9.35%	9.83%
2002	3.21%	46.77%	39.24%	33.65%	22.61%	16.13%	10.78%	10.18%	7.46%	6.48%	7.25%	10.88%	7.94%	8.12%	8.95%	9.89%	7.57%	7.15%	7.34%	10.27%	6.32%	4.91%	6.82%	7.39%	7.37%	7.13%	7.09%	7.81%	8.37%	9.13%
2003	6.37%	19.88%	27.69%	19.87%	14.14%	9.28%	8.92%	7.27%	6.92%	8.94%	14.78%	9.14%	9.56%	10.42%	12.19%	10.99%	8.11%	8.95%	12.24%	8.20%	5.94%	7.17%	6.97%	6.51%	6.40%	5.98%	6.31%	6.74%	7.48%	9.03%
2004	5.13%	21.74%	18.66%	14.05%	8.73%	8.22%	6.56%	6.05%	8.08%	14.18%	8.67%	8.71%	9.34%	10.48%	10.79%	8.59%	8.47%	11.89%	7.18%	5.01%	6.57%	6.30%	6.33%	5.78%	5.58%	5.92%	6.33%	6.64%	7.76%	10.69%
2005	4.22%	10.81%	11.10%	7.88%	7.22%	5.81%	5.37%	7.87%	14.70%	8.51%	8.58%	8.94%	9.52%	8.85%	8.87%	9.21%	11.92%	5.85%	3.96%	5.13%	5.08%	4.91%	4.36%	4.58%	4.43%	4.65%	4.87%	6.06%	7.07%	8.52%
2006	1.58%	7.50%	9.05%	12.30%	7.81%	6.49%	9.49%	17.13%	9.66%	9.47%	9.14%	9.49%	8.31%	7.55%	8.56%	12.47%	5.56%	3.32%	4.76%	4.91%	4.88%	4.46%	4.08%	4.37%	4.43%	4.83%	5.90%	7.15%	8.21%	9.85%
2007	1.53%	10.93%	16.47%	8.46%	6.23%	8.81%	16.32%	10.15%	9.24%	8.89%	9.62%	8.03%	6.94%	7.66%	11.75%	5.83%	3.38%	4.62%	4.75%	4.59%	4.39%	4.07%	4.32%	4.41%	4.56%	5.72%	6.60%	7.87%	8.79%	10.33%
2008	2.15%	22.86%	12.20%	7.93%	12.05%	21.96%	12.39%	10.50%	10.22%	10.69%	8.87%	7.66%	8.52%	13.17%	7.06%	4.71%	5.21%	5.04%	4.72%	4.48%	4.31%	4.31%	4.35%	4.66%	5.20%	6.19%	7.01%	8.22%	9.20%	10.91%
2009	5.55%	8.37%	7.37%	15.10%	25.37%	12.03%	15.57%	16.69%	15.65%	11.84%	10.06%	12.75%	19.08%	10.18%	6.48%	7.11%	5.79%	5.01%	4.56%	4.30%	4.40%	4.56%	4.80%	5.30%	5.86%	6.54%	7.23%	8.11%	8.44%	9.79%
2010	1.42%	4.34%	9.35%	17.10%	10.52%	17.75%	18.77%	17.45%	13.45%	11.42%	15.50%	22.10%	11.72%	7.00%	8.79%	7.12%	5.30%	4.42%	4.25%	4.22%	4.28%	4.42%	4.90%	5.56%	5.96%	6.56%	7.25%	7.96%	8.42%	9.52%
2011	0.50%	7.54%	15.66%	11.10%	18.12%	18.96%	17.46%	13.50%	11.74%	15.90%	23.25%	12.78%	7.46%	8.02%	7.57%	5.81%	4.09%	3.64%	3.53%	3.68%	3.77%	4.14%	4.61%	4.88%	5.18%	5.68%	6.01%	6.63%	7.11%	7.96%
2012	0.87%	8.53%	9.35%	16.40%	16.91%	16.38%	13.05%	11.23%	14.89%	22.57%	12.62%	6.77%	6.74%	5.84%	6.12%	4.54%	2.84%	2.75%	2.70%	2.86%	3.18%	3.44%	3.75%	4.00%	4.09%	4.34%	4.75%	5.09%	5.32%	5.87%
2013	0.97%	5.04%	13.20%	14.26%	14.32%	12.51%	10.98%	14.21%	22.41%	11.00%	5.94%	5.44%	4.50%	4.16%	4.19%	3.23%	2.52%	2.46%	2.48%	2.67%	3.01%	3.16%	3.25%	3.41%	3.48%	3.82%	3.88%	4.16%	4.41%	4.78%
2014	1.56%	27.26%	20.60%	18.41%	14.83%	13.33%	17.58%	26.29%	12.96%	7.29%	6.90%	5.50%	4.68%	4.17%	4.05%	3.47%	2.87%	2.78%	2.95%	3.23%	3.49%	3.65%	3.89%	3.93%	4.17%	4.53%	4.79%	5.57%	5.47%	6.33%
2015	3.08%	15.87%	17.10%	14.99%	14.22%	22.48%	33.70%	13.92%	6.25%	6.33%	5.62%	4.85%	4.19%	3.73%	3.78%	3.31%	2.85%	3.01%	3.20%	3.40%	3.56%	3.66%	3.86%	4.03%	4.23%	4.62%	4.97%	5.32%	5.79%	6.44%
2016	2.82%	10.75%	11.55%	13.07%	22.73%	36.67%	15.30%	6.37%	5.87%	5.38%	5.13%	4.58%	3.99%	3.84%	3.79%	3.39%	3.31%	3.36%	3.49%	3.71%	3.72%	3.91%	3.98%	4.27%	4.39%	4.79%	5.20%	5.67%	6.12%	6.91%
2017	1.76%	8.89%	11.81%	25.25%	38.74%	17.25%	7.56%	6.71%	5.50%	4.95%	4.60%	4.15%	4.02%	3.87%	3.83%	3.78%	3.60%	3.62%	3.60%	3.79%	3.80%	3.92%	4.15%	4.35%	4.48%	4.76%	5.24%	5.88%	6.27%	7.32%
2018	1.43%	13.48%	29.86%	41.95%	21.74%	10.05%	9.16%	7.08%	5.93%	5.34%	4.91%	4.74%	4.46%	4.24%	4.50%	4.41%	4.21%	3.98%	3.96%	4.15%	4.20%	4.34%	4.78%	4.78%	4.91%	5.60%	6.05%	6.76%	7.42%	8.50%
2019	4.17%	33.91%	46.21%	26.58%	11.57%	10.52%	8.32%	6.94%	5.85%	5.31%	5.28%	4.99%	4.88%	4.99%	5.03%	5.02%	4.73%	4.39%	4.44%	4.47%	4.57%	4.67%	4.93%	5.13%	5.37%	5.81%	6.49%	7.09%	8.00%	9.10%
2020	4.20%	35.95%	15.77%	7.52%	7.47%	6.63%	5.84%	5.04%	4.51%	4.34%	4.38%	4.19%	4.11%	4.18%	4.12%	4.00%	3.74%	3.53%	3.49%	3.62%	3.72%	3.78%	3.89%	4.08%	4.30%	4.49%	4.86%	5.40%	5.66%	6.23%
2021	3.04%	9.17%	6.12%	6.46%	6.01%	5.70%	4.97%	4.29%	4.08%	4.06%	3.99%	3.94%	3.86%	3.77%	3.63%	3.47%	3.26%	3.07%	3.13%	3.15%	3.18%	3.32%	3.45%	3.57%	3.70%	3.93%	4.24%	4.50%	4.80%	5.23%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Non-Claim Termination Rate
All Products Combined

Table 8: Cumulative Number of Non-Claim Terminations as of Each Evaluation Year
Total Number of Non-Claim Terminations for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	2,405	16,970	86,404	271,194	397,137	422,365	456,092	479,491	512,168	542,894	556,375	570,881	588,354	604,693	615,450	622,016	628,819	631,402	633,149	634,730	635,841	637,021	637,974	638,936	640,001	640,999	641,962	642,973	644,313	646,258
1991	1,803	31,055	166,990	291,035	315,940	352,297	378,405	416,943	452,182	466,849	484,079	504,415	523,532	535,254	542,424	548,959	551,646	553,427	555,025	556,047	557,168	558,066	558,945	559,839	560,744	561,620	562,521	563,525	564,663	566,361
1992	3,503	52,977	138,376	169,470	217,935	256,052	317,138	375,588	398,983	429,053	464,902	500,429	519,232	530,208	538,088	543,030	545,813	547,774	549,370	550,763	552,021	553,328	554,587	555,800	557,086	558,340	559,629	561,012	562,568	564,824
1993	13,016	74,655	117,957	189,882	253,713	352,276	457,802	508,206	574,202	655,311	750,840	795,415	820,648	837,603	848,987	856,737	860,665	863,955	866,722	869,331	871,999	874,311	876,587	878,746	880,934	883,043	885,104	887,247	889,829	891,042
1994	10,915	45,988	127,405	202,896	322,723	445,113	507,602	590,538	688,819	809,356	870,341	906,094	929,567	945,323	957,916	964,755	969,077	972,923	976,586	980,499	983,725	986,699	989,772	992,787	995,812	998,516	1,001,152	1,004,287	1,006,011	1,007,155
1995	6,875	45,317	84,230	163,000	226,157	252,322	289,864	331,578	374,948	398,924	413,402	422,451	428,215	431,602	433,797	435,568	436,784	437,966	439,238	440,321	441,475	442,586	443,729	444,810	445,885	446,949	448,235	448,996	449,544	450,272
1996	3,846	32,223	154,051	269,703	315,303	385,360	462,662	545,843	589,777	615,630	631,352	641,116	647,063	651,097	654,514	657,178	659,164	661,381	663,334	665,194	667,030	668,845	670,556	672,212	673,852	675,807	677,013	677,845	679,011	680,365
1997	5,216	89,181	226,472	279,977	367,853	450,594	536,238	581,823	608,968	625,438	635,510	641,515	645,203	647,986	650,487	652,786	654,964	656,866	658,751	660,634	662,650	664,453	666,140	667,753	669,660	670,903	671,697	673,003	674,450	675,801
1998	14,111	94,597	155,101	270,755	421,619	624,721	723,135	778,400	809,015	827,290	838,354	846,294	852,142	857,220	862,266	868,031	871,708	875,220	878,688	882,224	885,353	888,082	890,835	893,893	896,047	897,477	899,575	901,862	904,182	906,208
1999	8,413	44,279	191,416	394,203	650,873	777,525	850,939	890,992	914,677	929,031	939,195	946,608	953,175	959,610	967,691	973,289	977,876	982,322	986,741	990,665	994,208	997,620	1,001,322	1,004,073	1,005,811	1,008,433	1,011,381	1,014,100	1,016,498	1,018,648
2000	5,056	199,866	393,048	536,005	602,945	641,714	663,328	675,883	682,674	686,806	689,590	691,673	693,830	696,446	698,677	700,782	702,793	704,675	706,484	708,082	709,666	711,515	712,788	713,557	714,721	716,062	717,371	718,633	719,879	720,970
2001	32,498	209,872	561,029	711,103	792,701	835,129	859,052	873,211	884,221	891,322	896,821	902,337	909,415	914,515	919,286	923,968	927,964	931,450	934,459	937,428	940,939	943,280	944,829	947,145	949,405	951,669	953,724	955,744	957,788	959,699
2002	35,874	379,555	582,619	709,400	777,096	817,730	841,688	861,768	875,077	885,652	896,392	910,501	919,819	928,420	936,901	944,994	950,646	955,570	960,257	966,190	969,577	972,065	975,287	978,523	981,517	984,199	986,678	989,200	991,684	994,056
2003	61,064	208,989	368,104	461,813	519,324	553,277	582,698	604,495	623,491	645,457	676,138	693,103	708,951	724,256	739,966	752,023	760,191	768,422	778,440	784,622	788,729	793,342	797,519	801,172	804,535	807,442	810,315	813,181	816,118	819,267
2004	45,770	195,642	302,453	371,636	410,293	443,150	467,049	487,290	511,580	547,616	567,283	584,980	601,891	618,771	634,061	644,805	654,516	666,677	673,510	678,008	683,367	688,177	692,711	696,610	700,151	703,624	707,107	710,519	714,189	717,945
2005	20,203	64,554	104,795	130,601	151,971	167,641	180,929	198,318	225,423	239,345	251,814	263,356	274,311	283,513	291,863	299,556	308,426	312,525	315,179	318,421	321,375	324,086	326,385	328,684	330,805	332,880	334,943	337,354	339,958	342,603
2006	6,313	33,567	63,023	97,425	116,742	131,170	149,556	176,286	189,349	200,516	209,940	218,590	225,410	231,079	236,911	244,306	247,415	249,201	251,627	253,995	256,205	258,133	259,822	261,546	263,213	264,927	266,894	269,105	271,438	273,703
2007	6,148	44,818	93,256	114,964	129,324	146,951	172,740	186,341	197,026	205,920	214,314	220,596	225,547	230,549	237,365	240,502	242,244	244,497	246,686	248,697	250,520	252,140	253,781	255,377	256,946	258,796	260,786	262,972	265,202	267,417
2008	22,138	208,519	294,262	343,967	407,939	495,718	536,734	566,322	590,941	613,178	629,577	642,413	655,368	672,958	681,702	687,115	692,753	697,903	702,481	706,618	710,398	714,009	717,488	721,035	724,783	728,948	733,337	738,065	742,883	747,801
2009	101,679	234,501	341,963	529,350	770,781	869,156	975,789	1,070,625	1,145,541	1,195,252	1,233,050	1,275,127	1,327,820	1,353,225	1,368,289	1,383,302	1,394,785	1,404,214	1,412,380	1,419,743	1,426,892	1,433,974	1,441,067	1,448,493	1,456,237	1,464,277	1,472,555	1,481,117	1,489,308	1,497,553
2010	23,715	91,840	225,302	430,482	542,731	700,872	839,324	947,367	1,019,895	1,074,665	1,138,621	1,213,157	1,248,407	1,267,974	1,290,387	1,306,842	1,318,444	1,327,688	1,336,190	1,344,261	1,352,081	1,359,798	1,367,936	1,376,669	1,385,489	1,394,542	1,403,861	1,413,320	1,422,530	1,431,459
2011	6,004	89,303	237,959	331,989	460,671	572,677	659,648	718,418	763,847	816,732	879,327	909,706	926,103	942,325	956,475	966,405	973,087	978,814	984,168	989,541	994,814	1,000,366	1,006,257	1,012,200	1,018,181	1,024,347	1,030,489	1,036,838	1,043,181	1,049,242
2012	10,273	102,437	194,439	332,400	453,226	553,125	623,086	676,971	738,915	815,450	853,281	872,169	889,692	903,976	918,007	927,656	933,508	939,016	944,272	949,681	955,484	961,542	967,905	974,418	980,798	987,253	993,979	1,000,829	1,007,621	1,014,429
2013	12,987	76,761	224,038	362,556	483,477	576,866	650,368	733,389	840,253	887,316	911,132	931,706	947,918	962,242	976,023	986,141	993,818	1,001,128	1,008,305	1,015,803	1,023,868	1,032,059	1,040,208	1,048,443	1,056,549	1,064,972	1,073,167	1,081,579	1,090,104	1,098,378
2014	12,279	177,930	281,289	358,681	412,511	454,862	502,087	557,900	582,088	594,659	605,691	613,976	620,672	626,370	631,660	635,953	639,386	642,611	645,935	649,443	653,063	656,708	660,436	664,040	667,692	671,419	675,176	679,305	683,137	687,045
2015	34,404	182,511	318,306	421,265	506,252	615,456	737,684	781,762	800,206	817,632	832,148	844,033	853,821	862,195	870,332	877,129	882,818	888,630	894,607	900,729	906,848	912,918	919,058	925,199	931,357	937,722	944,220	950,824	957,604	964,407
2016	35,508	154,094	267,994	381,379	541,431	730,039	797,845	824,032	846,534	865,924	883,403	898,224	910,602	922,022	932,839	942,084	950,795	959,326	967,875	976,612	984,983	993,428	1,001,668	1,010,091	1,018,373	1,026,900	1,035,672	1,044,710	1,053,868	1,062,983
2017	21,938	121,851	240,169	441,287	663,345	747,074	780,710	808,266	829,381	847,299	863,061	876,590	889,094	900,623	911,537	921,781	931,154	940,202	948,839	957,572	965,902	974,137	982,458	990,762	998,917	1,007,100	1,015,618	1,024,596	1,033,520	1,042,425
2018	14,501	133,149	334,944	534,196	618,205	652,838	681,210	701,316	716,974	730,174	741,600	752,009	761,302	769,701	778,145	785,964	793,054	799,469	805,571	811,664	817,515	823,279	829,305	835,031	840,608	846,580	852,634	858,942	865,358	871,652
2019	41,269	281,443	505,066	605,698	644,213	675,217	697,412	714,464	727,837	739,240	749,883	759,362	768,112	776,549	784,576	792,095	798,806	804,743	810,459	815,934	821,240	826,394	831,562	836,658	841,706	846,828	852,180	857,619	863,277	868,936
2020	56,050	393,758	520,973	576,797	627,857	669,990	704,823	733,269	757,475	779,667	801,023	820,547	838,874	856,671	873,444	889,023	903,042	915,796	927,939	940,070	951,973	963,627	975,148	986,715	998,389	1,009,923	1,021,760	1,034,143	1,046,317	1,058,330
2021	42,491	156,233	227,437	297,631	358,832	413,551	458,803	496,055	529,986	562,277	592,717	621,536	648,623	674,055	697,609	719,253	738,885	756,809	774,514	791,756	808,489	825,354	842,246	859,055	875,736	892,482	909,612	926,813	944,053	960,935

Table 9: Cumulative Non-Claim Termination Rate = Table 8 / Table 1 (Evaluation Year 1)
Cumulative Non-Claim Terminations as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.33%	2.36%	12.02%	37.73%	55.25%	58.76%	63.46%	66.71%	71.26%	75.53%	77.41%	79.43%	81.86%	84.13%	85.63%	86.54%	87.49%	87.85%	88.09%	88.31%	88.46%	88.63%	88.76%	88.90%	89.04%	89.18%	89.32%	89.46%	89.64%	89.91%
1991	0.29%	4.99%	26.84%	46.77%	50.78%	56.62%	60.82%	67.01%	72.67%	75.03%	77.80%	81.07%	84.14%	86.02%	87.18%	88.23%	88.66%	88.94%	89.20%	89.37%	89.55%	89.69%	89.83%	89.98%	90.12%	90.26%	90.41%	90.57%	90.75%	91.02%
1992	0.57%	8.65%	22.59%	27.67%	35.58%	41.81%	51.78%	61.33%	65.15%	70.06%	75.91%	81.71%	84.78%	86.57%	87.86%	88.67%	89.12%	89.44%	89.70%	89.93%	90.13%	90.35%	90.55%	90.75%	90.96%	91.16%	91.38%	91.60%	91.86%	92.22%
1993	1.35%	7.73%	12.21%	19.66%	26.26%	36.47%	47.39%	52.61%	59.44%	67.84%	77.73%	82.34%	84.95%	86.71%	87.89%	88.69%	89.09%	89.43%	89.72%	89.99%	90.27%	90.51%	90.74%	90.97%	91.19%	91.41%	91.62%	91.85%	92.11%	92.24%
1994	0.99%	4.15%	11.51%	18.33%	29.15%	40.21%	45.85%	53.34%	62.22%	73.11%	78.62%	81.85%	83.97%	85.39%	86.53%	87.14%	87.53%	87.88%	88.21%	88.57%	88.86%	89.13%	89.40%	89.68%	89.95%	90.19%	90.43%	90.72%	90.87%	90.97%
1995	1.36%	8.95%	16.63%	32.18%	44.65%	49.82%	57.23%	65.46%	74.03%	78.76%	81.62%	83.41%	84.54%	85.21%	85.65%	86.00%	86.24%	86.47%	86.72%	86.93%	87.16%	87.38%	87.61%	87.82%	88.03%	88.24%	88.50%	88.65%	88.76%	88.90%
1996	0.51%	4.24%	20.26%	35.46%	41.46%	50.67%	60.83%	71.77%	77.55%	80.95%	83.02%	84.30%	85.08%	85.61%	86.06%	86.41%	86.67%	86.96%	87.22%	87.46%	87.71%	87.95%	88.17%	88.39%	88.60%	88.86%	89.02%	89.13%	89.28%	89.46%
1997	0.69%	11.86%	30.11%	37.22%	48.90%	59.90%	71.29%	77.35%	80.95%	83.14%	84.48%	85.28%	85.77%	86.14%	86.47%	86.78%	87.07%	87.32%	87.57%	87.82%	88.09%	88.33%	88.56%	88.77%	89.02%	89.19%	89.29%	89.47%	89.66%	89.84%
1998	1.42%	9.49%	15.56%	27.16%	42.29%	62.67%	72.54%	78.08%	81.15%	82.99%	84.10%	84.89%	85.48%	85.99%	86.49%	87.07%	87.44%	87.79%	88.14%	88.50%	88.81%	89.08%	89.36%	89.67%	89.88%	90.03%	90.24%	90.47%	90.70%	90.90%
1999	0.74%	3.92%	16.93%	34.86%	57.56%	68.76%	75.25%	78.79%	80.88%	82.15%	83.05%	83.71%	84.29%	84.86%	85.57%	86.07%	86.47%	86.87%	87.26%	87.60%	87.92%	88.22%	88.55%	88.79%	88.94%	89.17%	89.43%	89.68%	89.89%	90.08%
2000	0.63%	24.76%	48.70%	66.41%	74.71%	79.51%	82.19%	83.74%	84.58%	85.10%	85.44%	85.70%	85.97%	86.29%	86.57%	86.83%	87.08%	87.31%	87.53%	87.73%	87.93%	88.16%	88.32%	88.41%	88.55%	88.72%	88.88%	89.04%	89.19%	89.33%
2001	3.04%	19.65%	52.52%	66.57%	74.21%	78.18%	80.42%	81.74%	82.77%	83.44%	83.95%	84.47%	85.13%	85.61%	86.06%	86.49%	86.87%	87.20%	87.48%	87.75%	88.08%	88.30%	88.45%	88.66%	88.88%	89.09%	89.28%	89.47%	89.66%	89.84%
2002	3.21%	33.93%	52.09%	63.42%	69.48%	73.11%	75.25%	77.05%	78.24%	79.18%	80.14%	81.40%	82.24%	83.01%	83.76%	84.49%	84.99%	85.43%	85.85%	86.38%	86.69%	86.91%	87.20%	87.49%	87.75%	87.99%	88.21%	88.44%	88.66%	88.87%
2003	6.37%	21.81%	38.42%	48.21%	54.21%	57.75%	60.82%	63.10%	65.08%	67.37%	70.58%	72.35%	74.00%	75.60%	77.24%	78.50%	79.35%	80.21%	81.26%	81.90%	82.33%	82.81%	83.25%	83.63%	83.98%	84.28%	84.58%	84.88%	85.19%	85.52%
2004	5.13%	21.92%	33.89%	41.65%	45.98%	49.66%	52.34%	54.61%	57.33%	61.37%	63.57%	65.55%	67.45%	69.34%	71.05%	72.26%	73.35%	74.71%	75.48%	75.98%	76.58%	77.12%	77.63%	78.06%	78.46%	78.85%	79.24%	79.62%	80.03%	80.46%
2005	4.22%	13.50%	21.91%	27.30%	31.77%	35.05%	37.83%	41.46%	47.13%	50.04%	52.64%	55.06%	57.35%	59.27%	61.02%	62.63%	64.48%	65.34%	65.89%	66.57%	67.19%	67.75%	68.23%	68.72%	69.16%	69.59%	70.02%	70.53%	71.07%	71.63%
2006	1.58%	8.39%	15.76%	24.36%	29.20%	32.80%	37.40%	44.09%	47.35%	50.15%	52.50%	54.67%	56.37%	57.79%	59.25%	61.10%	61.87%	62.32%	62.93%	63.52%	64.07%	64.56%	64.98%	65.41%	65.83%	66.25%	66.75%	67.30%	67.88%	68.45%
2007	1.53%	11.14%	23.18%	28.57%	32.14%	36.53%	42.94%	46.32%	48.97%	51.18%	53.27%	54.83%	56.06%	57.30%	59.00%	59.78%	60.21%	60.77%	61.31%	61.81%	62.27%	62.67%	63.08%	63.47%	63.86%	64.32%	64.82%	65.36%	65.92%	66.47%
2008	2.15%	20.21%	28.53%	33.34%	39.55%	48.05%	52.03%	54.90%	57.29%	59.44%	61.03%	62.28%	63.53%	65.24%	66.08%	66.61%	67.16%	67.65%	68.10%	68.50%	68.87%	69.22%	69.55%	69.90%	70.26%	70.66%	71.09%	71.55%	72.01%	72.49%
2009	5.55%	12.81%	18.67%	28.91%	42.09%	47.46%	53.28%	58.46%	62.55%	65.27%	67.33%	69.63%	72.51%	73.89%	74.72%	75.54%	76.16%	76.68%	77.12%	77.53%	77.92%	78.30%	78.69%	79.10%	79.52%	79.96%	80.41%	80.88%	81.33%	81.78%
2010	1.42%	5.51%	13.52%	25.83%	32.56%	42.05%	50.35%	56.83%	61.19%	64.47%	68.31%	72.78%	74.89%	76.07%	77.41%	78.40%	79.10%	79.65%	80.16%	80.64%	81.11%	81.58%	82.06%	82.59%	83.12%	83.66%	84.22%	84.79%	85.34%	85.88%
2011	0.50%	7.46%	19.89%	27.74%	38.50%	47.86%	55.12%	60.04%	63.83%	68.25%	73.48%	76.02%	77.39%	78.75%	79.93%	80.76%	81.32%	81.80%	82.24%	82.69%	83.13%	83.60%	84.09%	84.59%	85.09%	85.60%	86.11%	86.64%	87.17%	87.68%
2012	0.87%	8.65%	16.42%	28.06%	38.26%	46.70%	52.60%	57.15%	62.38%	68.84%	72.04%	73.63%	75.11%	76.32%	77.50%	78.32%	78.81%	79.28%	79.72%	80.18%	80.67%	81.18%	81.71%	82.26%	82.80%	83.35%	83.92%	84.49%	85.07%	85.64%
2013	0.97%	5.71%	16.66%	26.96%	35.95%	42.89%	48.36%	54.53%	62.48%	65.98%	67.75%	69.28%	70.49%	71.55%	72.58%	73.33%	73.90%	74.44%	74.98%	75.53%	76.13%	76.74%	77.35%	77.96%	78.56%	79.19%	79.80%	80.42%	81.06%	81.67%
2014	1.56%	22.63%	35.77%	45.61%	52.46%	57.84%	63.85%	70.95%	74.02%	75.62%	77.03%	78.08%	78.93%	79.66%	80.33%	80.87%	81.31%	81.72%	82.14%	82.59%	83.05%	83.51%	83.99%	84.45%	84.91%	85.38%	85.86%	86.39%	86.87%	87.37%
2015	3.08%	16.35%	28.52%	37.74%	45.35%	55.14%	66.09%	70.04%	71.69%	73.25%	74.55%	75.62%	76.49%	77.24%	77.97%	78.58%	79.09%	79.61%	80.15%	80.69%	81.24%	81.79%	82.34%	82.89%	83.44%	84.01%	84.59%	85.18%	85.79%	86.40%
2016	2.82%	12.25%	21.30%	30.32%	43.04%	58.03%	63.42%	65.50%	67.29%	68.83%	70.22%	71.40%	72.38%	73.29%	74.15%	74.89%	75.58%	76.26%	76.94%	77.63%	78.30%	78.97%	79.62%	80.29%	80.95%	81.63%	82.32%	83.04%	83.77%	84.50%
2017	1.76%	9.78%	19.27%	35.40%	53.22%	59.94%	62.64%	64.85%	66.54%	67.98%	69.24%	70.33%	71.33%	72.26%	73.13%	73.95%	74.71%	75.43%	76.12%	76.83%	77.49%	78.15%	78.82%	79.49%	80.14%	80.80%	81.48%	82.20%	82.92%	83.63%
2018	1.43%	13.12%	33.01%	52.65%	60.93%	64.34%	67.14%	69.12%	70.67%	71.97%	73.09%	74.12%	75.03%	75.86%	76.70%	77.47%	78.16%	78.80%	79.40%	80.00%	80.58%	81.14%	81.74%	82.30%	82.85%	83.44%	84.04%	84.66%	85.29%	85.91%
2019	4.17%	28.42%	50.99%	61.16%	65.04%	68.17%	70.42%	72.14%	73.49%	74.64%	75.71%	76.67%	77.55%	78.41%	79.22%	79.98%	80.65%	81.25%	81.83%	82.38%	82.92%	83.44%	83.96%	84.47%	84.98%	85.50%	86.04%	86.59%	87.16%	87.73%
2020	4.20%	29.54%	39.08%	43.27%	47.10%	50.26%	52.87%	55.00%	56.82%	58.48%	60.09%	61.55%	62.92%	64.26%	65.52%	66.69%	67.74%	68.69%	69.61%	70.52%	71.41%	72.28%	73.15%	74.01%	74.89%	75.75%	76.64%	77.57%	78.48%	79.39%
2021	3.04%	11.16%	16.25%	21.26%	25.64%	29.55%	32.78%	35.44%	37.87%	40.17%	42.35%	44.41%	46.34%	48.16%	49.84%	51.39%	52.79%	54.07%	55.34%	56.57%	57.76%	58.97%	60.18%	61.38%	62.57%	63.76%	64.99%	66.22%	67.45%	68.66%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
All Products Combined

Table 10: Gross Claim Cost in Each Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	3,073,174	124,854,855	521,827,531	794,117,977	760,854,723	559,640,821	392,947,969	337,655,896	247,057,639	174,950,520
1991	2,601,471	106,549,442	452,398,345	597,157,333	534,014,121	415,155,313	382,806,216	297,468,849	207,041,980	139,939,821
1992	1,257,151	79,245,922	296,710,764	398,894,729	418,747,359	461,333,990	396,563,055	293,039,318	198,846,063	113,306,259
1993	3,105,635	112,248,769	408,025,830	612,730,051	825,743,989	747,686,886	568,546,067	377,671,437	203,516,927	135,075,924
1994	5,342,530	176,333,428	587,401,839	1,000,669,862	1,101,747,340	889,081,139	584,955,106	333,877,011	222,357,968	157,425,886
1995	2,501,812	93,316,824	463,918,739	761,846,821	728,291,878	505,709,362	313,627,490	203,921,120	175,766,898	109,031,001
1996	1,351,909	165,904,906	800,034,525	1,177,978,393	951,388,574	629,632,383	437,156,004	363,066,236	217,714,899	120,985,507
1997	2,312,490	209,520,325	871,136,632	1,036,202,503	782,310,180	620,729,248	509,239,079	307,578,740	179,049,772	106,143,841
1998	3,588,997	249,202,231	903,574,611	966,283,975	871,840,362	817,838,990	530,271,002	320,535,520	194,164,898	129,677,144
1999	3,227,094	273,468,805	958,272,844	1,326,822,674	1,479,064,509	1,012,326,848	597,995,380	341,935,232	223,133,616	186,517,702
2000	3,753,739	280,658,854	1,126,493,083	1,628,030,502	1,149,055,865	647,128,028	373,769,869	249,417,430	205,410,361	167,431,174
2001	1,387,781	325,431,463	1,502,526,228	1,698,154,369	1,165,796,639	713,508,172	468,911,904	383,736,561	327,853,809	354,312,524
2002	2,934,027	403,921,771	1,510,010,841	1,460,106,274	1,016,726,348	720,377,061	600,412,393	531,523,138	563,764,579	476,178,309
2003	3,052,191	494,399,814	1,142,671,361	998,986,659	817,062,978	782,492,763	747,123,659	871,560,589	735,145,804	707,270,130
2004	67,639,436	730,083,174	1,111,244,453	1,188,162,577	1,285,692,738	1,214,186,685	1,319,063,233	1,072,126,429	1,070,149,086	1,098,146,561
2005	26,562,569	331,419,975	840,378,171	1,115,088,956	1,229,037,178	1,323,865,837	1,094,433,530	1,047,756,293	1,096,983,073	776,437,771
2006	9,997,700	318,035,668	1,010,328,222	1,480,399,145	1,756,160,030	1,349,604,434	1,295,663,831	1,410,060,474	962,332,156	735,165,703
2007	8,877,186	449,947,262	1,541,932,260	2,211,275,036	1,613,585,494	1,791,027,578	2,344,111,272	1,447,697,369	1,024,042,959	844,198,018
2008	20,494,138	1,079,033,031	4,076,899,010	3,965,321,084	4,722,781,525	6,677,663,685	4,229,306,127	2,824,156,847	2,283,990,054	1,285,674,938
2009	34,088,496	1,353,230,407	3,049,237,366	4,449,457,834	7,146,012,772	5,363,919,571	3,778,271,569	3,016,168,778	1,717,075,882	970,505,121
2010	18,228,050	450,168,603	1,408,222,796	2,857,805,757	2,837,895,350	2,340,272,650	1,763,568,099	1,063,184,020	631,962,414	399,041,913
2011	10,512,283	255,726,941	868,033,878	1,089,201,677	1,046,133,571	847,135,972	569,798,644	330,324,365	221,858,513	134,697,482
2012	8,662,792	156,324,538	458,148,257	611,103,636	649,530,686	471,443,980	299,262,135	218,077,048	132,663,173	33,658,509
2013	6,722,064	163,008,679	432,856,523	597,181,147	566,949,615	394,236,713	295,166,203	190,003,222	48,879,842	125,600,750
2014	846,568	75,392,326	246,250,515	376,487,275	286,275,489	231,612,170	155,477,362	44,202,922	89,843,914	163,393,453
2015	1,227,990	57,253,723	271,840,167	338,885,627	345,330,390	247,084,193	63,351,334	156,435,747	298,907,084	210,532,101
2016	1,011,785	59,969,486	237,635,573	369,638,339	308,963,909	87,043,152	248,483,083	646,041,412	497,304,070	325,218,744
2017	1,410,313	58,342,267	262,277,283	335,487,562	97,969,722	318,601,319	810,729,631	692,901,204	568,966,526	478,813,630
2018	1,706,489	68,632,107	233,553,280	92,246,054	372,387,256	856,144,462	711,577,257	598,477,509	511,520,004	442,796,660
2019	1,247,112	41,378,887	50,682,831	435,526,068	948,215,348	829,945,590	663,661,509	472,326,794	426,442,180	364,709,370
2020	454,026	4,957,385	498,377,952	1,110,256,879	964,727,621	675,976,314	567,405,331	509,971,074	454,113,188	394,215,623
2021	20,672	242,454,716	995,224,259	793,420,170	664,991,360	692,653,650	689,509,138	557,606,325	468,917,537	427,893,079

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	119,346,143	66,058,334	44,896,058	35,171,832	24,037,832	14,885,040	10,705,345	8,648,959	7,818,831	6,023,987
1991	79,385,696	52,454,202	36,139,332	26,381,667	16,911,592	10,884,389	6,712,986	6,823,640	5,734,226	6,516,084
1992	73,424,183	48,221,368	30,062,384	17,110,250	12,314,692	7,694,142	7,377,663	7,121,684	6,376,948	7,198,431
1993	91,607,385	57,744,087	32,377,027	20,133,030	14,539,564	12,044,835	11,141,128	13,094,748	13,721,607	9,888,056
1994	94,925,866	54,981,551	34,405,882	23,529,121	18,666,019	19,267,137	25,572,832	20,038,430	16,295,213	21,929,321
1995	58,384,673	36,742,446	24,051,173	20,083,215	20,030,266	22,362,286	19,216,484	14,657,973	16,215,029	11,572,887
1996	74,866,428	47,904,801	42,543,643	38,378,855	44,379,039	35,408,684	32,916,812	33,892,590	23,352,485	27,055,544
1997	69,214,111	59,570,684	50,397,628	57,866,631	46,718,773	40,137,749	43,674,531	33,266,040	34,249,405	35,098,950
1998	108,025,882	99,399,492	107,799,551	94,214,664	83,510,126	86,688,071	63,998,303	65,546,982	66,348,821	34,177,085
1999	170,775,211	179,917,835	167,959,493	143,894,785	143,774,051	98,368,180	98,469,151	95,394,187	53,175,591	37,780,752
2000	176,031,330	139,394,114	116,330,932	119,224,253	83,791,685	82,138,537	76,375,119	48,010,929	35,948,215	18,779,119
2001	308,889,978	251,406,506	245,283,413	161,618,632	159,230,249	134,344,149	82,448,153	49,013,830	27,809,272	19,733,583
2002	425,773,601	425,303,315	275,851,084	249,564,286	220,353,157	120,368,812	71,910,238	43,685,765	25,473,386	7,398,987
2003	730,023,644	497,524,121	387,482,857	317,175,744	167,261,653	92,883,930	51,646,536	29,615,236	6,820,338	8,382,864
2004	764,230,160	600,625,700	485,713,964	248,483,348	142,956,614	74,257,931	47,846,535	11,925,103	13,836,041	28,289,411
2005	609,927,170	470,889,244	249,785,125	136,200,376	81,560,952	45,261,370	12,080,898	14,180,546	26,075,899	20,775,237
2006	592,987,782	324,655,216	200,826,668	108,922,072	66,810,687	19,044,324	15,102,678	30,140,525	22,938,716	21,636,609
2007	495,497,644	274,126,567	168,499,441	103,859,518	28,705,480	24,167,577	49,548,938	36,135,975	35,657,995	21,453,858
2008	707,111,759	438,619,653	272,249,661	74,765,727	65,530,448	137,866,183	96,839,269	68,388,590	50,733,675	45,298,482
2009	585,111,881	351,644,395	99,049,209	94,757,838	202,574,121	128,456,122	88,028,511	70,887,869	60,665,684	44,984,464
2010	236,682,355	58,483,460	85,739,612	159,981,154	113,133,239	79,210,966	60,894,470	45,052,430	37,724,079	31,688,717
2011	37,197,189	95,412,796	131,727,970	100,252,159	73,913,191	56,609,046	46,203,581	32,734,164	28,777,247	22,346,406
2012	84,733,158	169,004,033	137,983,336	79,758,851	56,546,265	48,165,847	37,174,672	32,251,625	26,322,559	19,655,492
2013	275,791,958	187,437,159	124,000,530	113,589,223	85,425,248	77,223,569	62,886,794	55,999,068	45,234,544	35,447,765
2014	104,517,025	84,844,572	70,274,026	54,990,328	49,222,540	40,593,188	35,550,225	26,588,908	24,733,659	22,426,366
2015	169,643,457	157,313,579	116,415,252	96,414,133	81,019,447	76,198,230	52,451,479	57,256,592	36,907,660	31,613,869
2016	236,358,279	187,928,570	159,543,562	126,997,221	98,233,668	89,851,451	95,024,048	59,878,881	49,138,802	40,787,044
2017	403,323,469	333,599,541	305,086,489	224,301,860	198,951,781	174,042,821	152,501,488	119,979,651	98,139,387	72,080,273
2018	422,112,051	316,207,870	278,377,674	232,937,308	208,929,303	186,903,802	171,424,373	132,621,813	99,092,806	78,169,039
2019	323,030,348	281,506,940	237,826,212	225,506,369	213,275,290	166,321,683	137,388,416	116,255,745	89,736,660	71,808,824
2020	370,574,107	298,071,211	267,969,398	259,733,561	243,565,330	172,927,247	163,696,481	94,089,927	97,197,134	75,913,720
2021	402,742,800	362,486,618	293,139,540	252,224,445	233,768,893	200,720,104	141,918,120	116,750,761	89,188,737	65,019,755

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	7,744,467	6,992,825	4,616,051	5,528,983	2,908,573	3,217,871	3,990,748	1,746,716	1,587,411	1,102,834
1991	6,591,393	5,496,206	5,850,255	3,526,153	4,109,522	4,773,898	2,459,984	1,668,243	1,657,804	647,469
1992	5,709,122	6,669,532	3,982,410	4,907,255	5,228,459	3,593,096	1,860,799	1,289,173	507,271	129,081
1993	13,545,314	8,821,222	11,519,475	10,822,674	7,394,607	3,442,714	2,077,756	1,471,814	378,956	317,763
1994	15,492,598	14,214,905	15,829,623	9,393,932	6,219,550	3,362,420	1,882,893	472,035	544,870	942,722
1995	13,619,742	15,891,514	8,543,407	6,252,679	4,206,709	1,265,656	458,434	634,618	973,055	637,560
1996	28,527,638	17,321,628	10,699,235	7,585,484	3,900,978	540,964	736,260	1,679,265	1,718,392	857,789
1997	21,983,279	13,463,666	7,451,684	6,056,473	1,400,660	1,512,842	2,783,597	1,732,227	1,622,524	1,383,027
1998	21,194,555	10,847,666	8,725,739	2,761,003	1,585,925	3,966,863	4,660,907	4,393,321	2,586,606	1,750,398
1999	20,186,914	12,591,770	3,489,903	2,649,783	6,609,572	6,592,769	5,729,392	5,602,153	3,748,758	2,497,339
2000	12,318,088	4,167,237	2,572,512	4,595,127	5,088,197	4,203,237	3,743,597	3,066,639	2,168,848	2,092,007
2001	6,837,000	2,935,072	7,142,114	7,382,073	6,059,984	4,883,942	5,147,371	4,977,993	3,060,040	2,309,212
2002	5,963,826	14,145,015	10,763,886	8,100,388	8,363,009	6,903,672	6,488,969	5,659,822	3,445,181	3,304,826
2003	18,075,065	15,114,987	10,874,742	9,988,898	10,017,622	9,017,314	8,145,898	6,070,450	5,918,820	3,592,233
2004	23,442,147	19,525,516	12,830,781	14,655,065	13,576,721	11,003,219	10,825,032	7,004,384	7,584,317	5,382,190
2005	17,485,284	13,971,446	10,947,322	10,076,039	10,237,232	8,237,997	8,484,712	7,589,177	7,220,679	4,540,774
2006	16,451,847	12,101,399	8,777,003	10,416,767	8,590,181	8,028,017	8,231,362	8,274,977	6,289,542	4,184,711
2007	15,125,456	14,359,432	14,728,027	13,169,297	13,701,903	11,097,269	10,808,321	10,866,530	7,888,732	4,714,835
2008	44,180,317	27,807,228	27,812,499	26,117,799	25,794,959	22,333,430	19,957,277	19,235,709	13,111,223	8,055,230
2009	36,798,557	27,743,471	24,528,378	21,485,095	18,711,544	16,928,815	14,096,648	13,813,488	11,369,476	7,455,663
2010	25,076,094	22,048,013	18,531,163	18,533,218	15,036,691	13,412,027	12,830,902	10,114,641	6,547,792	5,465,676
2011	19,543,331	18,090,685	15,703,869	14,123,583	13,312,801	12,108,089	10,427,077	7,729,944	5,119,516	4,240,216
2012	15,340,043	13,419,064	10,869,146	10,582,773	9,511,328	9,678,121	7,658,910	6,494,094	4,356,203	4,139,195
2013	30,024,681	22,214,340	20,546,397	18,510,205	18,718,293	12,679,545	11,170,110	9,311,065	6,952,863	5,179,726
2014	17,689,152	13,051,486	11,996,660	11,805,086	8,705,178	9,348,847	7,588,649	6,018,671	6,136,529	3,613,025
2015	25,574,999	20,396,121	18,729,235	14,480,308	14,637,488	13,270,955	10,318,897	8,551,789	6,306,733	5,668,657
2016	32,800,427	28,109,011	24,359,244	19,234,577	16,749,738	16,998,053	13,961,538	10,939,611	8,076,507	7,593,028
2017	61,725,588	66,284,414	44,152,796	43,001,937	34,420,566	33,145,682	29,142,750	25,863,422	17,395,724	13,081,984
2018	61,018,766	60,652,207	65,965,449	42,241,499	34,502,951	35,358,744	28,267,490	26,509,277	17,803,978	14,877,549
2019	51,999,099	43,844,055	35,844,018	34,663,720	30,705,972	29,040,386	23,284,614	25,002,460	17,892,844	12,883,392
2020	55,441,803	43,735,240	38,886,842	29,891,959	26,764,317	23,497,611	22,418,549	35,470,236	14,138,802	8,303,837
2021	58,627,175	36,870,064	36,583,426	25,570,074	26,035,701	21,171,495	20,034,752	14,320,043	10,486,404	5,776,899

Table 11: Claim Cost Net of Recovery in Each Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	2,480,479	67,264,859	258,247,039	394,126,058	389,321,121	292,125,312	211,515,835	170,278,261	111,096,623	78,732,659
1991	1,005,047	55,306,659	231,482,439	309,023,487	284,768,698	226,478,077	194,623,844	135,615,292	92,039,874	55,731,788
1992	521,537	42,596,243	160,800,832	213,665,478	228,510,364	229,599,679	170,490,103	123,665,923	76,710,285	37,492,828
1993	1,102,429	61,998,369	226,995,772	329,358,722	396,930,202	310,262,371	220,330,492	133,364,011	58,970,177	36,655,509
1994	2,844,572	103,027,855	333,393,684	481,688,811	433,039,036	328,966,766	193,193,973	94,098,065	57,241,023	43,018,530
1995	1,209,908	55,268,147	213,713,573	292,117,213	268,323,294	177,881,673	95,983,498	58,852,783	55,042,955	33,846,784
1996	577,846	67,658,857	301,619,143	426,845,763	318,851,722	188,765,056	122,959,058	111,383,142	67,906,711	42,123,199
1997	773,629	85,096,379	334,763,178	352,802,974	237,009,167	178,328,518	155,703,206	95,259,103	61,669,459	40,679,339
1998	1,405,795	100,876,807	311,719,537	287,191,546	240,771,425	245,738,663	159,358,353	105,889,073	74,853,613	65,970,363
1999	1,235,574	102,573,315	308,718,706	377,448,782	443,955,926	311,420,578	210,879,838	128,654,033	108,895,293	109,681,012
2000	1,306,399	98,461,984	353,654,417	547,062,899	387,704,089	238,399,484	153,552,521	123,819,632	123,959,646	102,567,470
2001	427,509	108,203,812	538,345,075	599,624,405	435,236,646	288,140,244	230,084,550	226,028,566	199,323,179	227,261,748
2002	998,154	148,895,183	571,927,681	574,160,956	407,916,409	343,974,255	332,898,135	313,383,395	356,866,692	314,324,982
2003	1,299,438	218,175,717	481,976,583	401,681,200	376,138,196	424,374,263	425,206,551	535,977,456	469,323,477	453,441,835
2004	30,974,357	323,687,131	455,657,866	552,119,948	701,436,722	709,206,566	817,242,880	705,842,803	699,734,469	680,316,509
2005	10,396,998	136,679,389	399,711,631	620,119,919	729,155,904	848,412,839	731,067,025	704,143,602	707,320,541	467,959,913
2006	4,643,483	152,764,697	576,991,537	912,031,836	1,163,507,658	943,256,699	897,087,025	945,510,858	610,352,934	478,714,173
2007	5,016,624	259,919,027	949,151,865	1,489,859,306	1,145,705,076	1,264,976,046	1,576,658,915	927,681,942	671,205,632	584,863,298
2008	11,963,289	665,877,386	2,666,177,704	2,766,964,205	3,262,449,289	4,265,223,891	2,562,143,879	1,755,322,807	1,513,916,623	912,025,275
2009	22,688,337	856,771,987	2,019,300,831	2,912,679,202	4,195,149,831	2,957,544,938	2,175,268,141	1,862,619,026	1,159,608,929	702,925,790
2010	12,030,829	300,975,147	893,318,337	1,572,177,334	1,409,418,129	1,222,085,033	1,023,759,991	686,372,094	430,080,965	277,710,882
2011	7,151,361	170,674,052	487,199,227	499,069,079	509,710,347	478,800,214	351,414,877	212,382,788	142,787,878	76,681,363
2012	4,005,653	99,275,184	216,659,895	302,511,010	350,743,887	288,264,626	194,066,729	136,061,116	77,357,608	22,957,758
2013	4,094,555	79,514,653	219,488,172	329,960,185	333,423,810	253,076,755	188,642,284	112,148,724	36,872,406	83,212,951
2014	273,515	34,274,660	119,706,389	199,776,658	171,517,032	138,988,852	86,820,250	31,173,802	61,077,645	93,261,080
2015	286,781	30,017,694	144,494,142	197,125,394	207,745,104	141,170,482	43,572,509	95,089,630	169,294,426	126,993,710
2016	495,821	36,539,220	143,823,260	230,387,067	180,684,277	62,393,509	150,039,888	359,272,512	286,979,722	198,765,147
2017	594,813	35,731,533	165,613,691	191,496,320	69,908,691	187,639,057	449,938,190	400,112,850	326,311,632	267,619,626
2018	799,188	45,485,998	133,224,202	69,200,511	227,406,240	483,128,848	407,912,231	344,490,289	294,762,738	246,756,820
2019	839,774	26,503,982	37,316,806	264,013,899	539,076,754	480,915,733	403,081,138	274,620,228	246,345,924	210,291,638
2020	0	3,520,242	302,420,305	627,230,868	576,773,561	406,792,030	327,343,845	302,417,811	275,489,387	225,179,240
2021	0	150,893,339	575,347,529	470,759,570	409,852,488	434,998,804	444,580,119	330,433,017	277,885,535	259,587,057

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	50,552,815	26,056,074	18,470,356	13,931,272	9,463,993	6,925,747	5,535,933	5,307,801	5,751,762	4,020,893
1991	30,156,829	18,504,260	12,100,737	9,675,630	6,677,875	5,284,097	4,319,912	5,079,637	3,785,191	4,375,474
1992	21,178,227	13,618,877	9,650,670	7,050,553	5,295,349	4,159,688	4,869,082	4,229,241	4,236,979	4,866,452
1993	25,921,479	17,552,055	11,640,391	9,019,342	7,495,488	7,445,519	6,848,045	8,010,619	8,480,319	5,736,468
1994	26,371,406	20,720,335	13,633,200	12,105,390	11,632,581	10,587,399	15,801,562	12,410,052	9,981,596	12,314,130
1995	20,679,100	14,100,381	13,454,647	12,350,686	12,141,810	14,401,692	12,373,718	9,125,920	9,036,031	6,344,658
1996	30,304,543	23,949,160	25,411,700	24,052,438	28,131,768	23,724,817	21,011,869	18,891,632	12,532,487	15,629,072
1997	34,459,885	35,868,431	30,478,228	37,314,192	30,439,093	25,106,108	26,853,908	17,591,143	19,279,067	20,633,120
1998	63,728,289	60,560,722	68,831,571	62,199,508	54,859,489	52,648,236	34,796,603	37,032,115	42,476,361	22,777,381
1999	100,280,707	111,859,351	112,504,139	92,767,095	87,295,215	56,440,910	57,292,537	58,355,088	34,879,733	24,330,806
2000	115,746,110	96,657,646	79,603,830	74,203,103	49,337,587	52,460,910	50,443,302	32,295,314	23,801,972	11,683,064
2001	210,120,392	168,022,736	154,108,445	97,121,433	98,667,556	87,912,752	54,860,271	33,375,398	18,414,754	14,092,515
2002	281,307,972	261,388,292	161,735,063	154,509,918	140,237,967	81,887,281	48,336,689	29,359,938	15,032,608	5,238,367
2003	442,351,856	279,703,779	223,100,248	193,896,046	111,587,002	65,883,422	35,571,635	17,479,051	4,557,909	6,400,536
2004	429,259,501	357,700,426	303,158,337	169,566,797	97,425,849	52,319,324	30,094,266	8,738,739	10,100,497	17,667,512
2005	375,618,431	308,141,296	177,627,236	98,091,089	58,903,146	29,241,091	7,380,002	11,237,673	17,197,736	13,886,937
2006	406,733,584	234,724,996	149,574,282	80,095,738	47,710,222	13,684,610	10,525,598	20,015,602	15,364,556	14,355,049
2007	354,630,684	205,700,321	126,809,953	74,182,763	22,108,014	18,269,893	32,427,723	24,418,507	25,275,065	14,065,731
2008	531,117,499	332,285,787	194,286,870	58,079,787	49,253,565	95,265,278	65,699,612	45,361,263	31,527,544	28,973,525
2009	425,773,120	241,131,438	75,014,686	70,245,277	135,951,146	83,166,890	59,616,325	44,014,068	38,410,594	28,986,062
2010	149,117,567	43,662,166	61,455,591	101,375,159	72,118,000	50,710,820	38,924,366	27,421,968	22,211,071	19,598,579
2011	24,823,423	68,699,078	79,931,160	64,349,217	46,393,617	33,716,765	28,414,807	19,338,658	17,836,051	13,711,515
2012	52,599,511	92,739,992	87,760,460	50,414,676	34,887,746	30,414,156	22,242,642	18,752,239	15,286,806	11,676,421
2013	152,154,209	111,823,918	76,419,874	71,183,431	50,267,470	44,502,739	34,362,982	32,807,751	25,873,828	19,987,152
2014	60,518,861	49,365,750	38,613,226	31,828,803	27,546,628	24,185,901	21,302,189	15,326,453	14,181,234	11,902,677
2015	105,128,106	95,637,929	66,881,105	53,636,341	45,536,410	42,832,776	28,760,271	34,444,449	21,052,186	18,378,134
2016	140,029,543	110,757,951	91,597,756	72,635,610	58,741,505	51,235,938	60,812,869	34,795,596	29,476,628	23,754,837
2017	224,425,654	183,469,301	173,535,262	123,183,119	107,860,897	92,568,138	83,272,827	64,638,607	54,215,883	40,371,680
2018	237,907,293	177,302,364	158,050,793	127,289,559	117,543,121	102,021,782	98,000,965	77,188,285	57,258,689	44,067,302
2019	179,572,456	159,086,534	130,395,205	137,083,133	121,641,227	94,130,090	80,734,193	70,909,039	50,737,146	40,706,070
2020	219,522,264	174,534,696	160,247,139	157,457,536	146,247,447	99,143,030	99,830,113	56,073,524	58,222,402	44,737,858
2021	231,957,512	213,499,210	169,019,645	145,052,913	135,403,317	122,637,763	85,901,283	68,472,753	52,666,331	36,383,207

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	5,534,902	5,011,425	3,094,163	3,207,508	1,513,325	1,993,388	2,398,457	754,149	783,130	470,757
1991	4,385,438	3,462,831	3,337,319	1,958,515	2,401,459	2,495,344	1,341,798	977,701	807,105	318,671
1992	3,206,054	3,709,434	1,922,445	2,235,833	2,658,280	1,919,805	686,915	384,398	174,432	22,651
1993	6,746,240	3,835,558	5,467,302	5,958,516	3,892,023	1,754,369	1,053,205	888,079	45,774	173,924
1994	6,825,688	7,465,344	8,869,179	4,803,746	2,292,820	2,130,321	887,051	225,916	289,633	564,204
1995	7,918,955	8,542,488	4,233,298	3,011,289	2,249,107	593,902	247,974	377,747	622,735	421,434
1996	17,012,482	9,997,484	5,971,116	4,258,165	1,827,817	211,437	434,899	1,138,182	1,035,202	628,185
1997	13,260,279	7,387,698	4,092,794	3,337,870	575,228	971,423	1,727,938	1,098,436	1,009,868	789,784
1998	12,402,559	6,529,630	4,875,547	1,576,689	1,305,844	2,331,034	3,038,392	2,646,617	1,563,898	1,131,873
1999	12,788,636	8,306,996	1,888,314	1,778,530	3,825,034	4,248,494	3,805,104	3,488,345	2,117,020	1,370,322
2000	8,000,102	2,978,879	2,011,796	3,055,128	3,049,915	2,781,188	2,402,590	1,937,623	1,193,889	1,183,833
2001	3,726,256	2,200,938	4,254,067	4,613,282	3,642,956	3,117,637	3,062,923	2,823,198	1,644,672	1,103,349
2002	4,080,586	8,190,927	6,887,570	4,981,583	5,041,516	4,500,591	3,585,025	2,997,668	1,825,290	1,709,405
2003	11,294,138	8,898,997	6,255,724	5,952,801	5,881,327	5,020,138	4,321,272	3,149,730	3,146,809	1,846,932
2004	15,225,327	12,398,754	8,075,200	8,913,837	8,188,049	6,074,005	5,572,879	4,146,577	3,954,030	2,773,295
2005	11,879,423	9,144,862	6,844,909	6,615,462	6,160,229	5,134,393	5,030,877	4,122,909	4,230,607	2,570,926
2006	9,697,945	7,850,156	5,504,660	6,066,171	5,264,716	4,985,503	4,613,407	4,909,796	3,826,111	2,466,224
2007	9,160,180	8,999,197	8,511,943	8,525,321	8,372,237	6,940,808	6,096,827	6,725,634	4,705,032	2,790,002
2008	32,287,628	17,531,856	18,227,151	15,888,564	14,329,045	13,820,327	13,008,451	11,907,981	8,409,536	4,787,189
2009	23,878,120	16,589,477	15,300,601	12,572,989	12,011,592	10,915,737	8,676,804	8,457,541	6,838,358	4,322,107
2010	15,477,964	13,268,498	11,313,517	10,441,968	9,345,543	8,421,249	7,520,829	6,105,382	3,713,767	2,990,379
2011	11,766,777	11,074,771	8,852,771	7,564,820	7,390,706	7,064,534	6,011,365	4,457,586	3,084,930	1,911,396
2012	8,590,599	7,422,178	7,103,840	6,672,122	5,698,462	5,771,368	4,287,339	3,698,345	2,805,706	2,152,640
2013	16,330,939	13,475,712	11,859,209	9,956,361	10,706,253	7,356,869	6,492,803	5,281,665	4,270,792	2,886,527
2014	9,840,554	7,653,481	6,688,741	6,803,392	5,077,922	5,065,852	3,932,910	3,657,087	3,555,924	2,180,574
2015	13,915,633	11,732,216	10,522,898	8,569,661	8,288,892	7,042,878	6,122,497	4,584,094	3,604,659	3,006,157
2016	18,742,604	16,252,219	15,331,350	11,452,475	9,358,323	10,092,774	7,874,790	6,571,726	4,471,199	4,106,590
2017	35,975,037	44,920,111	23,718,280	23,237,485	19,905,224	18,092,120	17,574,222	14,495,552	9,882,199	7,126,348
2018	36,140,693	38,305,220	41,455,301	24,261,345	19,451,922	19,530,900	16,186,959	14,475,533	9,827,522	8,301,037
2019	30,471,619	24,749,517	20,447,792	18,735,749	18,458,098	16,846,531	14,742,878	13,837,253	10,660,707	7,383,688
2020	35,337,148	26,691,142	23,016,930	18,002,227	16,253,550	13,671,468	12,935,017	26,570,718	8,407,188	4,846,698
2021	34,144,998	22,483,874	20,967,029	15,647,422	15,480,525	12,186,908	11,780,431	8,097,909	5,873,133	3,768,955

Table 12: Conditional Loss Severity = Table 11/Table 10
Loss Severity for Each Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	80.71%	53.87%	49.49%	49.63%	51.17%	52.20%	53.83%	50.43%	44.97%	45.00%
1991	38.63%	51.91%	51.17%	51.75%	53.33%	54.55%	50.84%	45.59%	44.45%	39.83%
1992	41.49%	53.75%	54.19%	53.56%	54.57%	49.77%	42.99%	42.20%	38.58%	33.09%
1993	35.50%	55.23%	55.63%	53.75%	48.07%	41.50%	38.75%	35.31%	28.98%	27.14%
1994	53.24%	58.43%	56.76%	48.14%	39.30%	37.00%	33.03%	28.18%	25.74%	27.33%
1995	48.36%	59.23%	46.07%	38.34%	36.84%	35.17%	30.60%	28.86%	31.32%	31.04%
1996	42.74%	40.78%	37.70%	36.24%	33.51%	29.98%	28.13%	30.68%	31.19%	34.82%
1997	33.45%	40.61%	38.43%	34.05%	30.30%	28.73%	30.58%	30.97%	34.44%	38.32%
1998	39.17%	40.48%	34.50%	29.72%	27.62%	30.05%	30.05%	33.04%	38.55%	50.87%
1999	38.29%	37.51%	32.22%	28.45%	30.02%	30.76%	35.26%	37.63%	48.80%	58.80%
2000	34.80%	35.08%	31.39%	33.60%	33.74%	36.84%	41.08%	49.64%	60.35%	61.26%
2001	30.81%	33.25%	35.83%	35.31%	37.33%	40.38%	49.07%	58.90%	60.80%	64.14%
2002	34.02%	36.86%	37.88%	39.32%	40.12%	47.75%	55.44%	58.96%	63.30%	66.01%
2003	42.57%	44.13%	42.18%	40.21%	46.04%	54.23%	56.91%	61.50%	63.84%	64.11%
2004	45.79%	44.34%	41.00%	46.47%	54.56%	58.41%	61.96%	65.84%	65.39%	61.95%
2005	39.14%	41.24%	47.56%	55.61%	59.33%	64.09%	66.80%	67.20%	64.48%	60.27%
2006	46.45%	48.03%	57.11%	61.61%	66.25%	69.89%	69.24%	67.05%	63.42%	65.12%
2007	56.51%	57.77%	61.56%	67.38%	71.00%	70.63%	67.26%	64.08%	65.54%	69.28%
2008	58.37%	61.71%	65.40%	69.78%	69.08%	63.87%	60.58%	62.15%	66.28%	70.94%
2009	66.56%	63.31%	66.22%	65.46%	58.71%	55.14%	57.57%	61.75%	67.53%	72.43%
2010	66.00%	66.86%	63.44%	55.01%	49.66%	52.22%	58.05%	64.56%	68.05%	69.59%
2011	68.03%	66.74%	56.13%	45.82%	48.72%	56.52%	61.67%	64.30%	64.36%	56.93%
2012	46.24%	63.51%	47.29%	49.50%	54.00%	61.15%	64.85%	62.39%	58.31%	68.21%
2013	60.91%	48.78%	50.71%	55.25%	58.81%	64.19%	63.91%	59.02%	75.43%	66.25%
2014	32.31%	45.46%	48.61%	53.06%	59.91%	60.01%	55.84%	70.52%	67.98%	57.08%
2015	23.35%	52.43%	53.15%	58.17%	60.16%	57.13%	68.78%	60.79%	56.64%	60.32%
2016	49.00%	60.93%	60.52%	62.33%	58.48%	71.68%	60.38%	55.61%	57.71%	61.12%
2017	42.18%	61.24%	63.14%	57.08%	71.36%	58.89%	55.50%	57.74%	57.35%	55.89%
2018	46.83%	66.28%	57.04%	75.02%	61.07%	56.43%	57.33%	57.56%	57.62%	55.73%
2019	67.34%	64.05%	73.63%	60.62%	56.85%	57.95%	60.74%	58.14%	57.77%	57.66%
2020	0.00%	71.01%	60.68%	56.49%	59.79%	60.18%	57.69%	59.30%	60.67%	57.12%
2021	0.00%	62.24%	57.81%	59.33%	61.63%	62.80%	64.48%	59.26%	59.26%	60.67%

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	42.36%	39.44%	41.14%	39.61%	39.37%	46.53%	51.71%	61.37%	73.56%	66.75%
1991	37.99%	35.28%	33.48%	36.68%	39.49%	48.55%	64.35%	74.44%	66.01%	67.15%
1992	28.84%	28.24%	32.10%	41.21%	43.00%	54.06%	66.00%	59.39%	66.44%	67.60%
1993	28.30%	30.40%	35.95%	44.80%	51.55%	61.82%	61.47%	61.17%	61.80%	58.01%
1994	27.78%	37.69%	39.62%	51.45%	62.32%	54.95%	61.79%	61.93%	61.25%	56.15%
1995	35.42%	38.38%	55.94%	61.50%	60.62%	64.40%	64.39%	62.26%	55.73%	54.82%
1996	40.48%	49.99%	59.73%	62.67%	63.39%	67.00%	63.83%	55.74%	53.67%	57.77%
1997	49.79%	60.21%	60.48%	64.48%	65.15%	62.55%	61.49%	52.88%	56.29%	58.79%
1998	58.99%	60.93%	63.85%	66.02%	65.69%	60.73%	54.37%	56.50%	64.02%	66.65%
1999	58.72%	62.17%	66.98%	64.47%	60.72%	57.38%	58.18%	61.17%	65.59%	64.40%
2000	65.75%	69.34%	68.43%	62.24%	58.88%	63.87%	66.05%	67.27%	66.21%	62.21%
2001	68.02%	66.83%	62.83%	60.09%	61.97%	65.44%	66.54%	68.09%	66.22%	71.41%
2002	66.07%	61.46%	58.63%	61.91%	63.64%	68.03%	67.22%	67.21%	59.01%	70.80%
2003	60.59%	56.22%	57.58%	61.13%	66.71%	70.93%	68.88%	59.02%	66.83%	76.35%
2004	56.17%	59.55%	62.41%	68.24%	68.15%	70.46%	62.90%	73.28%	73.00%	62.45%
2005	61.58%	65.44%	71.11%	72.02%	72.22%	64.60%	61.09%	79.25%	65.95%	66.84%
2006	68.59%	72.30%	74.48%	73.53%	71.41%	71.86%	69.69%	66.41%	66.98%	66.35%
2007	71.57%	75.04%	75.26%	71.43%	77.02%	75.60%	65.45%	67.57%	70.88%	65.56%
2008	75.11%	75.76%	71.36%	77.68%	75.16%	69.10%	67.84%	66.33%	62.14%	63.96%
2009	72.77%	68.57%	75.73%	74.13%	67.11%	64.74%	67.72%	62.09%	63.32%	64.44%
2010	63.00%	74.66%	71.68%	63.37%	63.75%	64.02%	63.92%	60.87%	58.88%	61.85%
2011	66.73%	72.00%	60.68%	64.19%	62.77%	59.56%	61.50%	59.08%	61.98%	61.36%
2012	62.08%	54.87%	63.60%	63.21%	61.70%	63.14%	59.83%	58.14%	58.07%	59.41%
2013	55.17%	59.66%	61.63%	62.67%	58.84%	57.63%	54.64%	58.59%	57.20%	56.38%
2014	57.90%	58.18%	54.95%	57.88%	55.96%	59.58%	59.92%	57.64%	57.34%	53.07%
2015	61.97%	60.79%	57.45%	55.63%	56.20%	56.21%	54.83%	60.16%	57.04%	58.13%
2016	59.24%	58.94%	57.41%	57.19%	59.80%	57.02%	64.00%	58.11%	59.99%	58.24%
2017	55.64%	55.00%	56.88%	54.92%	54.21%	53.19%	54.60%	53.87%	55.24%	56.01%
2018	56.36%	56.07%	56.78%	54.65%	56.26%	54.59%	57.17%	58.20%	57.78%	56.37%
2019	55.59%	56.51%	54.83%	60.79%	57.03%	56.60%	58.76%	60.99%	56.54%	56.69%
2020	59.24%	58.55%	59.80%	60.62%	60.04%	57.33%	60.98%	59.60%	59.90%	58.93%
2021	57.59%	58.90%	57.66%	57.51%	57.92%	61.10%	60.53%	58.65%	59.05%	55.96%

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	71.47%	71.67%	67.03%	58.01%	52.03%	61.95%	60.10%	43.18%	49.33%	42.69%
1991	66.53%	63.00%	57.05%	55.54%	58.44%	52.27%	54.54%	58.61%	48.69%	49.22%
1992	56.16%	55.62%	48.27%	45.56%	50.84%	53.43%	36.92%	29.82%	34.39%	17.55%
1993	49.80%	43.48%	47.46%	55.06%	52.63%	50.96%	50.69%	60.34%	12.08%	54.73%
1994	44.06%	52.52%	56.03%	51.14%	36.86%	63.36%	47.11%	47.86%	53.16%	59.85%
1995	58.14%	53.76%	49.55%	48.16%	53.46%	46.92%	54.09%	59.52%	64.00%	66.10%
1996	59.64%	57.72%	55.81%	56.14%	46.86%	39.09%	59.07%	67.78%	60.24%	73.23%
1997	60.32%	54.87%	54.92%	55.11%	41.07%	64.21%	62.08%	63.41%	62.24%	57.11%
1998	58.52%	60.19%	55.88%	57.11%	82.34%	58.76%	65.19%	60.24%	60.46%	64.66%
1999	63.35%	65.97%	54.11%	67.12%	57.87%	64.44%	66.41%	62.27%	56.47%	54.87%
2000	64.95%	71.48%	78.20%	66.49%	59.94%	66.17%	64.18%	63.18%	55.05%	56.59%
2001	54.50%	74.99%	59.56%	62.49%	60.11%	63.83%	59.50%	56.71%	53.75%	47.78%
2002	68.42%	57.91%	63.99%	61.50%	60.28%	65.19%	55.25%	52.96%	52.98%	51.72%
2003	62.48%	58.88%	57.53%	59.59%	58.71%	55.67%	53.05%	51.89%	53.17%	51.41%
2004	64.95%	63.50%	62.94%	60.82%	60.31%	55.20%	51.48%	59.20%	52.13%	51.53%
2005	67.94%	65.45%	62.53%	65.66%	60.17%	62.33%	59.29%	54.33%	58.59%	56.62%
2006	58.95%	64.87%	62.72%	58.23%	61.29%	62.10%	56.05%	59.33%	60.83%	58.93%
2007	60.56%	62.67%	57.79%	64.74%	61.10%	62.55%	56.41%	61.89%	59.64%	59.17%
2008	73.08%	63.05%	65.54%	60.83%	55.55%	61.88%	65.18%	61.91%	64.14%	59.43%
2009	64.89%	59.80%	62.38%	58.52%	64.19%	64.48%	61.55%	61.23%	60.15%	57.97%
2010	61.72%	60.18%	61.05%	56.34%	62.15%	62.79%	58.61%	60.36%	56.72%	54.71%
2011	60.21%	61.22%	56.37%	53.56%	55.52%	58.35%	57.65%	57.67%	60.26%	45.08%
2012	56.00%	55.31%	65.36%	63.05%	59.91%	59.63%	55.98%	56.95%	64.41%	52.01%
2013	54.39%	60.66%	57.72%	53.79%	57.20%	58.02%	58.13%	56.72%	61.42%	55.73%
2014	55.63%	58.64%	55.76%	57.63%	58.33%	54.19%	51.83%	60.76%	57.95%	60.35%
2015	54.41%	57.52%	56.18%	59.18%	56.63%	53.07%	59.33%	53.60%	57.16%	53.03%
2016	57.14%	57.82%	62.94%	59.54%	55.87%	59.38%	56.40%	60.07%	55.36%	54.08%
2017	58.28%	67.77%	53.72%	54.04%	57.83%	54.58%	60.30%	56.05%	56.81%	54.47%
2018	59.23%	63.16%	62.84%	57.43%	56.38%	55.24%	57.26%	54.61%	55.20%	55.80%
2019	58.60%	56.45%	57.05%	54.05%	60.11%	58.01%	63.32%	55.34%	59.58%	57.31%
2020	63.74%	61.03%	59.19%	60.22%	60.73%	58.18%	57.70%	74.91%	59.46%	58.37%
2021	58.24%	60.98%	57.31%	61.19%	59.46%	57.56%	58.80%	56.55%	56.01%	65.24%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
All Products Combined

Table 13: Cumulative Gross Claim Cost
Total Gross Losses for each Fiscal Year as of the End of the Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	3,073,174	127,928,029	649,755,560	1,443,873,537	2,204,728,260	2,764,369,081	3,157,317,050	3,494,972,946	3,742,030,585	3,916,981,105
1991	2,601,471	109,150,913	561,549,258	1,158,706,591	1,692,720,712	2,107,876,025	2,490,682,241	2,788,151,090	2,995,193,070	3,135,132,891
1992	1,257,151	80,503,073	377,213,837	776,108,566	1,194,855,925	1,656,189,915	2,052,752,970	2,345,792,288	2,544,638,351	2,657,944,610
1993	3,105,635	115,354,404	523,380,234	1,136,110,285	1,961,854,274	2,709,541,160	3,278,087,227	3,655,758,664	3,859,275,591	3,994,351,515
1994	5,342,530	181,675,958	769,077,797	1,769,747,659	2,871,494,999	3,760,576,138	4,345,531,244	4,679,408,255	4,901,766,223	5,059,192,109
1995	2,501,812	95,818,636	559,737,375	1,321,584,196	2,049,876,074	2,555,585,436	2,869,212,926	3,073,134,046	3,248,900,944	3,357,931,945
1996	1,351,909	167,256,815	967,291,340	2,145,269,733	3,096,658,307	3,726,290,690	4,163,446,694	4,526,512,930	4,744,227,829	4,865,213,336
1997	2,312,490	211,832,815	1,082,969,447	2,119,171,950	2,901,482,130	3,522,211,378	4,031,450,457	4,339,029,197	4,518,078,969	4,624,222,810
1998	3,588,997	252,791,228	1,156,365,839	2,122,649,814	2,994,490,176	3,812,329,166	4,342,600,168	4,663,135,688	4,857,300,586	4,986,977,730
1999	3,227,094	276,695,899	1,234,968,743	2,561,791,417	4,040,855,926	5,053,182,774	5,651,178,154	5,993,113,386	6,216,247,002	6,402,764,704
2000	3,753,739	284,412,593	1,410,905,676	3,038,936,178	4,187,992,043	4,835,120,071	5,208,889,940	5,458,307,370	5,663,717,731	5,831,148,905
2001	1,387,781	326,819,244	1,829,345,472	3,527,499,841	4,693,296,480	5,406,804,652	5,875,716,556	6,259,453,117	6,587,306,926	6,941,619,450
2002	2,934,027	406,855,798	1,916,866,639	3,376,972,913	4,393,699,261	5,114,076,322	5,714,488,715	6,246,011,853	6,809,776,432	7,285,954,741
2003	3,052,191	497,452,005	1,640,123,366	2,639,110,025	3,456,173,003	4,238,665,766	4,985,789,425	5,857,350,014	6,592,495,818	7,299,765,948
2004	67,639,436	797,722,610	1,908,967,063	3,097,129,640	4,382,822,378	5,597,009,063	6,916,072,296	7,988,198,725	9,058,347,811	10,156,494,372
2005	26,562,569	357,982,544	1,198,360,715	2,313,449,671	3,542,486,849	4,866,352,686	5,960,786,216	7,008,542,509	8,105,525,582	8,881,963,353
2006	9,997,700	328,033,368	1,338,361,590	2,818,760,735	4,574,920,765	5,924,525,199	7,220,189,030	8,630,249,504	9,592,581,660	10,327,747,363
2007	8,877,186	458,824,448	2,000,756,708	4,212,031,744	5,825,617,238	7,616,644,816	9,960,756,088	11,408,453,457	12,432,496,416	13,276,694,434
2008	20,494,138	1,099,527,169	5,176,426,179	9,141,747,263	13,864,528,788	20,542,192,473	24,771,498,600	27,595,655,447	29,879,645,501	31,165,320,439
2009	34,088,496	1,387,318,903	4,436,556,269	8,886,014,103	16,032,026,875	21,395,946,446	25,174,218,015	28,190,386,793	29,907,462,675	30,877,967,796
2010	18,228,050	468,396,653	1,876,619,449	4,734,425,206	7,572,320,556	9,912,593,206	11,676,161,305	12,739,345,325	13,371,307,739	13,770,349,652
2011	10,512,283	266,239,224	1,134,273,102	2,223,474,779	3,269,608,350	4,116,744,322	4,686,542,966	5,016,867,331	5,238,725,844	5,373,423,326
2012	8,662,792	164,987,330	623,135,587	1,234,239,223	1,883,769,909	2,355,213,889	2,654,476,024	2,872,553,072	3,005,216,245	3,038,874,754
2013	6,722,064	169,730,743	602,587,266	1,199,768,413	1,766,718,028	2,160,954,741	2,456,120,944	2,646,124,166	2,695,004,008	2,820,604,758
2014	846,568	76,238,894	322,489,409	698,976,684	985,252,173	1,216,864,343	1,372,341,705	1,416,544,627	1,506,388,541	1,669,781,994
2015	1,227,990	58,481,713	330,321,880	669,207,507	1,014,537,897	1,261,622,090	1,324,973,424	1,481,409,171	1,780,316,255	1,990,848,356
2016	1,011,785	60,981,271	298,616,844	668,255,183	977,219,092	1,064,262,244	1,312,745,327	1,958,786,739	2,456,090,809	2,781,309,553
2017	1,410,313	59,752,580	322,029,863	657,517,425	755,487,147	1,074,088,466	1,884,818,097	2,577,719,301	3,146,685,827	3,625,499,457
2018	1,706,489	70,338,596	303,891,876	396,137,930	768,525,186	1,624,669,648	2,336,246,905	2,934,724,413	3,446,244,417	3,889,041,077
2019	1,247,112	42,625,999	93,308,830	528,834,898	1,477,050,245	2,306,995,836	2,970,657,345	3,442,984,139	3,869,426,319	4,234,135,689
2020	454,026	5,411,411	503,789,363	1,614,046,242	2,578,773,863	3,254,750,177	3,822,155,508	4,332,126,581	4,786,239,769	5,180,455,392
2021	20,672	242,475,388	1,237,699,646	2,031,119,816	2,696,111,176	3,388,764,826	4,078,273,964	4,635,880,289	5,104,797,826	5,532,690,905

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	4,036,327,248	4,102,385,582	4,147,281,640	4,182,453,472	4,206,491,304	4,221,376,344	4,232,081,689	4,240,730,648	4,248,549,479	4,254,573,466
1991	3,214,518,587	3,266,972,789	3,303,112,121	3,329,493,788	3,346,405,380	3,357,289,769	3,364,002,755	3,370,826,395	3,376,560,621	3,383,076,705
1992	2,731,368,793	2,779,590,161	2,809,652,545	2,826,762,795	2,839,077,487	2,846,771,629	2,854,149,292	2,861,270,976	2,867,647,924	2,874,846,355
1993	4,085,958,900	4,143,702,987	4,176,080,014	4,196,213,044	4,210,752,608	4,222,797,443	4,233,938,571	4,247,033,319	4,260,754,926	4,270,642,982
1994	5,154,117,975	5,209,099,526	5,243,505,408	5,267,034,529	5,285,700,548	5,304,967,685	5,330,540,517	5,350,578,947	5,366,874,160	5,388,803,481
1995	3,416,316,618	3,453,059,064	3,477,110,237	3,497,193,452	3,517,223,718	3,539,586,004	3,558,802,488	3,573,460,461	3,589,675,490	3,601,248,377
1996	4,940,079,764	4,987,984,565	5,030,528,208	5,068,907,063	5,113,286,102	5,148,694,786	5,181,611,598	5,215,504,188	5,238,856,673	5,265,912,217
1997	4,693,436,921	4,753,007,605	4,803,405,233	4,861,271,864	4,907,990,637	4,948,128,386	4,991,802,917	5,025,068,957	5,059,318,362	5,094,417,312
1998	5,095,003,612	5,194,403,104	5,302,202,655	5,396,417,319	5,479,927,445	5,566,615,516	5,630,613,819	5,696,160,801	5,762,509,622	5,796,686,707
1999	6,573,539,915	6,753,457,750	6,921,417,243	7,065,312,028	7,209,086,079	7,307,454,259	7,405,923,410	7,501,317,597	7,554,493,188	7,592,273,940
2000	6,007,180,235	6,146,574,349	6,262,905,281	6,382,129,534	6,465,921,219	6,548,059,756	6,624,434,875	6,672,445,804	6,708,394,019	6,727,173,138
2001	7,250,509,428	7,501,915,934	7,747,199,347	7,908,817,979	8,068,048,228	8,202,392,377	8,284,840,530	8,333,854,360	8,361,663,632	8,381,397,215
2002	7,711,728,342	8,137,031,657	8,412,882,741	8,662,447,027	8,882,800,184	9,003,168,996	9,075,079,234	9,118,764,999	9,144,238,385	9,151,637,372
2003	8,029,789,592	8,527,313,713	8,914,796,570	9,231,972,314	9,399,233,967	9,492,117,897	9,543,764,433	9,573,379,669	9,580,200,007	9,588,582,871
2004	10,920,724,532	11,521,350,232	12,007,064,196	12,255,547,544	12,398,504,158	12,472,762,089	12,520,608,624	12,532,533,727	12,546,369,768	12,574,659,179
2005	9,491,890,523	9,962,779,767	10,212,564,892	10,348,765,268	10,430,326,220	10,475,587,590	10,487,668,488	10,501,849,034	10,527,924,933	10,548,700,170
2006	10,920,735,145	11,245,390,361	11,446,217,029	11,555,139,101	11,621,949,788	11,640,994,112	11,656,096,790	11,686,237,315	11,709,176,031	11,730,812,640
2007	13,772,192,078	14,046,318,645	14,214,818,086	14,318,677,604	14,347,383,084	14,371,550,661	14,421,099,599	14,457,235,573	14,492,893,568	14,514,347,426
2008	31,872,432,198	32,311,051,851	32,583,301,512	32,658,067,239	32,723,597,687	32,861,463,870	32,958,303,139	33,026,691,729	33,077,425,404	33,122,723,886
2009	31,463,079,677	31,814,724,072	31,913,773,281	32,008,531,119	32,211,105,239	32,339,561,361	32,427,589,872	32,498,477,741	32,559,143,424	32,604,127,888
2010	14,007,032,007	14,065,515,467	14,151,255,079	14,311,236,233	14,424,369,472	14,503,580,438	14,564,474,909	14,609,527,339	14,647,251,418	14,678,940,135
2011	5,410,620,515	5,506,033,311	5,637,761,282	5,738,013,441	5,811,926,632	5,868,535,677	5,914,739,258	5,947,473,422	5,976,250,669	5,998,597,075
2012	3,123,607,912	3,292,611,945	3,430,595,281	3,510,354,132	3,566,900,397	3,615,066,245	3,652,240,917	3,684,492,542	3,710,815,101	3,730,470,593
2013	3,096,396,717	3,283,833,875	3,407,834,405	3,521,423,628	3,606,848,876	3,684,072,446	3,746,959,239	3,802,958,307	3,848,192,851	3,883,640,617
2014	1,774,299,019	1,859,143,591	1,929,417,618	1,984,407,945	2,033,630,485	2,074,223,673	2,109,773,899	2,136,362,806	2,161,096,465	2,183,522,832
2015	2,160,491,813	2,317,805,393	2,434,220,644	2,530,634,778	2,611,654,225	2,687,852,455	2,740,303,934	2,797,560,525	2,834,468,185	2,866,082,054
2016	3,017,667,832	3,205,596,402	3,365,139,964	3,492,137,185	3,590,370,853	3,680,222,304	3,775,246,352	3,835,125,233	3,884,264,034	3,925,051,078
2017	4,028,822,926	4,362,422,468	4,667,508,956	4,891,810,817	5,090,762,598	5,264,805,419	5,417,306,907	5,537,286,558	5,635,425,944	5,707,506,217
2018	4,311,153,128	4,627,360,998	4,905,738,672	5,138,675,980	5,347,605,283	5,534,509,085	5,705,933,459	5,838,555,272	5,937,648,078	6,015,817,117
2019	4,557,166,037	4,838,672,977	5,076,499,189	5,302,005,558	5,515,280,849	5,681,602,531	5,818,990,948	5,935,246,693	6,024,983,353	6,096,792,177
2020	5,551,029,499	5,849,100,710	6,117,070,108	6,376,803,669	6,620,368,999	6,793,296,246	6,956,992,728	7,051,082,655	7,148,279,789	7,224,193,509
2021	5,935,433,705	6,297,920,323	6,591,059,863	6,843,284,308	7,077,053,201	7,277,773,305	7,419,691,425	7,536,442,186	7,625,630,923	7,690,650,678

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	4,262,317,933	4,269,310,758	4,273,926,809	4,279,455,792	4,282,364,365	4,285,582,236	4,289,572,984	4,291,319,700	4,292,907,111	4,294,009,945
1991	3,389,668,098	3,395,164,304	3,401,014,559	3,404,540,712	3,408,650,234	3,413,424,132	3,415,884,116	3,417,552,359	3,419,210,163	3,419,857,632
1992	2,880,555,477	2,887,225,009	2,891,207,419	2,896,114,674	2,901,343,133	2,904,936,229	2,906,797,028	2,908,086,201	2,908,593,472	2,908,722,553
1993	4,284,188,296	4,293,009,518	4,304,528,993	4,315,351,667	4,322,746,274	4,326,188,988	4,328,266,744	4,329,738,558	4,330,117,514	4,330,435,277
1994	5,404,296,079	5,418,510,984	5,434,340,607	5,443,734,539	5,449,954,089	5,453,316,509	5,455,199,402	5,455,671,437	5,456,216,307	5,457,159,029
1995	3,614,868,119	3,630,759,633	3,639,303,040	3,645,555,719	3,649,762,428	3,651,028,084	3,651,486,518	3,652,121,136	3,653,094,191	3,653,731,751
1996	5,294,439,855	5,311,761,483	5,322,460,718	5,330,046,202	5,333,947,180	5,334,488,144	5,335,224,404	5,336,903,670	5,338,622,061	5,339,479,850
1997	5,116,400,591	5,129,864,257	5,137,315,941	5,143,372,414	5,144,773,074	5,146,285,916	5,149,069,513	5,150,801,740	5,152,424,264	5,153,807,291
1998	5,817,881,262	5,828,728,928	5,837,454,667	5,840,215,670	5,841,801,595	5,845,768,458	5,850,429,365	5,854,822,686	5,857,409,292	5,859,159,690
1999	7,612,460,854	7,625,052,624	7,628,542,527	7,631,192,310	7,637,801,883	7,644,394,652	7,650,124,044	7,655,726,197	7,659,474,955	7,661,972,293
2000	6,739,491,226	6,743,658,463	6,746,230,975	6,750,826,101	6,755,914,298	6,760,117,535	6,763,861,132	6,766,927,771	6,769,096,619	6,771,188,626
2001	8,388,234,215	8,391,169,287	8,398,311,401	8,405,693,474	8,411,753,459	8,416,637,400	8,421,784,771	8,426,762,765	8,429,822,805	8,432,132,016
2002	9,157,601,198	9,171,746,212	9,182,510,098	9,190,610,486	9,198,973,495	9,205,877,167	9,212,366,136	9,218,025,957	9,221,471,138	9,224,775,964
2003	9,606,657,935	9,621,772,922	9,632,647,664	9,642,636,562	9,652,654,184	9,661,671,498	9,669,817,396	9,675,887,846	9,681,806,666	9,685,398,899
2004	12,598,101,325	12,617,626,842	12,630,457,622	12,645,112,687	12,658,689,408	12,669,692,627	12,680,517,659	12,687,522,043	12,695,106,360	12,700,488,550
2005	10,566,185,454	10,580,156,900	10,591,104,222	10,601,180,261	10,611,417,493	10,619,655,490	10,628,140,202	10,635,729,379	10,642,950,058	10,647,490,832
2006	11,747,264,487	11,759,365,887	11,768,142,890	11,778,559,657	11,787,149,839	11,795,177,856	11,803,409,218	11,811,684,194	11,817,973,737	11,822,158,448
2007	14,529,472,882	14,543,832,314	14,558,560,341	14,571,729,638	14,585,431,541	14,596,528,810	14,607,337,131	14,618,203,661	14,626,092,393	14,630,807,227
2008	33,166,904,203	33,194,711,431	33,222,523,930	33,248,641,729	33,274,436,688	33,296,770,118	33,316,727,395	33,335,963,104	33,349,074,327	33,357,129,557
2009	32,640,926,445	32,668,669,917	32,693,198,295	32,714,683,389	32,733,394,933	32,750,323,748	32,764,420,396	32,778,233,884	32,789,603,361	32,797,059,023
2010	14,704,016,229	14,726,064,242	14,744,595,405	14,763,128,623	14,778,165,315	14,791,577,342	14,804,408,244	14,814,522,885	14,821,070,678	14,826,536,353
2011	6,018,140,406	6,036,231,091	6,051,934,960	6,066,058,543	6,079,371,344	6,091,479,433	6,101,906,510	6,109,636,453	6,114,755,970	6,118,996,186
2012	3,745,810,636	3,759,229,699	3,770,098,845	3,780,681,618	3,790,192,946	3,799,871,066	3,807,529,976	3,814,024,071	3,818,380,274	3,822,519,469
2013	3,913,665,297	3,935,879,638	3,956,426,035	3,974,936,240	3,993,654,533	4,006,334,077	4,017,504,188	4,026,815,253	4,033,768,116	4,038,947,842
2014	2,201,211,983	2,214,263,469	2,226,260,129	2,238,065,216	2,246,770,393	2,256,119,240	2,263,707,889	2,269,726,560	2,275,863,090	2,279,476,115
2015	2,891,657,053	2,912,053,175	2,930,782,409	2,945,262,717	2,959,900,205	2,973,171,160	2,983,490,057	2,992,041,846	2,998,348,579	3,004,017,236
2016	3,957,851,506	3,985,960,517	4,010,319,761	4,029,554,338	4,046,304,076	4,063,302,129	4,077,263,667	4,088,203,278	4,096,279,785	4,103,872,813
2017	5,769,231,805	5,835,516,219	5,879,669,015	5,922,670,952	5,957,091,518	5,990,237,200	6,019,379,950	6,045,243,373	6,062,639,096	6,075,721,080
2018	6,076,835,883	6,137,488,090	6,203,453,539	6,245,695,038	6,280,197,989	6,315,556,733	6,343,824,224	6,370,333,500	6,388,137,478	6,403,015,027
2019	6,148,791,277	6,192,635,332	6,228,479,350	6,263,143,070	6,293,849,043	6,322,889,428	6,346,174,043	6,371,176,502	6,389,069,346	6,401,952,738
2020	7,279,635,312	7,323,370,552	7,362,257,394	7,392,149,353	7,418,913,671	7,442,411,281	7,464,829,831	7,500,300,067	7,514,438,869	7,522,742,706
2021	7,749,277,853	7,786,147,917	7,822,731,343	7,848,301,417	7,874,337,118	7,895,508,613	7,915,543,365	7,929,863,408	7,940,349,812	7,946,126,711

Table 14: Cumulative Claim Cost Net of Recovery
Total Losses Net of Recovery for each Fiscal Year as of the End of the Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	2,480,479	69,745,338	327,992,377	722,118,435	1,111,439,556	1,403,564,868	1,615,080,704	1,785,358,965	1,896,455,588	1,975,188,246
1991	1,005,047	56,311,706	287,794,144	596,817,631	881,586,329	1,108,064,406	1,302,688,249	1,438,303,542	1,530,343,416	1,586,075,204
1992	521,537	43,117,780	203,918,612	417,584,090	646,094,454	875,694,133	1,046,184,236	1,169,850,160	1,246,560,444	1,284,053,272
1993	1,102,429	63,100,798	290,096,570	619,455,292	1,016,385,493	1,326,647,864	1,546,978,356	1,680,342,367	1,739,312,545	1,775,968,053
1994	2,844,572	105,872,427	439,266,111	920,954,922	1,353,993,958	1,682,960,724	1,876,154,696	1,970,252,762	2,027,493,785	2,070,512,315
1995	1,209,908	56,478,055	270,191,628	562,308,841	830,632,135	1,008,513,808	1,104,497,306	1,163,350,089	1,218,393,045	1,252,239,828
1996	577,846	68,236,703	369,855,846	796,701,609	1,115,553,331	1,304,318,387	1,427,277,445	1,538,660,587	1,606,567,299	1,648,690,498
1997	773,629	85,870,008	420,633,186	773,436,160	1,010,445,327	1,188,773,845	1,344,477,052	1,439,736,155	1,501,405,614	1,542,084,954
1998	1,405,795	102,282,603	414,002,140	701,193,685	941,965,111	1,187,703,774	1,347,062,127	1,452,951,200	1,527,804,813	1,593,775,177
1999	1,235,574	103,808,889	412,527,595	789,976,377	1,233,932,303	1,545,352,881	1,756,232,720	1,884,886,752	1,993,782,046	2,103,463,057
2000	1,306,399	99,768,383	453,422,800	1,000,485,699	1,388,189,788	1,626,589,273	1,780,141,794	1,903,961,426	2,027,921,073	2,130,488,542
2001	427,509	108,631,321	646,976,396	1,246,600,801	1,681,837,448	1,969,977,691	2,200,062,241	2,426,090,808	2,625,413,987	2,852,675,735
2002	998,154	149,893,337	721,821,018	1,295,981,975	1,703,898,383	2,047,872,638	2,380,770,773	2,694,154,168	3,051,020,860	3,365,345,842
2003	1,299,438	219,475,155	701,451,738	1,103,132,938	1,479,271,134	1,903,645,397	2,328,851,948	2,864,829,404	3,334,152,881	3,787,594,716
2004	30,974,357	354,661,488	810,319,354	1,362,439,301	2,063,876,024	2,773,082,590	3,590,325,470	4,296,168,272	4,995,902,741	5,676,219,250
2005	10,396,998	147,076,386	546,788,017	1,166,907,937	1,896,063,841	2,744,476,679	3,475,543,705	4,179,687,306	4,887,007,848	5,354,967,761
2006	4,643,483	157,408,180	734,399,717	1,646,431,553	2,809,939,212	3,753,195,910	4,650,282,935	5,595,793,793	6,206,146,727	6,684,860,901
2007	5,016,624	264,935,651	1,214,087,516	2,703,946,822	3,849,651,898	5,114,627,945	6,691,286,859	7,618,968,801	8,290,174,434	8,875,037,732
2008	11,963,289	677,840,675	3,344,018,379	6,110,982,584	9,373,431,872	13,638,655,763	16,200,799,643	17,956,122,450	19,470,039,073	20,382,064,348
2009	22,688,337	879,460,324	2,898,761,155	5,811,440,357	10,006,590,187	12,964,135,126	15,139,403,266	17,002,022,292	18,161,631,221	18,864,557,011
2010	12,030,829	313,005,975	1,206,324,312	2,778,501,646	4,187,919,775	5,410,004,808	6,433,764,799	7,120,136,894	7,550,217,858	7,827,928,741
2011	7,151,361	177,825,413	665,024,641	1,164,093,719	1,673,804,066	2,152,604,280	2,504,019,157	2,716,401,945	2,859,189,823	2,935,871,186
2012	4,005,653	103,280,838	319,940,733	622,451,743	973,195,630	1,261,460,257	1,455,526,986	1,591,588,101	1,668,945,709	1,691,903,467
2013	4,094,555	83,609,208	303,097,380	633,057,565	966,481,375	1,219,558,130	1,408,200,414	1,520,349,138	1,557,221,544	1,640,434,495
2014	273,515	34,548,175	154,254,564	354,031,222	525,548,254	664,537,107	751,357,357	782,531,159	843,608,804	936,869,884
2015	286,781	30,304,475	174,798,617	371,924,011	579,669,115	720,839,597	764,412,106	859,501,736	1,028,796,163	1,155,789,872
2016	495,821	37,035,041	180,858,301	411,245,369	591,929,645	654,323,154	804,363,042	1,163,635,554	1,450,615,276	1,649,380,423
2017	594,813	36,326,347	201,940,038	393,436,358	463,345,049	650,984,106	1,100,922,295	1,501,035,145	1,827,346,777	2,094,966,403
2018	799,188	46,285,186	179,509,388	248,709,899	476,116,139	959,244,988	1,367,157,219	1,711,647,508	2,006,410,246	2,253,167,065
2019	839,774	27,343,756	64,660,561	328,674,460	867,751,214	1,348,666,947	1,751,748,085	2,026,368,313	2,272,714,237	2,483,005,875
2020	0	3,520,242	305,940,546	933,171,415	1,509,944,976	1,916,737,006	2,244,080,850	2,546,498,662	2,821,988,048	3,047,167,288
2021	0	150,893,339	726,240,868	1,197,000,437	1,606,852,925	2,041,851,729	2,486,431,848	2,816,864,865	3,094,750,400	3,354,337,457

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	2,025,741,062	2,051,797,136	2,070,267,492	2,084,198,763	2,093,662,757	2,100,588,504	2,106,124,437	2,111,432,237	2,117,183,999	2,121,204,892
1991	1,616,232,033	1,634,736,293	1,646,837,030	1,656,512,660	1,663,190,535	1,668,474,632	1,672,794,545	1,677,874,182	1,681,659,373	1,686,034,848
1992	1,305,231,500	1,318,850,376	1,328,501,047	1,335,551,599	1,340,846,948	1,345,006,636	1,349,875,718	1,354,104,959	1,358,341,938	1,363,208,390
1993	1,801,889,532	1,819,441,587	1,831,081,978	1,840,101,320	1,847,596,809	1,855,042,328	1,861,890,372	1,869,900,992	1,878,381,311	1,884,117,779
1994	2,096,883,721	2,117,604,056	2,131,237,256	2,143,342,646	2,154,975,228	2,165,562,626	2,181,364,188	2,193,774,240	2,203,755,836	2,216,069,966
1995	1,272,918,929	1,287,019,310	1,300,473,957	1,312,824,643	1,324,966,453	1,339,368,145	1,351,741,864	1,360,867,784	1,369,903,814	1,376,248,472
1996	1,678,995,041	1,702,944,201	1,728,355,900	1,752,408,338	1,780,540,106	1,804,264,923	1,825,276,792	1,844,168,424	1,856,700,911	1,872,329,983
1997	1,576,544,838	1,612,413,270	1,642,891,497	1,680,205,689	1,710,644,782	1,735,750,891	1,762,604,799	1,780,195,942	1,799,475,009	1,820,108,129
1998	1,657,503,466	1,718,064,188	1,786,895,759	1,849,095,267	1,903,954,756	1,956,602,992	1,991,399,596	2,028,431,711	2,070,908,072	2,093,685,453
1999	2,203,743,764	2,315,603,115	2,428,107,254	2,520,874,349	2,608,169,563	2,664,610,473	2,721,903,010	2,780,258,098	2,815,137,831	2,839,468,637
2000	2,246,234,652	2,342,892,298	2,422,496,129	2,496,699,231	2,546,036,818	2,598,497,728	2,648,941,030	2,681,236,343	2,705,038,316	2,716,721,380
2001	3,062,796,127	3,230,818,863	3,384,927,308	3,482,048,742	3,580,716,298	3,668,629,050	3,723,489,321	3,756,864,718	3,775,279,472	3,789,371,987
2002	3,646,653,814	3,908,042,106	4,069,777,169	4,224,287,086	4,364,525,054	4,446,412,335	4,494,749,024	4,524,108,962	4,539,141,570	4,544,379,937
2003	4,229,946,571	4,509,650,351	4,732,750,598	4,926,646,645	5,038,233,647	5,104,117,068	5,139,688,703	5,157,167,755	5,161,725,663	5,168,126,199
2004	6,105,478,751	6,463,179,177	6,766,337,514	6,935,904,311	7,033,330,160	7,085,649,484	7,115,743,750	7,124,482,489	7,134,582,986	7,152,250,498
2005	5,730,586,192	6,038,727,488	6,216,354,724	6,314,445,813	6,373,348,959	6,402,590,051	6,409,970,052	6,421,207,725	6,438,405,461	6,452,292,398
2006	7,091,594,485	7,326,319,481	7,475,893,762	7,555,989,500	7,603,699,722	7,617,384,332	7,627,909,930	7,647,925,532	7,663,290,088	7,677,645,137
2007	9,229,668,416	9,435,368,737	9,562,178,689	9,636,361,452	9,658,469,466	9,676,739,360	9,709,167,083	9,733,585,590	9,758,860,655	9,772,926,386
2008	20,913,181,847	21,245,467,634	21,439,754,504	21,497,834,291	21,547,087,855	21,642,353,133	21,708,052,745	21,753,414,009	21,784,941,553	21,813,915,078
2009	19,290,330,131	19,531,461,569	19,606,476,255	19,676,721,532	19,812,672,678	19,895,839,568	19,955,455,893	19,999,469,961	20,037,880,555	20,066,866,616
2010	7,977,046,307	8,020,708,474	8,082,164,065	8,183,539,224	8,255,657,224	8,306,368,044	8,345,292,410	8,372,714,378	8,394,925,449	8,414,524,028
2011	2,960,694,609	3,029,393,686	3,109,324,846	3,173,674,063	3,220,067,680	3,253,784,445	3,282,199,252	3,301,537,911	3,319,373,962	3,333,085,477
2012	1,744,502,978	1,837,242,971	1,925,003,431	1,975,418,106	2,010,305,852	2,040,720,009	2,062,962,651	2,081,714,890	2,097,001,696	2,108,678,117
2013	1,792,588,704	1,904,412,622	1,980,832,496	2,052,015,927	2,102,283,397	2,146,786,136	2,181,149,118	2,213,956,869	2,239,830,697	2,259,817,849
2014	997,388,744	1,046,754,494	1,085,367,720	1,117,196,523	1,144,743,151	1,168,929,052	1,190,231,241	1,205,557,694	1,219,738,927	1,231,641,604
2015	1,260,917,979	1,356,555,908	1,423,437,013	1,477,073,354	1,522,609,764	1,565,442,540	1,594,202,811	1,628,647,260	1,649,699,447	1,668,077,580
2016	1,789,409,966	1,900,167,917	1,991,765,673	2,064,401,283	2,123,142,788	2,174,378,726	2,235,191,596	2,269,987,192	2,299,463,820	2,323,218,657
2017	2,319,392,057	2,502,861,358	2,676,396,620	2,799,579,739	2,907,440,636	3,000,008,774	3,083,281,601	3,147,920,208	3,202,136,090	3,242,507,770
2018	2,491,074,358	2,668,376,722	2,826,427,516	2,953,717,075	3,071,260,196	3,173,281,978	3,271,282,943	3,348,471,228	3,405,729,917	3,449,797,219
2019	2,662,578,332	2,821,664,865	2,952,060,070	3,089,143,203	3,210,784,430	3,304,914,520	3,385,648,713	3,456,557,752	3,507,294,897	3,548,000,968
2020	3,266,689,552	3,441,224,248	3,601,471,387	3,758,928,923	3,905,176,369	4,004,319,400	4,104,149,512	4,160,223,037	4,218,445,439	4,263,183,297
2021	3,586,294,969	3,799,794,179	3,968,813,824	4,113,866,737	4,249,270,055	4,371,907,817	4,457,809,101	4,526,281,854	4,578,948,184	4,615,331,391

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	2,126,739,793	2,131,751,218	2,134,845,381	2,138,052,889	2,139,566,214	2,141,559,603	2,143,958,060	2,144,712,209	2,145,495,339	2,145,966,096
1991	1,690,420,286	1,693,883,117	1,697,220,436	1,699,178,951	1,701,580,410	1,704,075,754	1,705,417,552	1,706,395,252	1,707,202,358	1,707,521,029
1992	1,366,414,443	1,370,123,877	1,372,046,322	1,374,282,155	1,376,940,435	1,378,860,239	1,379,547,154	1,379,931,552	1,380,105,984	1,380,128,635
1993	1,890,864,018	1,894,699,577	1,900,166,879	1,906,125,395	1,910,017,418	1,911,771,787	1,912,824,992	1,913,713,071	1,913,758,845	1,913,932,769
1994	2,222,895,654	2,230,360,998	2,239,230,177	2,244,033,923	2,246,326,743	2,248,457,065	2,249,344,115	2,249,570,031	2,249,859,664	2,250,423,869
1995	1,384,167,426	1,392,709,915	1,396,943,212	1,399,954,502	1,402,203,608	1,402,797,510	1,403,045,484	1,403,423,231	1,404,045,966	1,404,467,399
1996	1,889,342,466	1,899,339,950	1,905,311,066	1,909,569,231	1,911,397,047	1,911,608,485	1,912,043,383	1,913,181,565	1,914,216,767	1,914,844,952
1997	1,833,368,408	1,840,756,106	1,844,848,899	1,848,186,770	1,848,761,998	1,849,733,421	1,851,461,360	1,852,559,796	1,853,569,664	1,854,359,448
1998	2,106,088,012	2,112,617,642	2,117,493,190	2,119,069,879	2,120,375,723	2,122,706,757	2,125,745,149	2,128,391,766	2,129,955,664	2,131,087,536
1999	2,852,257,274	2,860,564,270	2,862,452,584	2,864,231,114	2,868,056,147	2,872,304,641	2,876,109,745	2,879,598,090	2,881,715,110	2,883,085,432
2000	2,724,721,482	2,727,700,360	2,729,712,156	2,732,767,285	2,735,817,200	2,738,598,388	2,741,000,979	2,742,938,602	2,744,132,491	2,745,316,324
2001	3,793,098,243	3,795,299,181	3,799,553,248	3,804,166,530	3,807,809,485	3,810,927,122	3,813,990,045	3,816,813,244	3,818,457,915	3,819,561,264
2002	4,548,460,523	4,556,651,450	4,563,539,020	4,568,520,603	4,573,562,119	4,578,062,709	4,581,647,734	4,584,645,401	4,586,470,691	4,588,180,096
2003	5,179,420,337	5,188,319,335	5,194,575,059	5,200,527,860	5,206,409,187	5,211,429,324	5,215,750,596	5,218,900,326	5,222,047,135	5,223,894,066
2004	7,167,475,825	7,179,874,579	7,187,949,779	7,196,863,615	7,205,051,665	7,211,125,670	7,216,698,548	7,220,845,125	7,224,799,155	7,227,572,450
2005	6,464,171,822	6,473,316,684	6,480,161,593	6,486,777,055	6,492,937,284	6,498,071,677	6,503,102,554	6,507,225,462	6,511,456,070	6,514,026,996
2006	7,687,343,083	7,695,193,238	7,700,697,898	7,706,764,070	7,712,028,786	7,717,014,289	7,721,627,696	7,726,537,492	7,730,363,604	7,732,829,827
2007	9,782,086,566	9,791,085,763	9,799,597,706	9,808,123,027	9,816,495,264	9,823,436,071	9,829,532,899	9,836,258,533	9,840,963,565	9,843,753,567
2008	21,846,202,706	21,863,734,563	21,881,961,714	21,897,850,278	21,912,179,322	21,925,999,649	21,939,008,101	21,950,916,082	21,959,325,618	21,964,112,807
2009	20,090,744,737	20,107,334,214	20,122,634,814	20,135,207,804	20,147,219,396	20,158,135,133	20,166,811,937	20,175,269,478	20,182,107,836	20,186,429,944
2010	8,430,001,992	8,443,270,491	8,454,584,008	8,465,025,975	8,474,371,518	8,482,792,767	8,490,313,596	8,496,418,978	8,500,132,744	8,503,123,123
2011	3,344,852,254	3,355,927,025	3,364,779,797	3,372,344,617	3,379,735,323	3,386,799,857	3,392,811,223	3,397,268,809	3,400,353,739	3,402,265,135
2012	2,117,268,716	2,124,690,894	2,131,794,734	2,138,466,855	2,144,165,317	2,149,936,685	2,154,224,024	2,157,922,369	2,160,728,074	2,162,880,715
2013	2,276,148,789	2,289,624,501	2,301,483,710	2,311,440,071	2,322,146,323	2,329,503,193	2,335,995,996	2,341,277,660	2,345,548,453	2,348,434,980
2014	1,241,482,158	1,249,135,639	1,255,824,380	1,262,627,772	1,267,705,694	1,272,771,546	1,276,704,456	1,280,361,543	1,283,917,468	1,286,098,041
2015	1,681,993,214	1,693,725,429	1,704,248,327	1,712,817,988	1,721,106,880	1,728,149,757	1,734,272,254	1,738,856,348	1,742,461,007	1,745,467,164
2016	2,341,961,260	2,358,213,480	2,373,544,830	2,384,997,305	2,394,355,629	2,404,448,402	2,412,323,192	2,418,894,918	2,423,366,118	2,427,472,708
2017	3,278,482,808	3,323,402,919	3,347,121,199	3,370,358,684	3,390,263,908	3,408,356,027	3,425,930,249	3,440,425,801	3,450,308,001	3,457,434,348
2018	3,485,937,912	3,524,243,132	3,565,698,434	3,589,959,779	3,609,411,701	3,628,942,601	3,645,129,560	3,659,605,093	3,669,432,615	3,677,733,653
2019	3,578,472,586	3,603,222,103	3,623,669,896	3,642,405,645	3,660,863,743	3,677,710,274	3,692,453,152	3,706,290,405	3,716,951,111	3,724,334,800
2020	4,298,520,444	4,325,211,586	4,348,228,517	4,366,230,743	4,382,484,293	4,396,155,761	4,409,090,778	4,435,661,496	4,444,068,684	4,448,915,383
2021	4,649,476,389	4,671,960,263	4,692,927,292	4,708,574,714	4,724,055,238	4,736,242,146	4,748,022,577	4,756,120,486	4,761,993,620	4,765,762,575

Table 15: Cumulative Loss Severity = Table 14/Table 13
Loss Severity for Each Evaluation Year

Evaluation Year

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	80.71%	54.52%	50.48%	50.01%	50.41%	50.77%	51.15%	51.08%	50.68%	50.43%
1991	38.63%	51.59%	51.25%	51.51%	52.08%	52.57%	52.30%	51.59%	51.09%	50.59%
1992	41.49%	53.56%	54.06%	53.80%	54.07%	52.87%	50.96%	49.87%	48.99%	48.31%
1993	35.50%	54.70%	55.43%	54.52%	51.81%	48.96%	47.19%	45.96%	45.07%	44.46%
1994	53.24%	58.28%	57.12%	52.04%	47.15%	44.75%	43.17%	42.10%	41.36%	40.93%
1995	48.36%	58.94%	48.27%	42.55%	40.52%	39.46%	38.49%	37.86%	37.50%	37.29%
1996	42.74%	40.80%	38.24%	37.14%	36.02%	35.00%	34.28%	33.99%	33.86%	33.89%
1997	33.45%	40.54%	38.84%	36.50%	34.83%	33.75%	33.35%	33.18%	33.23%	33.35%
1998	39.17%	40.46%	35.80%	33.03%	31.46%	31.15%	31.02%	31.16%	31.45%	31.96%
1999	38.29%	37.52%	33.40%	30.84%	30.54%	30.58%	31.08%	31.45%	32.07%	32.85%
2000	34.80%	35.08%	32.14%	32.92%	33.15%	33.64%	34.18%	34.88%	35.81%	36.54%
2001	30.81%	33.24%	35.37%	35.34%	35.83%	36.44%	37.44%	38.76%	39.86%	41.10%
2002	34.02%	36.84%	37.66%	38.38%	38.78%	40.04%	41.66%	43.13%	44.80%	46.19%
2003	42.57%	44.12%	42.77%	41.80%	42.80%	44.91%	46.71%	48.91%	50.57%	51.89%
2004	45.79%	44.46%	42.45%	43.99%	47.09%	49.55%	51.91%	53.78%	55.15%	55.89%
2005	39.14%	41.08%	45.63%	50.44%	53.52%	56.40%	58.31%	59.64%	60.29%	60.29%
2006	46.45%	47.99%	54.87%	58.41%	61.42%	63.35%	64.41%	64.84%	64.70%	64.73%
2007	56.51%	57.74%	60.68%	64.20%	66.08%	67.15%	67.18%	66.78%	66.68%	66.85%
2008	58.37%	61.65%	64.60%	66.85%	67.61%	66.39%	65.40%	65.07%	65.16%	65.40%
2009	66.56%	63.39%	65.34%	65.40%	62.42%	60.59%	60.14%	60.31%	60.73%	61.09%
2010	66.00%	66.82%	64.28%	58.69%	55.31%	54.58%	55.10%	55.89%	56.47%	56.85%
2011	68.03%	66.79%	58.63%	52.35%	51.19%	52.29%	53.43%	54.15%	54.58%	54.64%
2012	46.24%	62.60%	51.34%	50.43%	51.66%	53.56%	54.83%	55.41%	55.53%	55.68%
2013	60.91%	49.26%	50.30%	52.76%	54.70%	56.44%	57.33%	57.46%	57.78%	58.16%
2014	32.31%	45.32%	47.83%	50.65%	53.34%	54.61%	54.75%	55.24%	56.00%	56.11%
2015	23.35%	51.82%	52.92%	55.58%	57.14%	57.14%	57.69%	58.02%	57.79%	58.06%
2016	49.00%	60.73%	60.57%	61.54%	60.57%	61.48%	61.27%	59.41%	59.06%	59.30%
2017	42.18%	60.79%	62.71%	59.84%	61.33%	60.61%	58.41%	58.23%	58.07%	57.78%
2018	46.83%	65.80%	59.07%	62.78%	61.95%	59.04%	58.52%	58.32%	58.22%	57.94%
2019	67.34%	64.15%	69.30%	62.15%	58.75%	58.46%	58.97%	58.85%	58.74%	58.64%
2020	0.00%	65.05%	60.73%	57.82%	58.55%	58.89%	58.71%	58.78%	58.96%	58.82%
2021	0.00%	62.23%	58.68%	58.93%	59.60%	60.25%	60.97%	60.76%	60.62%	60.63%

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	50.19%	50.01%	49.92%	49.83%	49.77%	49.76%	49.77%	49.79%	49.83%	49.86%
1991	50.28%	50.04%	49.86%	49.75%	49.70%	49.70%	49.73%	49.78%	49.80%	49.84%
1992	47.79%	47.45%	47.28%	47.25%	47.23%	47.25%	47.30%	47.33%	47.37%	47.42%
1993	44.10%	43.91%	43.85%	43.85%	43.88%	43.93%	43.98%	44.03%	44.09%	44.12%
1994	40.68%	40.65%	40.65%	40.69%	40.77%	40.82%	40.92%	41.00%	41.06%	41.12%
1995	37.26%	37.27%	37.40%	37.54%	37.67%	37.84%	37.98%	38.08%	38.16%	38.22%
1996	33.99%	34.14%	34.36%	34.57%	34.82%	35.04%	35.23%	35.36%	35.44%	35.56%
1997	33.59%	33.92%	34.20%	34.56%	34.85%	35.08%	35.31%	35.43%	35.57%	35.73%
1998	32.53%	33.08%	33.70%	34.27%	34.74%	35.15%	35.37%	35.61%	35.94%	36.12%
1999	33.52%	34.29%	35.08%	35.68%	36.18%	36.46%	36.75%	37.06%	37.26%	37.40%
2000	37.39%	38.12%	38.68%	39.12%	39.38%	39.68%	39.99%	40.18%	40.32%	40.38%
2001	42.24%	43.07%	43.69%	44.03%	44.38%	44.73%	44.94%	45.08%	45.15%	45.21%
2002	47.29%	48.03%	48.38%	48.77%	49.13%	49.39%	49.53%	49.61%	49.64%	49.66%
2003	52.68%	52.88%	53.09%	53.37%	53.60%	53.77%	53.85%	53.87%	53.88%	53.90%
2004	55.91%	56.10%	56.35%	56.59%	56.73%	56.81%	56.83%	56.85%	56.87%	56.88%
2005	60.37%	60.61%	60.87%	61.02%	61.10%	61.12%	61.12%	61.14%	61.16%	61.17%
2006	64.94%	65.15%	65.31%	65.39%	65.43%	65.44%	65.44%	65.44%	65.45%	65.45%
2007	67.02%	67.17%	67.27%	67.30%	67.32%	67.33%	67.33%	67.33%	67.34%	67.33%
2008	65.62%	65.75%	65.80%	65.83%	65.85%	65.86%	65.87%	65.87%	65.86%	65.86%
2009	61.31%	61.39%	61.44%	61.47%	61.51%	61.52%	61.54%	61.54%	61.54%	61.55%
2010	56.95%	57.02%	57.11%	57.18%	57.23%	57.27%	57.30%	57.31%	57.31%	57.32%
2011	54.72%	55.02%	55.15%	55.31%	55.40%	55.44%	55.49%	55.51%	55.54%	55.56%
2012	55.85%	55.80%	56.11%	56.27%	56.36%	56.45%	56.48%	56.50%	56.51%	56.53%
2013	57.89%	57.99%	58.13%	58.27%	58.29%	58.27%	58.21%	58.22%	58.20%	58.19%
2014	56.21%	56.30%	56.25%	56.30%	56.29%	56.36%	56.42%	56.43%	56.44%	56.41%
2015	58.36%	58.53%	58.48%	58.37%	58.30%	58.24%	58.18%	58.22%	58.20%	58.20%
2016	59.30%	59.28%	59.19%	59.12%	59.13%	59.08%	59.21%	59.19%	59.20%	59.19%
2017	57.57%	57.37%	57.34%	57.23%	57.11%	56.98%	56.92%	56.85%	56.82%	56.81%
2018	57.78%	57.67%	57.61%	57.48%	57.43%	57.34%	57.33%	57.35%	57.36%	57.35%
2019	58.43%	58.31%	58.15%	58.26%	58.22%	58.17%	58.18%	58.24%	58.21%	58.19%
2020	58.85%	58.83%	58.88%	58.95%	58.99%	58.95%	58.99%	59.00%	59.01%	59.01%
2021	60.42%	60.33%	60.22%	60.12%	60.04%	60.07%	60.08%	60.06%	60.05%	60.01%

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	49.90%	49.93%	49.95%	49.96%	49.96%	49.97%	49.98%	49.98%	49.98%	49.98%
1991	49.87%	49.89%	49.90%	49.91%	49.92%	49.92%	49.93%	49.93%	49.93%	49.93%
1992	47.44%	47.45%	47.46%	47.45%	47.46%	47.47%	47.46%	47.45%	47.45%	47.45%
1993	44.14%	44.13%	44.14%	44.17%	44.19%	44.19%	44.19%	44.20%	44.20%	44.20%
1994	41.13%	41.16%	41.21%	41.22%	41.22%	41.23%	41.23%	41.23%	41.23%	41.24%
1995	38.29%	38.36%	38.38%	38.40%	38.42%	38.42%	38.42%	38.43%	38.43%	38.44%
1996	35.69%	35.76%	35.80%	35.83%	35.83%	35.83%	35.84%	35.85%	35.86%	35.86%
1997	35.83%	35.88%	35.91%	35.93%	35.93%	35.94%	35.96%	35.97%	35.97%	35.98%
1998	36.20%	36.24%	36.27%	36.28%	36.30%	36.31%	36.33%	36.35%	36.36%	36.37%
1999	37.47%	37.52%	37.52%	37.53%	37.55%	37.57%	37.60%	37.61%	37.62%	37.63%
2000	40.43%	40.45%	40.46%	40.48%	40.50%	40.51%	40.52%	40.53%	40.54%	40.54%
2001	45.22%	45.23%	45.24%	45.26%	45.27%	45.28%	45.29%	45.29%	45.30%	45.30%
2002	49.67%	49.68%	49.70%	49.71%	49.72%	49.73%	49.73%	49.74%	49.74%	49.74%
2003	53.91%	53.92%	53.93%	53.93%	53.94%	53.94%	53.94%	53.94%	53.94%	53.94%
2004	56.89%	56.90%	56.91%	56.91%	56.92%	56.92%	56.91%	56.91%	56.91%	56.91%
2005	61.18%	61.18%	61.18%	61.19%	61.19%	61.19%	61.19%	61.18%	61.18%	61.18%
2006	65.44%	65.44%	65.44%	65.43%	65.43%	65.43%	65.42%	65.41%	65.41%	65.41%
2007	67.33%	67.32%	67.31%	67.31%	67.30%	67.30%	67.29%	67.29%	67.28%	67.28%
2008	65.87%	65.87%	65.86%	65.86%	65.85%	65.85%	65.85%	65.85%	65.85%	65.85%
2009	61.55%	61.55%	61.55%	61.55%	61.55%	61.55%	61.55%	61.55%	61.55%	61.55%
2010	57.33%	57.34%	57.34%	57.34%	57.34%	57.35%	57.35%	57.35%	57.35%	57.35%
2011	55.58%	55.60%	55.60%	55.59%	55.59%	55.60%	55.60%	55.61%	55.61%	55.60%
2012	56.52%	56.52%	56.54%	56.56%	56.57%	56.58%	56.58%	56.58%	56.59%	56.58%
2013	58.16%	58.17%	58.17%	58.15%	58.15%	58.15%	58.15%	58.14%	58.15%	58.14%
2014	56.40%	56.41%	56.41%	56.42%	56.42%	56.41%	56.40%	56.41%	56.41%	56.42%
2015	58.17%	58.16%	58.15%	58.16%	58.15%	58.12%	58.13%	58.12%	58.11%	58.10%
2016	59.17%	59.16%	59.19%	59.19%	59.17%	59.17%	59.17%	59.17%	59.16%	59.15%
2017	56.83%	56.95%	56.93%	56.91%	56.91%	56.90%	56.92%	56.91%	56.91%	56.91%
2018	57.36%	57.42%	57.48%	57.48%	57.47%	57.46%	57.46%	57.45%	57.44%	57.44%
2019	58.20%	58.19%	58.18%	58.16%	58.17%	58.17%	58.18%	58.17%	58.18%	58.17%
2020	59.05%	59.06%	59.06%	59.07%	59.07%	59.07%	59.06%	59.14%	59.14%	59.14%
2021	60.00%	60.00%	59.99%	59.99%	59.99%	59.99%	59.98%	59.98%	59.97%	59.98%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Active Loans
FRM30

Table 1: Number of Loans Active at the End of Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1990	685,126	667,129	592,851	403,464	272,944	242,290	205,676	179,522	145,455	114,018	99,913	85,515	68,443	52,593	42,309	35,918	29,059	26,453	24,593	22,882	21,364	20,037	18,991	17,907	16,734	15,472	14,418	13,356	11,898	9,364	685
1991	563,305	532,580	397,490	274,018	246,277	209,914	183,444	146,417	113,104	99,037	83,647	65,364	48,138	37,572	31,341	25,617	23,127	21,402	19,882	18,773	17,368	16,386	15,449	14,529	13,574	12,555	11,666	10,699	9,544	7,506	382
1992	480,130	432,474	355,659	328,979	290,000	258,484	208,353	159,246	140,273	117,008	87,922	58,418	43,257	34,825	29,255	25,878	23,573	21,780	20,313	18,959	17,522	16,287	15,146	14,059	12,897	11,669	10,579	9,442	8,093	5,966	576
1993	732,647	670,805	636,257	581,043	528,760	449,624	362,759	321,636	270,632	204,287	123,474	87,581	68,443	56,732	49,877	45,087	41,347	38,092	35,275	32,627	29,262	26,974	24,728	22,618	20,468	18,207	16,351	14,407	12,139	10,411	1,187
1994	779,468	746,563	688,621	632,924	545,025	450,008	401,809	341,843	265,719	167,295	120,168	93,953	78,508	69,059	62,614	57,628	53,285	49,425	45,732	41,488	37,330	34,456	31,497	28,715	25,886	22,995	20,602	17,878	16,280	13,525	821
1995	363,249	330,641	305,700	252,617	200,318	177,021	147,198	111,820	73,442	52,618	40,383	33,042	28,480	25,740	23,910	22,321	20,935	19,628	18,250	17,071	15,754	14,571	13,427	12,437	11,458	10,464	9,357	8,674	8,170	7,126	900
1996	543,633	523,632	453,188	367,746	328,772	274,129	206,840	131,567	92,662	70,143	56,966	49,059	44,197	40,817	38,055	35,662	33,368	30,867	28,780	26,720	24,526	22,658	20,966	19,390	17,861	16,067	14,909	14,149	13,000	11,218	1,244
1997	491,274	442,316	366,663	331,636	277,586	209,192	133,447	93,915	70,803	57,504	49,634	44,605	41,244	38,531	36,205	33,936	31,424	29,379	27,327	25,270	23,124	21,399	19,868	18,452	16,831	15,723	15,003	13,861	12,568	10,856	1,469
1998	863,337	793,459	739,447	638,599	494,085	296,328	200,447	146,857	117,795	100,652	90,033	82,023	75,815	70,595	65,634	59,790	55,356	51,068	46,810	42,839	39,161	36,313	33,528	30,550	28,389	26,834	24,579	22,244	19,982	17,499	2,663
1999	1,024,735	983,104	849,654	651,623	396,401	268,766	195,451	156,220	133,298	118,895	108,149	99,804	92,546	85,739	77,636	71,780	66,055	60,482	55,373	50,920	46,853	43,321	39,687	36,934	35,152	32,188	29,301	26,524	23,958	20,717	2,122
2000	729,514	547,798	358,875	211,973	140,477	100,331	78,648	66,216	58,663	53,396	49,257	45,946	42,825	39,322	36,519	33,775	31,063	28,734	26,644	24,936	23,183	21,456	20,208	19,377	18,257	16,889	15,577	14,312	13,079	11,340	1,524
2001	1,015,542	811,302	458,897	300,242	212,974	167,171	141,079	124,490	111,065	101,119	93,118	85,551	76,445	70,125	64,317	58,706	53,685	49,584	46,172	42,960	39,058	36,521	34,859	32,490	30,097	27,571	25,391	23,399	21,392	18,982	2,941
2002	984,834	636,868	442,119	321,258	257,610	219,669	194,980	172,520	155,955	142,630	129,510	113,071	102,592	93,338	84,726	76,928	70,656	65,349	60,586	54,888	50,699	48,075	44,911	41,643	38,608	35,708	33,239	30,760	28,348	24,736	3,637
2003	840,355	650,029	501,246	413,665	359,228	324,371	292,035	265,509	242,678	216,941	182,312	163,059	146,197	130,802	117,209	106,608	97,970	89,517	79,654	73,403	67,380	62,786	58,555	54,782	51,485	47,574	44,553	41,423	38,306	34,121	53
2004	747,480	580,086	489,075	427,988	388,015	349,775	318,303	291,837	261,141	218,684	195,097	174,686	156,402	140,506	128,140	118,137	108,327	96,691	89,889	84,687	76,949	72,101	67,785	63,903	60,253	55,785	52,397	48,995	45,125	33,452	99
2005	411,224	357,798	320,535	292,876	265,008	241,148	220,828	196,399	162,080	143,390	127,333	113,067	101,059	92,150	84,892	77,739	69,357	65,275	62,659	59,159	54,488	51,831	49,545	47,447	45,250	42,310	40,125	37,754	35,007	29,509	103
2006	378,916	345,416	310,476	266,877	235,696	211,817	184,153	147,380	127,385	110,791	96,897	85,620	77,294	70,953	65,125	57,870	54,629	52,459	49,771	47,195	44,425	42,406	40,568	38,667	36,828	34,789	32,779	30,493	28,034	22,564	123
2007	390,269	343,440	285,607	249,512	224,160	194,354	153,015	129,542	111,557	96,478	84,074	75,417	68,897	63,145	56,408	52,870	50,653	47,974	45,444	43,016	40,739	38,994	37,287	35,608	33,940	31,962	29,941	27,591	25,213	21,213	137
2008	994,881	785,271	677,272	604,368	511,881	384,213	317,458	269,852	230,287	198,630	176,759	160,277	145,591	128,330	119,570	113,785	106,881	101,110	95,904	91,555	86,979	82,995	79,154	75,369	71,423	66,701	61,922	56,877	51,848	44,610	378
2009	1,755,028	1,520,793	1,400,116	1,190,546	911,208	782,376	654,044	541,304	455,127	398,985	357,511	314,169	263,134	238,522	224,020	209,299	196,813	186,685	177,901	170,071	161,325	153,891	146,754	139,270	130,972	121,886	113,413	104,735	96,121	83,507	517
2010	1,534,332	1,449,767	1,318,767	1,110,276	989,148	824,430	680,242	569,282	495,937	441,698	379,936	309,917	277,327	259,465	240,342	225,568	214,092	204,516	196,208	187,847	179,087	171,262	163,045	154,188	145,243	135,511	126,120	116,709	107,469	91,990	670
2011	1,057,442	982,360	847,557	759,276	637,132	529,696	445,870	390,036	347,877	298,963	241,600	213,671	199,520	185,719	175,321	167,067	160,374	154,674	149,321	143,891	138,018	132,652	126,758	120,662	114,397	107,689	101,501	95,119	88,810	75,874	544
2012	1,063,549	973,485	889,179	758,403	642,986	547,432	480,718	429,997	372,940	303,015	268,660	252,000	237,554	226,711	217,912	210,663	204,462	198,684	193,224	187,609	181,235	174,942	168,559	162,056	155,423	147,852	141,026	133,985	127,027	115,398	611
2013	1,269,291	1,196,326	1,052,302	915,294	794,997	702,312	629,802	549,619	447,532	402,151	378,515	358,828	344,258	332,050	321,523	312,494	304,199	296,263	288,607	280,355	268,166	259,409	250,409	241,565	232,596	220,174	211,021	202,048	193,287	172,498	624
2014	736,915	568,474	470,096	394,437	341,151	299,205	253,105	199,439	175,128	162,058	150,952	142,843	136,373	131,048	126,525	122,456	118,660	115,203	111,741	107,906	103,083	99,246	95,315	91,224	87,163	81,966	77,943	73,884	69,815	61,457	512
2015	1,073,177	897,500	764,677	662,404	576,926	468,482	348,738	303,919	283,634	264,851	249,680	237,388	227,488	219,159	211,672	204,820	198,657	192,558	186,235	179,572	171,760	165,356	158,919	152,212	145,448	137,393	130,711	123,841	116,877	105,600	883
2016	1,221,722	1,071,400	958,448	843,833	684,050	498,303	428,775	398,454	372,127	350,516	331,944	316,247	303,518	292,110	281,740	272,220	262,904	253,742	244,675	235,435	224,269	215,507	206,681	197,106	188,103	177,644	168,650	159,211	149,356	131,710	1,282
2017	1,209,847	1,091,236	973,376	773,070	554,825	468,760	430,300	397,852	372,661	351,921	333,627	318,328	304,725	292,240	280,988	269,933	259,520	249,460	239,765	229,940	218,797	209,767	200,208	190,660	181,630	171,335	162,159	152,377	141,910	121,000	950
2018	990,014	859,077	659,083	462,868	375,380	334,765	300,979	276,240	257,042	241,215	227,450	215,211	204,464	194,896	185,373	176,248	167,968	160,348	153,123	146,144	138,337	131,747	125,235	119,000	112,939	106,000	99,441	92,666	85,786	73,373	376
2019	970,994	694,011	474,056	370,980	326,303	288,889	261,846	241,293	224,856	211,284	198,576	187,295	177,223	167,530	158,527	149,882	142,014	135,237	128,886	122,699	116,275	110,534	105,060	99,648	94,305	88,473	82,741	76,839	70,736	62,275	864
2020	1,320,150	930,241	798,578	735,146	677,632	630,085	591,163	559,389	532,565	507,706	484,417	463,213	442,787	423,375	405,229	388,473	373,270	359,553	346,586	333,789	319,434	307,267	295,185	282,929	270,685	256,071	242,755	228,484	214,172	191,924	3,297
2021	1,382,558	1,225,219	1,149,090	1,073,689	1,008,179	949,575	901,184	861,148	824,671	790,084	757,498	727,003	698,763	671,701	646,951	624,041	603,385	584,291	565,670	547,245	525,717	507,867	489,897	471,528	451,522	426,428	404,447	382,296	359,413	323,307	0

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Claim Rate
FRM30

Table 2: Number of Claims in Each Evaluation Year

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	55	1,926	7,444	10,410	9,606	7,048	5,010	4,333	3,277	2,371	1,666	998	727	594	434	292	215	167	157	126	144	141	100	114	69	62	80	53	43	33
1991	40	1,537	5,804	7,227	6,189	4,716	4,215	3,329	2,383	1,733	1,010	737	535	414	287	194	124	136	111	122	134	111	111	71	81	97	52	40	38	19
1992	20	961	3,263	4,179	3,999	4,055	3,520	2,774	1,893	1,205	854	587	439	264	192	131	134	105	104	128	102	106	69	87	85	67	46	30	14	3
1993	36	1,210	4,081	5,720	7,081	6,536	5,186	3,576	2,097	1,497	1,112	779	482	307	211	185	186	218	228	170	216	153	190	199	146	82	57	34	8	19
1994	54	1,735	5,141	7,804	8,489	7,231	5,033	3,132	2,314	1,702	1,169	764	465	348	269	284	382	302	272	342	264	232	260	167	126	80	43	14	26	34
1995	25	845	3,594	5,883	5,668	4,335	2,870	2,012	1,821	1,253	748	467	354	281	284	305	274	217	230	173	197	214	146	109	75	33	16	20	21	44
1996	19	1,443	6,307	8,914	7,554	5,402	3,960	3,509	2,389	1,472	915	627	523	487	579	469	449	433	327	375	403	282	205	138	85	17	34	53	46	57
1997	28	1,462	5,617	7,046	5,597	4,855	4,228	2,984	1,919	1,182	796	684	575	647	566	483	549	414	420	458	338	235	168	110	23	34	56	79	68	51
1998	28	2,028	7,808	8,795	8,452	8,295	5,684	3,689	2,287	1,582	1,294	1,208	1,342	1,174	1,074	1,138	889	897	927	589	392	250	177	59	56	114	133	110	107	60
1999	43	2,826	9,300	12,747	14,362	10,295	6,440	3,809	2,538	2,096	1,886	2,020	1,920	1,646	1,748	1,282	1,258	1,282	833	634	379	247	67	85	123	183	169	127	105	109
2000	53	2,713	10,788	15,127	10,997	6,411	3,698	2,494	2,028	1,631	1,714	1,424	1,199	1,248	933	932	911	640	499	292	198	61	56	93	87	97	92	94	91	70
2001	18	3,422	14,373	16,147	11,228	6,895	4,567	3,730	3,119	3,417	3,002	2,547	2,581	1,863	1,814	1,669	1,154	725	497	310	98	82	158	164	135	142	118	107	74	70
2002	44	3,889	13,181	12,847	8,817	6,206	4,974	4,508	4,908	4,204	3,844	3,996	2,811	2,608	2,454	1,597	1,046	760	382	116	143	182	196	175	148	140	115	104	94	90
2003	40	4,445	9,794	8,584	6,796	6,289	6,121	7,370	6,247	6,239	6,752	4,832	3,868	3,347	2,091	1,322	823	453	116	182	280	238	205	161	160	149	148	136	127	100
2004	562	5,894	8,975	9,171	9,292	9,038	10,400	8,582	8,868	9,461	6,751	5,592	4,755	2,969	1,852	1,191	706	190	276	445	381	301	221	196	205	151	190	169	145	162
2005	202	2,663	6,423	7,818	8,650	9,609	8,119	8,156	8,698	6,240	5,099	4,316	2,801	1,697	1,128	631	182	246	331	336	257	190	174	150	134	139	136	140	136	107
2006	98	2,689	7,781	10,812	12,667	9,974	9,835	10,757	7,468	5,998	5,009	3,221	2,169	1,341	815	258	246	377	352	309	214	167	124	151	133	124	139	158	147	129
2007	102	3,506	10,957	15,209	11,423	12,623	16,040	10,224	7,605	6,489	4,342	2,698	1,839	1,073	347	351	496	477	425	281	216	175	160	149	151	134	142	166	158	159
2008	174	7,525	25,967	25,690	30,902	42,435	27,096	19,161	16,033	10,377	6,393	4,444	2,613	813	837	1,193	1,120	831	590	474	385	298	300	332	291	309	332	356	306	254
2009	291	8,999	20,239	30,207	46,518	34,765	25,577	21,216	14,222	9,076	5,996	3,568	1,111	1,207	1,824	1,647	1,130	813	650	476	391	335	273	279	305	276	274	238	228	182
2010	145	3,317	10,430	20,057	19,442	17,003	13,964	10,027	6,819	4,749	2,659	794	1,172	1,902	1,515	1,021	757	577	424	363	309	233	238	249	257	254	236	198	183	168
2011	107	2,085	6,322	7,472	7,427	6,848	5,481	3,713	2,608	1,520	456	1,043	1,501	1,231	908	690	524	387	319	277	226	211	210	214	216	204	172	203	144	120
2012	75	1,515	3,625	4,857	5,645	4,736	3,509	2,634	1,494	416	1,198	1,887	1,582	1,113	772	608	439	368	267	262	209	226	190	196	177	162	166	132	132	105
2013	94	1,447	3,721	5,453	5,692	4,525	3,455	2,074	624	1,990	2,833	2,309	1,666	1,293	1,061	842	716	630	501	462	419	364	340	282	289	240	223	242	239	201
2014	18	769	2,507	3,835	3,381	2,871	1,739	577	1,319	1,641	1,286	1,024	829	688	593	454	399	295	303	272	252	222	202	171	168	180	146	146	131	99
2015	18	707	3,023	4,038	4,142	2,747	873	2,086	3,030	2,611	2,079	1,613	1,236	965	864	691	543	487	442	393	334	319	238	254	230	263	201	165	159	157
2016	17	896	3,198	4,642	3,582	1,189	3,400	5,643	5,157	3,517	2,444	1,863	1,574	1,178	1,033	888	779	721	601	534	478	367	340	332	305	297	265	236	246	185
2017	25	924	3,562	3,949	1,377	4,156	6,944	6,601	5,525	4,265	3,428	2,807	2,423	1,907	1,740	1,584	1,388	1,214	993	859	720	579	517	491	544	469	444	395	346	295
2018	24	1,073	2,816	1,409	4,728	7,094	6,632	5,455	4,407	3,549	2,924	2,521	2,095	1,843	1,746	1,709	1,362	1,141	986	793	633	560	481	473	417	430	393	354	315	270
2019	30	626	751	4,573	7,377	7,003	5,693	4,036	3,361	2,748	2,376	2,165	1,818	1,686	1,535	1,419	1,144	931	760	608	520	432	387	388	391	314	289	277	222	214
2020	10	111	5,304	8,375	7,597	5,827	4,433	3,805	3,267	2,862	2,465	2,166	2,078	1,919	1,780	1,547	1,321	990	838	692	553	467	421	366	343	326	277	266	240	201
2021	1	2,783	6,874	6,433	5,710	4,907	4,217	3,881	3,318	3,019	2,712	2,421	2,419	2,206	2,017	1,749	1,419	1,173	957	681	568	494	446	434	384	328	322	283	286	202

Table 3: Conditional Claim Rate = Table 2 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Claim During the Evaluation Year

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.01%	0.29%	1.26%	2.58%	3.52%	2.91%	2.44%	2.41%	2.25%	2.08%	1.67%	1.17%	1.06%	1.13%	1.03%	0.81%	0.74%	0.63%	0.64%	0.55%	0.67%	0.70%	0.53%	0.64%	0.41%	0.40%	0.55%	0.40%	0.36%	0.35%
1991	0.01%	0.29%	1.46%	2.64%	2.51%	2.25%	2.30%	2.27%	2.11%	1.75%	1.21%	1.13%	1.11%	1.10%	0.92%	0.76%	0.54%	0.64%	0.56%	0.65%	0.77%	0.68%	0.72%	0.49%	0.60%	0.77%	0.45%	0.37%	0.40%	0.25%
1992	0.00%	0.22%	0.92%	1.27%	1.38%	1.57%	1.69%	1.74%	1.35%	1.03%	0.97%	1.00%	1.01%	0.76%	0.66%	0.51%	0.57%	0.48%	0.51%	0.68%	0.58%	0.65%	0.46%	0.62%	0.66%	0.57%	0.43%	0.32%	0.17%	0.05%
1993	0.00%	0.18%	0.64%	0.98%	1.34%	1.45%	1.43%	1.11%	0.77%	0.73%	0.90%	0.89%	0.70%	0.54%	0.42%	0.41%	0.45%	0.57%	0.65%	0.52%	0.74%	0.57%	0.77%	0.88%	0.71%	0.45%	0.35%	0.24%	0.07%	0.18%
1994	0.01%	0.23%	0.75%	1.23%	1.56%	1.61%	1.25%	0.92%	0.87%	1.02%	0.97%	0.81%	0.59%	0.50%	0.43%	0.49%	0.72%	0.61%	0.59%	0.82%	0.71%	0.67%	0.83%	0.58%	0.49%	0.35%	0.21%	0.08%	0.16%	0.25%
1995	0.01%	0.26%	1.18%	2.33%	2.83%	2.45%	1.95%	1.80%	2.48%	2.38%	1.85%	1.41%	1.24%	1.09%	1.19%	1.37%	1.31%	1.11%	1.26%	1.01%	1.25%	1.47%	1.09%	0.88%	0.65%	0.32%	0.17%	0.23%	0.26%	0.62%
1996	0.00%	0.28%	1.39%	2.42%	2.30%	1.97%	1.91%	2.67%	2.58%	2.10%	1.61%	1.28%	1.18%	1.19%	1.52%	1.32%	1.35%	1.40%	1.14%	1.40%	1.64%	1.24%	0.98%	0.71%	0.48%	0.11%	0.23%	0.37%	0.35%	0.51%
1997	0.01%	0.33%	1.53%	2.12%	2.02%	2.32%	3.17%	3.18%	2.71%	2.06%	1.60%	1.53%	1.39%	1.68%	1.56%	1.42%	1.75%	1.41%	1.54%	1.81%	1.46%	1.10%	0.85%	0.60%	0.14%	0.22%	0.37%	0.57%	0.54%	0.47%
1998	0.00%	0.26%	1.06%	1.38%	1.71%	2.80%	2.84%	2.51%	1.94%	1.57%	1.44%	1.47%	1.77%	1.66%	1.64%	1.90%	1.61%	1.76%	1.98%	1.37%	1.00%	0.69%	0.53%	0.19%	0.20%	0.42%	0.54%	0.49%	0.54%	0.34%
1999	0.00%	0.29%	1.09%	1.96%	3.62%	3.83%	3.29%	2.44%	1.90%	1.76%	1.74%	2.02%	2.07%	1.92%	2.25%	1.79%	1.90%	2.12%	1.50%	1.25%	0.81%	0.57%	0.17%	0.23%	0.35%	0.57%	0.58%	0.48%	0.44%	0.53%
2000	0.01%	0.50%	3.01%	7.14%	7.83%	6.39%	4.70%	3.77%	3.46%	3.05%	3.48%	3.10%	2.80%	3.17%	2.55%	2.76%	2.93%	2.23%	1.87%	1.17%	0.85%	0.28%	0.28%	0.48%	0.48%	0.57%	0.59%	0.66%	0.70%	0.62%
2001	0.00%	0.42%	3.13%	5.38%	5.27%	4.12%	3.24%	3.00%	2.81%	3.38%	3.22%	2.98%	3.38%	2.66%	2.82%	2.84%	2.15%	1.46%	1.08%	0.72%	0.25%	0.22%	0.45%	0.50%	0.45%	0.52%	0.46%	0.46%	0.35%	0.37%
2002	0.00%	0.61%	2.98%	4.00%	3.42%	2.83%	2.55%	2.61%	3.15%	2.95%	2.97%	3.53%	2.74%	2.79%	2.90%	2.08%	1.48%	1.16%	0.63%	0.21%	0.28%	0.38%	0.44%	0.42%	0.38%	0.39%	0.35%	0.34%	0.33%	0.36%
2003	0.00%	0.68%	1.95%	2.08%	1.89%	1.94%	2.10%	2.78%	2.57%	2.88%	3.70%	2.96%	2.65%	2.56%	1.78%	1.24%	0.84%	0.51%	0.15%	0.25%	0.42%	0.38%	0.35%	0.29%	0.31%	0.31%	0.33%	0.33%	0.33%	0.29%
2004	0.08%	1.02%	1.84%	2.14%	2.39%	2.58%	3.27%	2.94%	3.40%	4.33%	3.46%	3.20%	3.04%	2.11%	1.45%	1.01%	0.65%	0.20%	0.31%	0.53%	0.50%	0.42%	0.33%	0.31%	0.34%	0.27%	0.36%	0.34%	0.32%	0.48%
2005	0.05%	0.74%	2.00%	2.67%	3.26%	3.98%	3.68%	4.15%	5.37%	4.35%	4.00%	3.82%	2.77%	1.84%	1.33%	0.81%	0.26%	0.38%	0.53%	0.57%	0.47%	0.37%	0.35%	0.32%	0.30%	0.33%	0.34%	0.37%	0.39%	0.36%
2006	0.03%	0.78%	2.51%	4.05%	5.37%	4.71%	5.34%	7.30%	5.86%	5.41%	5.17%	3.76%	2.81%	1.89%	1.25%	0.45%	0.45%	0.72%	0.71%	0.65%	0.48%	0.39%	0.31%	0.39%	0.36%	0.36%	0.42%	0.52%	0.52%	0.57%
2007	0.03%	1.02%	3.84%	6.10%	5.10%	6.49%	10.48%	7.89%	6.82%	6.73%	5.16%	3.58%	2.67%	1.70%	0.62%	0.66%	0.98%	0.99%	0.94%	0.65%	0.53%	0.45%	0.43%	0.42%	0.44%	0.42%	0.47%	0.60%	0.63%	0.75%
2008	0.02%	0.96%	3.83%	4.25%	6.04%	11.04%	8.54%	7.10%	6.96%	5.22%	3.62%	2.77%	1.79%	0.63%	0.70%	1.05%	1.05%	0.82%	0.62%	0.52%	0.44%	0.36%	0.38%	0.44%	0.41%	0.46%	0.54%	0.63%	0.59%	0.57%
2009	0.02%	0.59%	1.45%	2.54%	5.11%	4.44%	3.91%	3.92%	3.12%	2.27%	1.68%	1.14%	0.42%	0.51%	0.81%	0.79%	0.57%	0.44%	0.37%	0.28%	0.24%	0.22%	0.19%	0.20%	0.23%	0.23%	0.24%	0.23%	0.24%	0.22%
2010	0.01%	0.23%	0.79%	1.81%	1.97%	2.06%	2.05%	1.76%	1.37%	1.08%	0.70%	0.26%	0.42%	0.73%	0.63%	0.45%	0.35%	0.28%	0.22%	0.19%	0.17%	0.14%	0.15%	0.16%	0.18%	0.19%	0.19%	0.17%	0.17%	0.18%
2011	0.01%	0.21%	0.75%	0.98%	1.17%	1.29%	1.23%	0.95%	0.75%	0.51%	0.19%	0.49%	0.75%	0.66%	0.52%	0.41%	0.33%	0.25%	0.21%	0.19%	0.16%	0.16%	0.17%	0.18%	0.19%	0.19%	0.17%	0.21%	0.16%	0.16%
2012	0.01%	0.16%	0.41%	0.64%	0.88%	0.87%	0.73%	0.61%	0.40%	0.14%	0.45%	0.75%	0.67%	0.49%	0.35%	0.29%	0.21%	0.19%	0.14%	0.14%	0.12%	0.13%	0.11%	0.12%	0.11%	0.11%	0.12%	0.10%	0.10%	0.09%
2013	0.01%	0.12%	0.35%	0.60%	0.72%	0.64%	0.55%	0.38%	0.14%	0.49%	0.75%	0.64%	0.48%	0.39%	0.33%	0.27%	0.24%	0.21%	0.17%	0.16%	0.16%	0.14%	0.14%	0.12%	0.12%	0.11%	0.11%	0.12%	0.12%	0.12%
2014	0.00%	0.14%	0.53%	0.97%	0.99%	0.96%	0.69%	0.29%	0.75%	1.01%	0.85%	0.72%	0.61%	0.52%	0.47%	0.37%	0.34%	0.26%	0.27%	0.25%	0.24%	0.22%	0.21%	0.19%	0.19%	0.22%	0.19%	0.20%	0.19%	0.16%
2015	0.00%	0.08%	0.40%	0.61%	0.72%	0.59%	0.25%	0.69%	1.07%	0.99%	0.83%	0.68%	0.54%	0.44%	0.41%	0.34%	0.27%	0.25%	0.24%	0.22%	0.19%	0.19%	0.15%	0.17%	0.16%	0.19%	0.15%	0.13%	0.14%	0.15%
2016	0.00%	0.08%	0.33%	0.55%	0.52%	0.24%	0.79%	1.42%	1.39%	1.00%	0.74%	0.59%	0.52%	0.40%	0.37%	0.33%	0.30%	0.28%	0.25%	0.23%	0.21%	0.17%	0.16%	0.17%	0.16%	0.17%	0.16%	0.15%	0.16%	0.14%
2017	0.00%	0.08%	0.37%	0.51%	0.25%	0.89%	1.61%	1.66%	1.48%	1.21%	1.03%	0.88%	0.80%	0.65%	0.62%	0.59%	0.53%	0.49%	0.41%	0.37%	0.33%	0.28%	0.26%	0.26%	0.30%	0.27%	0.27%	0.26%	0.24%	0.24%
2018	0.00%	0.12%	0.43%	0.30%	1.26%	2.12%	2.20%	1.97%	1.71%	1.47%	1.29%	1.17%	1.02%	0.95%	0.94%	0.97%	0.81%	0.71%	0.64%	0.54%	0.46%	0.43%	0.38%	0.40%	0.37%	0.41%	0.40%	0.38%	0.37%	0.37%
2019	0.00%	0.09%	0.16%	1.23%	2.26%	2.42%	2.17%	1.67%	1.49%	1.30%	1.20%	1.16%	1.03%	1.01%	0.97%	0.95%	0.81%	0.69%	0.59%	0.50%	0.45%	0.39%	0.37%	0.39%	0.41%	0.35%	0.35%	0.36%	0.31%	0.34%
2020	0.00%	0.01%	0.66%	1.14%	1.12%	0.92%	0.75%	0.68%	0.61%	0.56%	0.51%	0.47%	0.47%	0.45%	0.44%	0.40%	0.35%	0.28%	0.24%	0.21%	0.17%	0.15%	0.14%	0.13%	0.13%	0.13%	0.11%	0.12%	0.11%	0.10%
2021	0.00%	0.23%	0.60%	0.60%	0.57%	0.52%	0.47%	0.45%	0.40%	0.38%	0.36%	0.33%	0.35%	0.33%	0.31%	0.28%	0.24%	0.20%	0.17%	0.12%	0.11%	0.10%	0.09%	0.09%	0.09%	0.08%	0.08%	0.07%	0.08%	0.06%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Claim Rate
FRM30

Table 4: Cumulative Number of Claims as of Each Evaluation Year
Total Number of Claims for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	55	1,981	9,425	19,835	29,441	36,489	41,499	45,832	49,109	51,480	53,146	54,144	54,871	55,465	55,899	56,191	56,406	56,573	56,730	56,856	57,000	57,141	57,241	57,355	57,424	57,486	57,566	57,619	57,662	57,695
1991	40	1,577	7,381	14,608	20,797	25,513	29,728	33,057	35,440	37,173	38,183	38,920	39,455	39,869	40,156	40,350	40,474	40,610	40,721	40,843	40,977	41,088	41,199	41,270	41,351	41,448	41,500	41,540	41,578	41,597
1992	20	981	4,244	8,423	12,422	16,477	19,997	22,771	24,664	25,869	26,723	27,310	27,749	28,013	28,205	28,336	28,470	28,575	28,679	28,807	28,909	29,015	29,084	29,171	29,256	29,323	29,369	29,399	29,413	29,416
1993	36	1,246	5,327	11,047	18,128	24,664	29,850	33,426	35,523	37,020	38,132	38,911	39,393	39,700	39,911	40,096	40,282	40,500	40,728	40,898	41,114	41,267	41,457	41,656	41,802	41,884	41,941	41,975	41,983	42,002
1994	54	1,789	6,930	14,734	23,223	30,454	35,487	38,619	40,933	42,635	43,804	44,568	45,033	45,381	45,650	45,934	46,316	46,618	46,890	47,232	47,496	47,728	47,988	48,155	48,281	48,361	48,404	48,418	48,444	48,478
1995	25	870	4,464	10,347	16,015	20,350	23,220	25,232	27,053	28,306	29,054	29,521	29,875	30,156	30,440	30,745	31,019	31,236	31,466	31,639	31,836	32,050	32,196	32,305	32,380	32,413	32,429	32,449	32,470	32,514
1996	19	1,462	7,769	16,683	24,237	29,639	33,599	37,108	39,497	40,969	41,884	42,511	43,034	43,521	44,100	44,569	45,018	45,451	45,778	46,153	46,556	46,838	47,043	47,181	47,266	47,283	47,317	47,370	47,416	47,473
1997	28	1,490	7,107	14,153	19,750	24,605	28,833	31,817	33,736	34,918	35,714	36,398	36,973	37,620	38,186	38,669	39,218	39,632	40,052	40,510	40,848	41,083	41,251	41,361	41,384	41,418	41,474	41,553	41,621	41,672
1998	28	2,056	9,864	18,659	27,111	35,406	41,090	44,779	47,066	48,648	49,942	51,150	52,492	53,666	54,740	55,878	56,767	57,664	58,591	59,180	59,572	59,822	59,999	60,058	60,114	60,228	60,361	60,471	60,578	60,638
1999	43	2,869	12,169	24,916	39,278	49,573	56,013	59,822	62,360	64,456	66,342	68,362	70,282	71,928	73,676	74,958	76,216	77,498	78,331	78,965	79,344	79,591	79,658	79,743	79,866	80,049	80,218	80,345	80,450	80,559
2000	53	2,766	13,554	28,681	39,678	46,089	49,787	52,281	54,309	55,940	57,654	59,078	60,277	61,525	62,458	63,390	64,301	64,941	65,440	65,732	65,930	65,991	66,047	66,140	66,227	66,324	66,416	66,510	66,601	66,671
2001	18	3,440	17,813	33,960	45,188	52,083	56,650	60,380	63,499	66,916	69,918	72,465	75,046	76,909	78,723	80,392	81,546	82,271	82,768	83,078	83,176	83,258	83,416	83,580	83,715	83,857	83,975	84,082	84,156	84,226
2002	44	3,933	17,114	29,961	38,778	44,984	49,958	54,466	59,374	63,578	67,422	71,418	74,229	76,837	79,291	80,888	81,934	82,694	83,076	83,192	83,335	83,517	83,713	83,888	84,036	84,176	84,291	84,395	84,489	84,579
2003	40	4,485	14,279	22,863	29,659	35,948	42,069	49,439	55,686	61,925	68,677	73,509	77,377	80,724	82,815	84,137	84,960	85,413	85,529	85,711	85,991	86,229	86,434	86,595	86,755	86,904	87,052	87,188	87,315	87,415
2004	562	6,456	15,431	24,602	33,894	42,932	53,332	61,914	70,782	80,243	86,994	92,586	97,341	100,310	102,162	103,353	104,059	104,249	104,525	104,970	105,351	105,652	105,873	106,069	106,274	106,425	106,615	106,784	106,929	107,091
2005	202	2,865	9,288	17,106	25,756	35,365	43,484	51,640	60,338	66,578	71,677	75,993	78,794	80,491	81,619	82,250	82,432	82,678	83,009	83,345	83,602	83,792	83,966	84,116	84,250	84,389	84,525	84,665	84,801	84,908
2006	98	2,787	10,568	21,380	34,047	44,021	53,856	64,613	72,081	78,079	83,088	86,309	88,478	89,819	90,634	90,892	91,138	91,515	91,867	92,176	92,390	92,557	92,681	92,832	92,965	93,089	93,228	93,386	93,533	93,662
2007	102	3,608	14,565	29,774	41,197	53,820	69,860	80,084	87,689	94,178	98,520	101,218	103,057	104,130	104,477	104,828	105,324	105,801	106,226	106,507	106,723	106,898	107,058	107,207	107,358	107,492	107,634	107,800	107,958	108,117
2008	174	7,699	33,666	59,356	90,258	132,693	159,789	178,950	194,983	205,360	211,753	216,197	218,810	219,623	220,460	221,653	222,773	223,604	224,194	224,668	225,053	225,351	225,651	225,983	226,274	226,583	226,915	227,271	227,577	227,831
2009	291	9,290	29,529	59,736	106,254	141,019	166,596	187,812	202,034	211,110	217,106	220,674	221,785	222,992	224,816	226,463	227,593	228,406	229,056	229,532	229,923	230,258	230,531	230,810	231,115	231,391	231,665	231,903	232,131	232,313
2010	145	3,462	13,892	33,949	53,391	70,394	84,358	94,385	101,204	105,953	108,612	109,406	110,578	112,480	113,995	115,016	115,773	116,350	116,774	117,137	117,446	117,679	117,917	118,166	118,423	118,677	118,913	119,111	119,294	119,462
2011	107	2,192	8,514	15,986	23,413	30,261	35,742	39,455	42,063	43,583	44,039	45,082	46,583	47,814	48,722	49,412	49,936	50,323	50,642	50,919	51,145	51,356	51,566	51,780	51,996	52,200	52,372	52,575	52,719	52,839
2012	75	1,590	5,215	10,072	15,717	20,453	23,962	26,596	28,090	28,506	29,704	31,591	33,173	34,286	35,058	35,666	36,105	36,473	36,740	37,002	37,211	37,437	37,627	37,823	38,000	38,162	38,328	38,460	38,592	38,697
2013	94	1,541	5,262	10,715	16,407	20,932	24,387	26,461	27,085	29,075	31,908	34,217	35,883	37,176	38,237	39,079	39,795	40,425	40,926	41,388	41,807	42,171	42,511	42,793	43,082	43,322	43,545	43,787	44,026	44,227
2014	18	787	3,294	7,129	10,510	13,381	15,120	15,697	17,016	18,657	19,943	20,967	21,796	22,484	23,077	23,531	23,930	24,225	24,528	24,800	25,052	25,274	25,476	25,647	25,815	25,995	26,141	26,287	26,418	26,517
2015	18	725	3,748	7,786	11,928	14,675	15,548	17,634	20,664	23,275	25,354	26,967	28,203	29,168	30,032	30,723	31,266	31,753	32,195	32,588	32,922	33,241	33,479	33,733	33,963	34,226	34,427	34,592	34,751	34,908
2016	17	913	4,111	8,753	12,335	13,524	16,924	22,567	27,724	31,241	33,685	35,548	37,122	38,300	39,333	40,221	41,000	41,721	42,322	42,856	43,334	43,701	44,041	44,373	44,678	44,975	45,240	45,476	45,722	45,907
2017	25	949	4,511	8,460	9,837	13,993	20,937	27,538	33,063	37,328	40,756	43,563	45,986	47,893	49,633	51,217	52,605	53,819	54,812	55,671	56,391	56,970	57,487	57,978	58,522	58,991	59,435	59,830	60,176	60,471
2018	24	1,097	3,913	5,322	10,050	17,144	23,776	29,231	33,638	37,187	40,111	42,632	44,727	46,570	48,316	50,025	51,387	52,528	53,514	54,307	54,940	55,500	55,981	56,454	56,871	57,301	57,694	58,048	58,363	58,633
2019	30	656	1,407	5,980	13,357	20,360	26,053	30,089	33,450	36,198	38,574	40,739	42,557	44,243	45,778	47,197	48,341	49,272	50,032	50,640	51,160	51,592	51,979	52,367	52,758	53,072	53,361	53,638	53,860	54,074
2020	10	121	5,425	13,800	21,397	27,224	31,657	35,462	38,729	41,591	44,056	46,222	48,300	50,219	51,999	53,546	54,867	55,857	56,695	57,387	57,940	58,407	58,828	59,194	59,537	59,863	60,140	60,406	60,646	60,847
2021	1	2,784	9,658	16,091	21,801	26,708	30,925	34,806	38,124	41,143	43,855	46,276	48,695	50,901	52,918	54,667	56,086	57,259	58,216	58,897	59,465	59,959	60,405	60,839	61,223	61,551	61,873	62,156	62,442	62,644

Table 5: Cumulative Claim Rate = Table 4 / Table 1 (Evaluation Year 1)
Cumulative Claims as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.01%	0.29%	1.38%	2.90%	4.30%	5.33%	6.06%	6.69%	7.17%	7.51%	7.76%	7.90%	8.01%	8.10%	8.16%	8.20%	8.23%	8.26%	8.28%	8.30%	8.32%	8.34%	8.35%	8.37%	8.38%	8.39%	8.40%	8.41%	8.42%	8.42%
1991	0.01%	0.28%	1.31%	2.59%	3.69%	4.53%	5.28%	5.87%	6.29%	6.60%	6.78%	6.91%	7.00%	7.08%	7.13%	7.16%	7.19%	7.21%	7.23%	7.25%	7.27%	7.29%	7.31%	7.33%	7.34%	7.36%	7.37%	7.37%	7.38%	7.38%
1992	0.00%	0.20%	0.88%	1.75%	2.59%	3.43%	4.16%	4.74%	5.14%	5.39%	5.57%	5.69%	5.78%	5.83%	5.87%	5.90%	5.93%	5.95%	5.97%	6.00%	6.02%	6.04%	6.06%	6.08%	6.09%	6.11%	6.12%	6.12%	6.13%	6.13%
1993	0.00%	0.17%	0.73%	1.51%	2.47%	3.37%	4.07%	4.56%	4.85%	5.05%	5.20%	5.31%	5.38%	5.42%	5.45%	5.47%	5.50%	5.53%	5.56%	5.58%	5.61%	5.63%	5.66%	5.69%	5.71%	5.72%	5.72%	5.73%	5.73%	5.73%
1994	0.01%	0.23%	0.89%	1.89%	2.98%	3.91%	4.55%	4.95%	5.25%	5.47%	5.62%	5.72%	5.78%	5.82%	5.86%	5.89%	5.94%	5.98%	6.02%	6.06%	6.09%	6.12%	6.16%	6.18%	6.19%	6.20%	6.21%	6.21%	6.22%	6.22%
1995	0.01%	0.24%	1.23%	2.85%	4.41%	5.60%	6.39%	6.95%	7.45%	7.79%	8.00%	8.13%	8.22%	8.30%	8.38%	8.46%	8.54%	8.60%	8.66%	8.71%	8.76%	8.82%	8.86%	8.89%	8.91%	8.92%	8.93%	8.93%	8.94%	8.95%
1996	0.00%	0.27%	1.43%	3.07%	4.46%	5.45%	6.18%	6.83%	7.27%	7.54%	7.70%	7.82%	7.92%	8.01%	8.11%	8.20%	8.28%	8.36%	8.42%	8.49%	8.56%	8.62%	8.65%	8.68%	8.69%	8.70%	8.70%	8.71%	8.72%	8.73%
1997	0.01%	0.30%	1.45%	2.88%	4.02%	5.01%	5.87%	6.48%	6.87%	7.11%	7.27%	7.41%	7.53%	7.66%	7.77%	7.87%	7.98%	8.07%	8.15%	8.25%	8.31%	8.36%	8.40%	8.42%	8.42%	8.43%	8.44%	8.46%	8.47%	8.48%
1998	0.00%	0.24%	1.14%	2.16%	3.14%	4.10%	4.76%	5.19%	5.45%	5.63%	5.78%	5.92%	6.08%	6.22%	6.34%	6.47%	6.58%	6.68%	6.79%	6.85%	6.90%	6.93%	6.95%	6.96%	6.96%	6.98%	6.99%	7.00%	7.02%	7.02%
1999	0.00%	0.28%	1.19%	2.43%	3.83%	4.84%	5.47%	5.84%	6.09%	6.29%	6.47%	6.67%	6.86%	7.02%	7.19%	7.31%	7.44%	7.56%	7.64%	7.71%	7.74%	7.77%	7.77%	7.78%	7.79%	7.81%	7.83%	7.84%	7.85%	7.86%
2000	0.01%	0.38%	1.86%	3.93%	5.44%	6.32%	6.82%	7.17%	7.44%	7.67%	7.90%	8.10%	8.26%	8.43%	8.56%	8.69%	8.81%	8.90%	8.97%	9.01%	9.04%	9.05%	9.05%	9.07%	9.08%	9.09%	9.10%	9.12%	9.13%	9.14%
2001	0.00%	0.34%	1.75%	3.34%	4.45%	5.13%	5.58%	5.95%	6.25%	6.59%	6.88%	7.14%	7.39%	7.57%	7.75%	7.92%	8.03%	8.10%	8.15%	8.18%	8.19%	8.20%	8.21%	8.23%	8.24%	8.26%	8.27%	8.28%	8.29%	8.29%
2002	0.00%	0.40%	1.74%	3.04%	3.94%	4.57%	5.07%	5.53%	6.03%	6.46%	6.85%	7.25%	7.54%	7.80%	8.05%	8.21%	8.32%	8.40%	8.44%	8.45%	8.46%	8.48%	8.50%	8.52%	8.53%	8.55%	8.56%	8.57%	8.58%	8.59%
2003	0.00%	0.53%	1.70%	2.72%	3.53%	4.28%	5.01%	5.88%	6.63%	7.37%	8.17%	8.75%	9.21%	9.61%	9.85%	10.01%	10.11%	10.16%	10.18%	10.20%	10.23%	10.26%	10.29%	10.30%	10.32%	10.34%	10.36%	10.38%	10.39%	10.40%
2004	0.08%	0.86%	2.06%	3.29%	4.53%	5.74%	7.13%	8.28%	9.47%	10.74%	11.64%	12.39%	13.02%	13.42%	13.67%	13.83%	13.92%	13.95%	13.98%	14.04%	14.09%	14.13%	14.16%	14.19%	14.22%	14.24%	14.26%	14.29%	14.31%	14.33%
2005	0.05%	0.70%	2.26%	4.16%	6.26%	8.60%	10.57%	12.56%	14.67%	16.19%	17.43%	18.48%	19.16%	19.57%	19.85%	20.00%	20.05%	20.11%	20.19%	20.27%	20.33%	20.38%	20.42%	20.46%	20.49%	20.52%	20.55%	20.59%	20.62%	20.65%
2006	0.03%	0.74%	2.79%	5.64%	8.99%	11.62%	14.21%	17.05%	19.02%	20.61%	21.93%	22.78%	23.35%	23.70%	23.92%	23.99%	24.05%	24.15%	24.24%	24.33%	24.38%	24.43%	24.46%	24.50%	24.53%	24.57%	24.60%	24.65%	24.68%	24.72%
2007	0.03%	0.92%	3.73%	7.63%	10.56%	13.79%	17.90%	20.52%	22.47%	24.13%	25.24%	25.94%	26.41%	26.68%	26.77%	26.86%	26.99%	27.11%	27.22%	27.29%	27.35%	27.39%	27.43%	27.47%	27.51%	27.54%	27.58%	27.62%	27.66%	27.70%
2008	0.02%	0.77%	3.38%	5.97%	9.07%	13.34%	16.06%	17.99%	19.60%	20.64%	21.28%	21.73%	21.99%	22.08%	22.16%	22.28%	22.39%	22.48%	22.53%	22.58%	22.62%	22.65%	22.68%	22.71%	22.74%	22.77%	22.81%	22.84%	22.87%	22.90%
2009	0.02%	0.53%	1.68%	3.40%	6.05%	8.04%	9.49%	10.70%	11.51%	12.03%	12.37%	12.57%	12.64%	12.71%	12.81%	12.90%	12.97%	13.01%	13.05%	13.08%	13.10%	13.12%	13.14%	13.15%	13.17%	13.18%	13.20%	13.21%	13.23%	13.24%
2010	0.01%	0.23%	0.91%	2.21%	3.48%	4.59%	5.50%	6.15%	6.60%	6.91%	7.08%	7.13%	7.21%	7.33%	7.43%	7.50%	7.55%	7.58%	7.61%	7.63%	7.65%	7.67%	7.69%	7.70%	7.72%	7.73%	7.75%	7.76%	7.77%	7.79%
2011	0.01%	0.21%	0.81%	1.51%	2.21%	2.86%	3.38%	3.73%	3.98%	4.12%	4.16%	4.26%	4.41%	4.52%	4.61%	4.67%	4.72%	4.76%	4.79%	4.82%	4.84%	4.86%	4.88%	4.90%	4.92%	4.94%	4.95%	4.97%	4.99%	5.00%
2012	0.01%	0.15%	0.49%	0.95%	1.48%	1.92%	2.25%	2.50%	2.64%	2.68%	2.79%	2.97%	3.12%	3.22%	3.30%	3.35%	3.39%	3.43%	3.45%	3.48%	3.50%	3.52%	3.54%	3.56%	3.57%	3.59%	3.60%	3.62%	3.63%	3.64%
2013	0.01%	0.12%	0.41%	0.84%	1.29%	1.65%	1.92%	2.08%	2.13%	2.29%	2.51%	2.70%	2.83%	2.93%	3.01%	3.08%	3.14%	3.18%	3.22%	3.26%	3.29%	3.32%	3.35%	3.37%	3.39%	3.41%	3.43%	3.45%	3.47%	3.48%
2014	0.00%	0.11%	0.45%	0.97%	1.43%	1.82%	2.05%	2.13%	2.31%	2.53%	2.71%	2.85%	2.96%	3.05%	3.13%	3.19%	3.25%	3.29%	3.33%	3.37%	3.40%	3.43%	3.46%	3.48%	3.50%	3.53%	3.55%	3.57%	3.58%	3.60%
2015	0.00%	0.07%	0.35%	0.73%	1.11%	1.37%	1.45%	1.64%	1.93%	2.17%	2.36%	2.51%	2.63%	2.72%	2.80%	2.86%	2.91%	2.96%	3.00%	3.04%	3.07%	3.10%	3.12%	3.14%	3.16%	3.19%	3.21%	3.22%	3.24%	3.25%
2016	0.00%	0.07%	0.34%	0.72%	1.01%	1.11%	1.39%	1.85%	2.27%	2.56%	2.76%	2.91%	3.04%	3.13%	3.22%	3.29%	3.36%	3.41%	3.46%	3.51%	3.55%	3.58%	3.60%	3.63%	3.66%	3.68%	3.70%	3.72%	3.74%	3.76%
2017	0.00%	0.08%	0.37%	0.70%	0.81%	1.16%	1.73%	2.28%	2.73%	3.09%	3.37%	3.60%	3.80%	3.96%	4.10%	4.23%	4.35%	4.45%	4.53%	4.60%	4.66%	4.71%	4.75%	4.79%	4.84%	4.88%	4.91%	4.95%	4.97%	5.00%
2018	0.00%	0.11%	0.40%	0.54%	1.02%	1.73%	2.40%	2.95%	3.40%	3.76%	4.05%	4.31%	4.52%	4.70%	4.88%	5.05%	5.19%	5.31%	5.41%	5.49%	5.55%	5.61%	5.65%	5.70%	5.74%	5.79%	5.83%	5.86%	5.90%	5.92%
2019	0.00%	0.07%	0.14%	0.62%	1.38%	2.10%	2.68%	3.10%	3.44%	3.73%	3.97%	4.20%	4.38%	4.56%	4.71%	4.86%	4.98%	5.07%	5.15%	5.22%	5.27%	5.31%	5.35%	5.39%	5.43%	5.47%	5.50%	5.52%	5.55%	5.57%
2020	0.00%	0.01%	0.41%	1.05%	1.62%	2.06%	2.40%	2.69%	2.93%	3.15%	3.34%	3.50%	3.66%	3.80%	3.94%	4.06%	4.16%	4.23%	4.29%	4.35%	4.39%	4.42%	4.46%	4.48%	4.51%	4.53%	4.56%	4.58%	4.59%	4.61%
2021	0.00%	0.20%	0.70%	1.16%	1.58%	1.93%	2.24%	2.52%	2.76%	2.98%	3.17%	3.35%	3.52%	3.68%	3.83%	3.95%	4.06%	4.14%	4.21%	4.26%	4.30%	4.34%	4.37%	4.40%	4.43%	4.45%	4.48%	4.50%	4.52%	4.53%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Non-Claim Termination Rate
FRM30

Table 6: Number of Non-Claim Terminations in Each Evaluation Year

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	2,291	13,725	66,834	178,977	120,914	23,606	31,604	21,821	30,790	29,066	12,439	13,400	16,345	15,256	9,850	6,098	6,643	2,433	1,698	1,555	1,095	1,166	940	948	1,054	976	949	993	1,312	1,911
1991	1,638	27,510	129,286	116,245	21,552	31,647	22,255	33,698	30,930	12,334	14,380	17,546	16,691	10,152	5,944	5,530	2,365	1,584	1,404	961	1,069	851	824	843	848	809	826	913	1,063	1,587
1992	3,069	43,606	73,552	22,501	34,980	27,461	46,611	46,333	17,080	22,060	28,232	28,917	14,722	8,168	5,378	3,246	2,166	1,665	1,358	1,213	1,090	1,115	1,070	998	1,060	1,039	1,029	1,098	1,318	1,831
1993	11,115	49,481	30,468	49,494	45,202	72,600	81,679	37,547	48,907	64,848	79,701	35,112	18,656	11,403	6,644	4,604	3,542	3,021	2,576	2,435	2,479	2,105	2,052	1,902	1,936	1,839	1,740	1,885	2,213	1,046
1994	7,790	23,326	52,801	47,893	79,410	87,786	43,166	56,834	73,810	96,722	45,958	25,451	14,980	9,100	6,176	4,700	3,926	3,539	3,399	3,612	2,900	2,608	2,672	2,592	2,565	2,274	2,296	2,647	1,497	987
1995	5,058	26,680	21,347	47,200	46,631	18,962	26,953	33,366	36,557	19,571	11,487	6,874	4,208	2,459	1,546	1,284	1,108	1,086	1,138	962	1,018	961	994	874	886	897	1,081	658	415	605
1996	2,595	15,944	64,137	76,528	31,420	49,241	63,329	71,764	36,516	21,047	12,262	7,280	4,339	2,893	2,183	1,924	1,845	2,064	1,758	1,676	1,647	1,577	1,486	1,436	1,434	1,684	1,117	704	1,078	1,175
1997	2,900	44,568	70,036	27,981	48,453	63,539	71,517	36,548	21,193	12,117	7,074	4,345	2,786	2,066	1,760	1,786	1,963	1,630	1,631	1,588	1,660	1,475	1,361	1,306	1,590	1,029	644	1,060	1,201	1,191
1998	9,935	57,887	46,204	92,053	136,062	189,462	90,197	49,901	26,775	15,561	9,325	6,802	4,866	4,046	3,887	4,706	3,545	3,391	3,330	3,372	2,978	2,560	2,608	2,915	2,097	1,276	2,073	2,223	2,063	1,961
1999	7,390	31,372	124,150	185,284	240,860	117,340	66,875	35,422	20,384	12,307	8,860	6,325	5,338	5,161	6,355	4,573	4,467	4,291	4,276	3,786	3,407	3,271	3,565	2,667	1,646	2,578	2,702	2,618	2,395	2,138
2000	4,389	174,561	178,135	131,775	60,499	33,735	17,985	9,938	5,525	3,636	2,425	1,887	1,922	2,255	1,870	1,812	1,801	1,689	1,591	1,404	1,410	1,644	1,192	738	1,024	1,238	1,209	1,167	1,118	1,076
2001	31,230	169,570	338,032	142,508	76,040	38,908	21,525	12,859	10,306	6,529	4,999	5,020	6,525	4,457	3,994	3,942	3,867	3,376	2,914	2,891	3,407	2,384	1,504	2,205	2,256	2,280	2,031	1,879	1,900	1,924
2002	32,566	311,467	181,568	108,014	54,831	31,735	19,715	17,952	11,657	9,121	9,276	12,443	7,668	6,646	6,158	6,201	5,226	4,547	4,379	5,548	3,366	2,271	2,964	3,092	2,871	2,584	2,281	2,359	2,270	2,341
2003	55,129	130,712	138,989	78,997	47,641	28,568	26,215	19,156	16,584	19,498	27,877	14,421	12,994	12,047	11,502	9,279	7,815	8,000	9,739	6,037	3,936	4,349	4,019	3,594	3,115	2,874	2,849	2,958	2,794	2,966
2004	38,687	122,251	82,035	51,916	30,681	29,202	21,072	17,884	21,828	32,996	16,836	14,819	13,529	12,927	10,514	8,812	9,104	11,443	6,519	4,285	5,041	4,519	4,079	3,668	3,216	3,238	3,169	3,147	3,530	3,583
2005	16,239	34,322	30,840	19,841	19,218	14,251	12,201	16,273	25,621	12,450	10,958	9,950	9,207	7,212	6,130	6,522	8,200	3,836	2,271	2,960	2,687	2,433	2,091	1,928	1,957	1,815	1,997	2,159	2,449	2,550
2006	5,616	25,097	27,159	32,787	18,514	13,905	17,829	26,016	12,527	10,596	8,885	8,056	6,157	5,000	5,012	6,996	2,994	1,791	2,333	2,198	2,032	1,846	1,706	1,745	1,642	1,603	1,845	2,082	2,279	2,269
2007	5,801	37,420	46,876	20,886	13,929	17,183	25,299	13,249	10,380	8,590	8,062	5,959	4,681	4,679	6,390	3,186	1,721	2,202	2,105	2,130	1,789	1,566	1,543	1,525	1,502	1,734	1,870	2,178	2,197	2,343
2008	21,626	180,285	82,032	47,214	61,585	85,233	39,659	28,445	23,532	21,280	15,478	12,038	12,073	16,448	7,923	4,592	5,784	4,940	4,616	3,849	3,663	3,680	3,535	3,449	3,640	4,180	4,439	4,682	4,709	4,780
2009	98,063	126,882	100,438	179,363	232,820	94,067	102,755	91,524	71,955	47,066	35,478	39,774	49,922	23,404	12,678	13,074	11,356	9,315	8,133	7,299	7,203	7,088	6,847	7,191	7,960	8,112	8,172	8,412	8,317	8,161
2010	21,781	59,322	120,570	188,434	101,686	147,715	130,224	100,933	66,526	49,490	59,103	69,225	31,418	15,960	17,608	13,753	10,719	8,999	7,884	7,885	7,594	7,579	7,968	8,588	8,631	8,844	9,140	9,198	8,988	8,866
2011	4,699	68,191	128,481	80,809	114,717	100,588	78,345	52,121	39,551	47,394	56,907	26,886	12,650	12,570	9,490	7,564	6,169	5,313	5,033	5,077	5,038	5,145	5,681	5,879	5,982	6,026	6,004	6,164	6,104	6,060
2012	8,503	79,971	80,681	125,919	109,772	90,818	63,205	48,087	55,563	69,509	33,157	14,773	12,864	9,730	8,027	6,641	5,762	5,410	5,191	5,323	5,472	6,046	6,169	6,255	6,398	6,517	6,604	6,859	6,755	6,834
2013	12,078	59,346	140,303	131,555	114,605	88,160	69,055	78,109	101,463	43,391	20,803	17,378	12,904	10,915	9,466	8,187	7,579	7,306	7,145	7,581	7,799	8,137	8,351	8,249	8,142	8,440	8,266	8,475	8,374	8,477
2014	10,898	156,756	95,871	71,824	49,905	39,075	44,361	53,089	22,992	11,429	9,820	7,085	5,641	4,637	3,930	3,615	3,397	3,162	3,156	3,398	3,551	3,547	3,631	3,625	3,565	3,644	3,827	3,876	3,893	3,866
2015	32,754	142,198	129,800	98,235	81,336	105,697	118,871	42,733	17,255	16,172	13,092	10,679	8,664	7,364	6,623	6,161	5,620	5,612	5,871	6,124	6,181	6,001	6,086	6,081	6,148	6,358	6,380	6,626	6,692	6,641
2016	34,570	114,839	109,754	109,973	156,201	184,558	66,128	24,678	21,170	18,094	16,128	13,834	11,155	10,230	9,337	8,632	8,537	8,441	8,458	8,596	8,616	8,284	8,286	8,364	8,321	8,428	8,580	9,023	9,122	9,221
2017	21,314	96,348	114,298	196,357	216,868	81,909	31,516	25,847	19,666	16,475	14,866	12,492	11,180	10,578	9,512	9,471	9,025	8,846	8,684	8,707	8,197	8,235	8,532	8,239	8,150	8,287	8,481	8,906	9,030	8,995
2018	14,006	115,834	197,178	194,806	82,760	33,521	27,154	19,284	14,791	12,278	10,841	9,718	8,652	7,725	7,777	7,416	6,918	6,479	6,219	6,017	5,994	5,882	5,845	5,641	5,548	5,928	6,081	6,285	6,411	6,296
2019	40,560	235,767	219,204	98,503	37,300	30,411	21,350	16,517	13,076	10,824	10,332	9,116	8,254	8,007	7,468	7,226	6,724	5,846	5,588	5,521	5,249	5,264	5,070	5,013	4,927	5,162	5,412	5,601	5,807	5,689
2020	55,441	334,347	126,359	55,057	49,917	41,720	34,489	27,969	23,557	21,997	20,824	19,038	18,348	17,493	16,366	15,209	13,882	12,727	12,124	11,963	11,878	11,565	11,537	11,629	11,480	11,785	11,948	12,151	12,211	12,222
2021	41,997	112,558	69,255	68,968	59,800	53,697	44,174	36,155	33,159	31,568	29,874	28,074	25,820	24,856	22,733	21,161	19,237	17,921	17,633	17,424	16,950	16,942	16,791	16,759	16,525	16,904	17,082	17,136	17,222	16,711

Table 7: Non-Claim Termination Rate = Table 6 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Termination by Other Than Claim During the Evaluation Year

	Evaluation Year																												
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.33%	2.06%	11.27%	44.36%	44.30%	9.74%	15.37%	12.16%	21.17%	25.49%	12.45%	15.67%	23.88%	29.01%	23.28%	16.98%	22.86%	9.20%	6.90%	6.80%	5.13%	5.82%	4.95%	5.29%	6.30%	6.31%	6.58%	7.43%	11.03%	20.41%
1991	0.29%	5.17%	32.53%	42.42%	8.75%	15.08%	12.13%	23.02%	27.35%	12.45%	17.19%	26.84%	34.67%	27.02%	18.97%	21.59%	10.23%	7.40%	7.06%	5.12%	6.15%	5.19%	5.33%	5.80%	6.25%	6.44%	7.08%	8.53%	11.14%	21.14%
1992	0.64%	10.08%	20.68%	6.84%	12.06%	10.62%	22.37%	29.10%	12.18%	18.85%	32.11%	49.50%	34.03%	23.45%	18.38%	12.54%	9.19%	7.64%	6.69%	6.40%	6.22%	6.85%	7.06%	7.10%	8.22%	8.90%	9.73%	11.63%	16.29%	30.69%
1993	1.52%	7.38%	4.79%	8.52%	8.55%	16.15%	22.52%	11.67%	18.07%	31.74%	64.55%	40.09%	27.26%	20.10%	13.32%	10.21%	8.57%	7.93%	7.30%	7.46%	8.47%	7.80%	8.30%	8.41%	9.46%	10.10%	10.64%	13.08%	18.23%	10.05%
1994	1.00%	3.12%	7.67%	7.57%	14.57%	19.51%	10.74%	16.63%	27.78%	57.82%	38.24%	27.09%	19.08%	13.18%	9.86%	8.16%	7.37%	7.16%	7.43%	8.71%	7.77%	7.57%	8.48%	9.03%	9.91%	9.89%	11.14%	14.81%	9.20%	7.30%
1995	1.39%	8.07%	6.98%	18.68%	23.28%	10.71%	18.31%	29.84%	49.78%	37.19%	28.45%	20.80%	14.78%	9.55%	6.47%	5.75%	5.29%	5.53%	6.24%	5.64%	6.46%	6.60%	7.40%	7.03%	7.73%	8.57%	11.55%	7.59%	5.08%	8.49%
1996	0.48%	3.04%	14.15%	20.81%	9.56%	17.96%	30.62%	54.55%	39.41%	30.01%	21.53%	14.84%	9.82%	7.09%	5.74%	5.40%	5.53%	6.69%	6.11%	6.27%	6.72%	6.96%	7.09%	7.41%	8.03%	10.48%	7.49%	4.98%	8.29%	10.47%
1997	0.59%	10.08%	19.10%	8.44%	17.46%	30.37%	53.59%	38.92%	29.93%	21.07%	14.25%	9.74%	6.75%	5.36%	4.86%	5.26%	6.25%	5.55%	5.97%	6.28%	7.18%	6.89%	6.85%	7.08%	9.45%	6.54%	4.29%	7.65%	9.56%	10.97%
1998	1.15%	7.30%	6.25%	14.41%	27.54%	63.94%	45.00%	33.98%	22.73%	15.46%	10.36%	8.29%	6.42%	5.73%	5.92%	7.87%	6.40%	6.64%	7.11%	7.87%	7.60%	7.05%	7.78%	9.54%	7.39%	4.76%	8.43%	9.99%	10.32%	11.21%
1999	0.72%	3.19%	14.61%	28.43%	60.76%	43.66%	34.22%	22.67%	15.29%	10.35%	8.19%	6.34%	5.77%	6.02%	8.19%	6.37%	6.76%	7.09%	7.72%	7.44%	7.27%	7.55%	8.98%	7.22%	4.68%	8.01%	9.22%	9.87%	10.00%	10.32%
2000	0.60%	31.87%	49.64%	62.17%	43.07%	33.62%	22.87%	15.01%	9.42%	6.81%	4.92%	4.11%	4.49%	5.73%	5.12%	5.36%	5.80%	5.88%	5.97%	5.63%	6.08%	7.66%	5.90%	3.81%	5.61%	7.33%	7.76%	8.15%	8.55%	9.49%
2001	3.08%	20.90%	73.66%	47.46%	35.70%	23.27%	15.26%	10.33%	9.28%	6.46%	5.37%	5.87%	8.54%	6.36%	6.21%	6.71%	7.20%	6.81%	6.31%	6.73%	8.72%	6.53%	4.31%	6.79%	7.50%	8.27%	8.00%	8.03%	8.88%	10.14%
2002	3.31%	48.91%	41.07%	33.62%	21.28%	14.45%	10.11%	10.41%	7.47%	6.39%	7.16%	11.00%	7.47%	7.12%	7.27%	8.06%	7.40%	6.96%	7.23%	10.11%	6.64%	4.72%	6.60%	7.43%	7.44%	7.24%	6.86%	7.67%	8.01%	9.46%
2003	6.56%	20.11%	27.73%	19.10%	13.26%	8.81%	8.98%	7.21%	6.83%	8.99%	15.29%	8.84%	8.89%	9.21%	9.81%	8.70%	7.98%	8.94%	12.23%	8.22%	5.84%	6.93%	6.86%	6.56%	6.05%	6.04%	6.39%	7.14%	7.29%	8.69%
2004	5.18%	21.07%	16.77%	12.13%	7.91%	8.35%	6.62%	6.13%	8.36%	15.09%	8.63%	8.48%	8.65%	9.20%	8.21%	7.46%	8.40%	11.83%	7.25%	5.06%	6.55%	6.27%	6.02%	5.74%	5.34%	5.80%	6.05%	6.42%	7.82%	10.71%
2005	3.95%	9.59%	9.62%	6.77%	7.25%	5.91%	5.53%	8.29%	15.81%	8.68%	8.61%	8.80%	9.11%	7.83%	7.22%	8.39%	11.82%	5.88%	3.62%	5.00%	4.93%	4.69%	4.22%	4.06%	4.32%	4.29%	4.98%	5.72%	7.00%	8.64%
2006	1.48%	7.27%	8.75%	12.29%	7.86%	6.56%	9.68%	17.65%	9.83%	9.56%	9.17%	9.41%	7.97%	7.05%	7.70%	12.09%	5.48%	3.41%	4.69%	4.66%	4.57%	4.35%	4.21%	4.51%	4.46%	4.61%	5.63%	6.83%	8.13%	10.06%
2007	1.49%	10.90%	16.41%	8.37%	6.21%	8.84%	16.53%	10.23%	9.30%	8.90%	9.59%	7.90%	6.79%	7.41%	11.33%	6.03%	3.40%	4.59%	4.63%	4.95%	4.39%	4.02%	4.14%	4.28%	4.43%	5.43%	6.25%	7.89%	8.71%	11.05%
2008	2.17%	22.96%	12.11%	7.81%	12.03%	22.18%	12.49%	10.54%	10.22%	10.71%	8.76%	7.51%	8.29%	12.82%	6.63%	4.04%	5.41%	4.89%	4.81%	4.20%	4.21%	4.43%	4.47%	4.58%	5.10%	6.27%	7.17%	8.23%	9.08%	10.72%
2009	5.59%	8.34%	7.17%	15.07%	25.55%	12.02%	15.71%	16.91%	15.81%	11.80%	9.92%	12.66%	18.97%	9.81%	5.66%	6.25%	5.77%	4.99%	4.57%	4.29%	4.46%	4.61%	4.67%	5.16%	6.08%	6.66%	7.21%	8.03%	8.65%	9.77%
2010	1.42%	4.09%	9.14%	16.97%	10.28%	17.92%	19.14%	17.73%	13.41%	11.20%	15.56%	22.34%	11.33%	6.15%	7.33%	6.10%	5.01%	4.40%	4.02%	4.20%	4.24%	4.43%	4.89%	5.57%	5.94%	6.53%	7.25%	7.88%	8.36%	9.64%
2011	0.44%	6.94%	15.16%	10.64%	18.01%	18.99%	17.57%	13.36%	11.37%	15.85%	23.55%	12.58%	6.34%	6.77%	5.41%	4.53%	3.85%	3.43%	3.37%	3.53%	3.65%	3.88%	4.48%	4.87%	5.23%	5.60%	5.92%	6.48%	6.87%	7.99%
2012	0.80%	8.21%	9.07%	16.60%	17.07%	16.59%	13.15%	11.18%	14.90%	22.94%	12.34%	5.86%	5.42%	4.29%	3.68%	3.15%	2.82%	2.72%	2.69%	2.84%	3.02%	3.46%	3.66%	3.86%	4.12%	4.41%	4.68%	5.12%	5.32%	5.92%
2013	0.95%	4.96%	13.33%	14.37%	14.42%	12.55%	10.96%	14.21%	22.67%	10.79%	5.50%	4.84%	3.75%	3.29%	2.94%	2.62%	2.49%	2.47%	2.48%	2.70%	2.91%	3.14%	3.33%	3.41%	3.50%	3.83%	3.92%	4.19%	4.33%	4.91%
2014	1.48%	27.57%	20.39%	18.21%	14.63%	13.06%	17.53%	26.62%	13.13%	7.05%	6.51%	4.96%	4.14%	3.54%	3.11%	2.95%	2.86%	2.74%	2.82%	3.15%	3.44%	3.57%	3.81%	3.97%	4.09%	4.45%	4.91%	5.25%	5.58%	6.29%
2015	3.05%	15.84%	16.97%	14.83%	14.10%	22.56%	34.09%	14.06%	6.08%	6.11%	5.24%	4.50%	3.81%	3.36%	3.13%	3.01%	2.83%	2.91%	3.15%	3.41%	3.60%	3.63%	3.83%	4.00%	4.23%	4.63%	4.88%	5.35%	5.73%	6.29%
2016	2.83%	10.72%	11.45%	13.03%	22.83%	37.04%	15.42%	6.19%	5.69%	5.16%	4.86%	4.37%	3.68%	3.50%	3.31%	3.17%	3.25%	3.33%	3.46%	3.65%	3.84%	3.84%	4.01%	4.24%	4.42%	4.74%	5.09%	5.67%	6.11%	7.00%
2017	1.76%	8.83%	11.74%	25.40%	39.09%	17.47%	7.32%	6.50%	5.28%	4.68%	4.46%	3.92%	3.67%	3.62%	3.39%	3.51%	3.48%	3.55%	3.62%	3.79%	3.75%	3.93%	4.26%	4.32%	4.49%	4.84%	5.23%	5.84%	6.36%	7.43%
2018	1.41%	13.48%	29.92%	42.09%	22.05%	10.01%	9.02%	6.98%	5.75%	5.09%	4.77%	4.52%	4.23%	3.96%	4.20%	4.21%	4.12%	4.04%	4.06%	4.12%	4.33%	4.46%	4.67%	4.74%	4.91%	5.59%	6.12%	6.78%	7.47%	8.58%
2019	4.18%	33.97%	46.24%	26.55%	11.43%	10.53%	8.15%	6.85%	5.82%	5.12%	5.20%	4.87%	4.66%	4.78%	4.71%	4.82%	4.73%	4.32%	4.34%	4.50%	4.51%	4.76%	4.83%	5.03%	5.22%	5.83%	6.54%	7.29%	8.21%	9.14%
2020	4.20%	35.94%	15.82%	7.49%	7.37%	6.62%	5.83%	5.00%	4.42%	4.33%	4.30%	4.11%	4.14%	4.13%	4.04%	3.92%	3.72%	3.54%	3.50%	3.58%	3.72%	3.76%	3.91%	4.11%	4.24%	4.60%	4.92%	5.32%	5.70%	6.37%
2021	3.04%	9.19%	6.03%	6.42%	5.93%	5.65%	4.90%	4.20%	4.02%	4.00%	3.94%	3.86%	3.70%	3.70%	3.51%	3.39%	3.19%	3.07%	3.12%	3.18%	3.22%	3.34%	3.43%	3.55%	3.66%	3.96%	4.22%	4.48%	4.79%	5.17%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Non-Claim Termination Rate
FRM30

Table 8: Cumulative Number of Non-Claim Terminations as of Each Evaluation Year
Total Number of Non-Claim Terminations for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	2,291	16,016	82,850	261,827	382,741	406,347	437,951	459,772	490,562	519,628	532,067	545,467	561,812	577,068	586,918	593,016	599,659	602,092	603,790	605,345	606,440	607,606	608,546	609,494	610,548	611,524	612,473	613,466	614,778	616,689
1991	1,638	29,148	158,434	274,679	296,231	327,878	350,133	383,831	414,761	427,095	441,475	459,021	475,712	485,864	491,808	497,338	499,703	501,287	502,691	503,652	504,721	505,572	506,396	507,239	508,087	508,896	509,722	510,635	511,698	513,285
1992	3,069	46,675	120,227	142,728	177,708	205,169	251,780	298,113	315,193	337,253	365,485	394,402	409,124	417,292	422,670	425,916	428,082	429,747	431,105	432,318	433,408	434,523	435,593	436,591	437,651	438,690	439,719	440,817	442,135	443,966
1993	11,115	60,596	91,064	140,558	185,760	258,360	340,039	377,586	426,493	491,341	571,042	606,154	624,810	636,213	642,857	647,461	651,003	654,024	656,600	659,035	661,514	663,619	665,671	667,573	669,509	671,348	673,088	674,973	677,186	678,232
1994	7,790	31,116	83,917	131,810	211,220	299,006	342,172	399,006	472,816	569,538	615,496	640,947	655,927	665,027	671,203	675,903	679,829	683,368	686,767	690,379	693,279	695,887	698,559	701,151	703,716	705,990	708,286	710,933	712,430	713,417
1995	5,058	31,738	53,085	100,285	146,916	165,878	192,831	226,197	262,754	282,325	293,812	300,686	304,894	307,353	308,899	310,183	311,291	312,377	313,515	314,477	315,495	316,456	317,450	318,324	319,210	320,107	321,188	321,846	322,261	322,866
1996	2,595	18,539	82,676	159,204	190,624	239,865	303,194	374,958	411,474	432,521	444,783	452,063	456,402	459,295	461,478	463,402	465,247	467,311	469,069	470,745	472,392	473,969	475,455	476,891	478,325	480,009	481,126	481,830	482,908	484,083
1997	2,900	47,468	117,504	145,485	193,938	257,477	328,994	365,542	386,735	398,852	405,926	410,271	413,057	415,123	416,883	418,669	420,632	422,262	423,893	425,481	427,141	428,616	429,977	431,283	432,873	433,902	434,546	435,606	436,807	437,998
1998	9,935	67,822	114,026	206,079	342,141	531,603	621,800	671,701	698,476	714,037	723,362	730,164	735,030	739,076	742,963	747,669	751,214	754,605	757,935	761,307	764,285	766,845	769,453	772,368	774,465	775,741	777,814	780,037	782,100	784,061
1999	7,390	38,762	162,912	348,196	589,056	706,396	773,271	808,693	829,077	841,384	850,244	856,569	861,907	867,068	873,423	877,996	882,463	886,754	891,030	894,816	898,223	901,494	905,059	907,726	909,372	911,950	914,652	917,270	919,665	921,803
2000	4,389	178,950	357,085	488,860	549,359	583,094	601,079	611,017	616,542	620,178	622,603	624,490	626,412	628,667	630,537	632,349	634,150	635,839	637,430	638,834	640,244	641,888	643,080	643,818	644,842	646,080	647,289	648,456	649,574	650,650
2001	31,230	200,800	538,832	681,340	757,380	796,288	817,813	830,672	840,978	847,507	852,506	857,526	864,051	868,508	872,502	876,444	880,311	883,687	886,601	889,492	892,899	895,283	896,787	898,992	901,248	903,528	905,559	907,438	909,338	911,262
2002	32,566	344,033	525,601	633,615	688,446	720,181	739,896	757,848	769,505	778,626	787,902	800,345	808,013	814,659	820,817	827,018	832,244	836,791	841,170	846,718	850,084	852,355	855,319	858,411	861,282	863,866	866,147	868,506	870,776	873,117
2003	55,129	185,841	324,830	403,827	451,468	480,036	506,251	525,407	541,991	561,489	589,366	603,787	616,781	628,828	640,330	649,609	657,424	665,424	675,163	681,200	685,136	689,485	693,504	697,098	700,213	703,087	705,936	708,894	711,688	714,654
2004	38,687	160,938	242,973	294,889	325,570	354,772	375,844	393,728	415,556	448,552	465,388	480,207	493,736	506,663	517,177	525,989	535,093	546,536	553,055	557,340	562,381	566,900	570,979	574,647	577,863	581,101	584,270	587,417	590,947	594,530
2005	16,239	50,561	81,401	101,242	120,460	134,711	146,912	163,185	188,806	201,256	212,214	222,164	231,371	238,583	244,713	251,235	259,435	263,271	265,542	268,502	271,189	273,622	275,713	277,641	279,598	281,413	283,410	285,569	288,018	290,568
2006	5,616	30,713	57,872	90,659	109,173	123,078	140,907	166,923	179,450	190,046	198,931	206,987	213,144	218,144	223,156	230,152	233,146	234,937	237,270	239,468	241,500	243,346	245,052	246,797	248,439	250,042	251,887	253,969	256,248	258,517
2007	5,801	43,221	90,097	110,983	124,912	142,095	167,394	180,643	191,023	199,613	207,675	213,634	218,315	222,994	229,384	232,570	234,291	236,493	238,598	240,728	242,517	244,083	245,626	247,151	248,653	250,387	252,257	254,435	256,632	258,975
2008	21,626	201,911	283,943	331,157	392,742	477,975	517,634	546,079	569,611	590,891	606,369	618,407	630,480	646,928	654,851	659,443	665,227	670,167	674,783	678,632	682,295	685,975	689,510	692,959	696,599	700,779	705,218	709,900	714,609	719,389
2009	98,063	224,945	325,383	504,746	737,566	831,633	934,388	1,025,912	1,097,867	1,144,933	1,180,411	1,220,185	1,270,107	1,293,511	1,306,189	1,319,263	1,330,619	1,339,934	1,348,067	1,355,366	1,362,569	1,369,657	1,376,504	1,383,695	1,391,655	1,399,767	1,407,939	1,416,351	1,424,668	1,432,829
2010	21,781	81,103	201,673	390,107	491,793	639,508	769,732	870,665	937,191	986,681	1,045,784	1,115,009	1,146,427	1,162,387	1,179,995	1,193,748	1,204,467	1,213,466	1,221,350	1,229,235	1,236,829	1,244,408	1,252,376	1,260,964	1,269,595	1,278,439	1,287,579	1,296,777	1,305,765	1,314,631
2011	4,699	72,890	201,371	282,180	396,897	497,485	575,830	627,951	667,502	714,896	771,803	798,689	811,339	823,909	833,399	840,963	847,132	852,445	857,478	862,555	867,593	872,738	878,419	884,298	890,280	896,306	902,310	908,474	914,578	920,638
2012	8,503	88,474	169,155	295,074	404,846	495,664	558,869	606,956	662,519	732,028	765,185	779,958	792,822	802,552	810,579	817,220	822,982	828,392	833,583	838,906	844,378	850,424	856,593	862,848	869,246	875,763	882,367	889,226	895,981	902,815
2013	12,078	71,424	211,727	343,282	457,887	546,047	615,102	693,211	794,674	838,065	858,868	876,246	889,150	900,065	909,531	917,718	925,297	932,603	939,748	947,329	955,128	963,265	971,616	979,865	988,007	996,447	1,004,713	1,013,188	1,021,562	1,030,039
2014	10,898	167,654	263,525	335,349	385,254	424,329	468,690	521,779	544,771	556,200	566,020	573,105	578,746	583,383	587,313	590,928	594,325	597,487	600,643	604,041	607,592	611,139	614,770	618,395	621,960	625,604	629,431	633,307	637,200	641,066
2015	32,754	174,952	304,752	402,987	484,323	590,020	708,891	751,624	768,879	785,051	798,143	808,822	817,486	824,850	831,473	837,634	843,254	848,866	854,737	860,861	867,042	873,043	879,129	885,210	891,358	897,716	904,096	910,722	917,414	924,055
2016	34,570	149,409	259,163	369,136	525,337	709,895	776,023	800,701	821,871	839,965	856,093	869,927	881,082	891,312	900,649	909,281	917,818	926,259	934,717	943,313	951,929	960,213	968,499	976,863	985,184	993,612	1,002,192	1,011,215	1,020,337	1,029,558
2017	21,314	117,662	231,960	428,317	645,185	727,094	758,610	784,457	804,123	820,598	835,464	847,956	859,136	869,714	879,226	888,697	897,722	906,568	915,252	923,959	932,156	940,391	948,923	957,162	965,312	973,599	982,080	990,986	1,000,016	1,009,011
2018	14,006	129,840	327,018	521,824	604,584	638,105	665,259	684,543	699,334	711,612	722,453	732,171	740,823	748,548	756,325	763,741	770,659	777,138	783,357	789,374	795,368	801,250	807,095	812,736	818,284	824,212	830,293	836,578	842,989	849,285
2019	40,560	276,327	495,531	594,034	631,334	661,745	683,095	699,612	712,688	723,512	733,844	742,960	751,214	759,221	766,689	773,915	780,639	786,485	792,073	797,594	802,843	808,107	813,177	818,190	823,117	828,279	833,691	839,292	845,099	850,788
2020	55,441	389,788	516,147	571,204	621,121	662,841	697,330	725,299	748,856	770,853	791,677	810,715	829,063	846,556	862,922	878,131	892,013	904,740	916,864	928,827	940,705	952,270	963,807	975,436	986,916	998,701	1,010,649	1,022,800	1,035,011	1,047,233
2021	41,997	154,555	223,810	292,778	352,578	406,275	450,449	486,604	519,763	551,331	581,205	609,279	635,099	659,955	682,688	703,849	723,086	741,007	758,640	776,064	793,014	809,956	826,747	843,506	860,031	876,935	894,017	911,153	928,375	945,086

Table 9: Cumulative Non-Claim Termination Rate = Table 8 / Table 1 (Evaluation Year 1)
Cumulative Non-Claim Terminations as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.33%	2.34%	12.09%	38.22%	55.86%	59.31%	63.92%	67.11%	71.60%	75.84%	77.66%	79.62%	82.00%	84.23%	85.67%	86.56%	87.53%	87.88%	88.13%	88.36%	88.52%	88.69%	88.82%	88.96%	89.11%	89.26%	89.40%	89.54%	89.73%	90.01%
1991	0.29%	5.17%	28.13%	48.76%	52.59%	58.21%	62.16%	68.14%	73.63%	75.82%	78.37%	81.49%	84.45%	86.25%	87.31%	88.29%	88.71%	88.99%	89.24%	89.41%	89.60%	89.75%	89.90%	90.05%	90.20%	90.34%	90.49%	90.65%	90.84%	91.12%
1992	0.64%	9.72%	25.04%	29.73%	37.01%	42.73%	52.44%	62.09%	65.65%	70.24%	76.12%	82.14%	85.21%	86.91%	88.03%	88.71%	89.16%	89.51%	89.79%	90.04%	90.27%	90.50%	90.72%	90.93%	91.15%	91.37%	91.58%	91.81%	92.09%	92.47%
1993	1.52%	8.27%	12.43%	19.18%	25.35%	35.26%	46.41%	51.54%	58.21%	67.06%	77.94%	82.73%	85.28%	86.84%	87.74%	88.37%	88.86%	89.27%	89.62%	89.95%	90.29%	90.58%	90.86%	91.12%	91.38%	91.63%	91.87%	92.13%	92.43%	92.57%
1994	1.00%	3.99%	10.77%	16.91%	27.10%	38.36%	43.90%	51.19%	60.66%	73.07%	78.96%	82.23%	84.15%	85.32%	86.11%	86.71%	87.22%	87.67%	88.11%	88.57%	88.94%	89.28%	89.62%	89.95%	90.28%	90.57%	90.87%	91.21%	91.40%	91.53%
1995	1.39%	8.74%	14.61%	27.61%	40.44%	45.67%	53.09%	62.27%	72.33%	77.72%	80.88%	82.78%	83.94%	84.61%	85.04%	85.39%	85.70%	86.00%	86.31%	86.57%	86.85%	87.12%	87.39%	87.63%	87.88%	88.12%	88.42%	88.60%	88.72%	88.88%
1996	0.48%	3.41%	15.21%	29.29%	35.06%	44.12%	55.77%	68.97%	75.69%	79.56%	81.82%	83.16%	83.95%	84.49%	84.89%	85.24%	85.58%	85.96%	86.28%	86.59%	86.90%	87.19%	87.46%	87.72%	87.99%	88.30%	88.50%	88.63%	88.83%	89.05%
1997	0.59%	9.66%	23.92%	29.61%	39.48%	52.41%	66.97%	74.41%	78.72%	81.19%	82.63%	83.51%	84.08%	84.50%	84.86%	85.22%	85.62%	85.95%	86.28%	86.61%	86.95%	87.25%	87.52%	87.79%	88.11%	88.32%	88.45%	88.67%	88.91%	89.16%
1998	1.15%	7.86%	13.21%	23.87%	39.63%	61.58%	72.02%	77.80%	80.90%	82.71%	83.79%	84.57%	85.14%	85.61%	86.06%	86.60%	87.01%	87.41%	87.79%	88.18%	88.53%	88.82%	89.13%	89.46%	89.71%	89.85%	90.09%	90.35%	90.59%	90.82%
1999	0.72%	3.78%	15.90%	33.98%	57.48%	68.93%	75.46%	78.92%	80.91%	82.11%	82.97%	83.59%	84.11%	84.61%	85.23%	85.68%	86.12%	86.53%	86.95%	87.32%	87.65%	87.97%	88.32%	88.58%	88.74%	88.99%	89.26%	89.51%	89.75%	89.96%
2000	0.60%	24.53%	48.95%	67.01%	75.30%	79.93%	82.39%	83.76%	84.51%	85.01%	85.34%	85.60%	85.87%	86.18%	86.43%	86.68%	86.93%	87.16%	87.38%	87.57%	87.76%	87.99%	88.15%	88.25%	88.39%	88.56%	88.73%	88.89%	89.04%	89.19%
2001	3.08%	19.77%	53.06%	67.09%	74.58%	78.41%	80.53%	81.80%	82.81%	83.45%	83.95%	84.44%	85.08%	85.52%	85.91%	86.30%	86.68%	87.02%	87.30%	87.59%	87.92%	88.16%	88.31%	88.52%	88.75%	88.97%	89.17%	89.36%	89.54%	89.73%
2002	3.31%	34.93%	53.37%	64.34%	69.90%	73.13%	75.13%	76.95%	78.14%	79.06%	80.00%	81.27%	82.05%	82.72%	83.35%	83.98%	84.51%	84.97%	85.41%	85.98%	86.32%	86.55%	86.85%	87.16%	87.45%	87.72%	87.95%	88.19%	88.42%	88.66%
2003	6.56%	22.11%	38.65%	48.05%	53.72%	57.12%	60.24%	62.52%	64.50%	66.82%	70.13%	71.85%	73.40%	74.83%	76.20%	77.30%	78.23%	79.18%	80.34%	81.06%	81.53%	82.05%	82.53%	82.95%	83.32%	83.67%	84.00%	84.36%	84.69%	85.04%
2004	5.18%	21.53%	32.51%	39.45%	43.56%	47.46%	50.28%	52.67%	55.59%	60.01%	62.26%	64.24%	66.05%	67.78%	69.19%	70.37%	71.59%	73.12%	73.99%	74.56%	75.24%	75.84%	76.39%	76.88%	77.31%	77.74%	78.17%	78.59%	79.06%	79.54%
2005	3.95%	12.30%	19.79%	24.62%	29.29%	32.76%	35.73%	39.68%	45.91%	48.94%	51.61%	54.03%	56.26%	58.02%	59.51%	61.09%	63.09%	64.02%	64.57%	65.29%	65.95%	66.54%	67.05%	67.52%	67.99%	68.43%	68.92%	69.44%	70.04%	70.66%
2006	1.48%	8.11%	15.27%	23.93%	28.81%	32.48%	37.19%	44.05%	47.36%	50.16%	52.50%	54.63%	56.25%	57.57%	58.89%	60.74%	61.53%	62.00%	62.62%	63.20%	63.73%	64.22%	64.67%	65.13%	65.57%	65.99%	66.48%	67.03%	67.63%	68.23%
2007	1.49%	11.07%	23.09%	28.44%	32.01%	36.41%	42.89%	46.29%	48.95%	51.15%	53.21%	54.74%	55.94%	57.14%	58.78%	59.59%	60.03%	60.60%	61.14%	61.68%	62.14%	62.54%	62.94%	63.33%	63.71%	64.16%	64.64%	65.19%	65.76%	66.36%
2008	2.17%	20.29%	28.54%	33.29%	39.48%	48.04%	52.03%	54.89%	57.25%	59.39%	60.95%	62.16%	63.37%	65.03%	65.82%	66.28%	66.86%	67.36%	67.83%	68.21%	68.58%	68.95%	69.31%	69.65%	70.02%	70.44%	70.88%	71.36%	71.83%	72.31%
2009	5.59%	12.82%	18.54%	28.76%	42.03%	47.39%	53.24%	58.46%	62.56%	65.24%	67.26%	69.53%	72.37%	73.70%	74.43%	75.17%	75.82%	76.35%	76.81%	77.23%	77.64%	78.04%	78.43%	78.84%	79.30%	79.76%	80.22%	80.70%	81.18%	81.64%
2010	1.42%	5.29%	13.14%	25.43%	32.05%	41.68%	50.17%	56.75%	61.08%	64.31%	68.16%	72.67%	74.72%	75.76%	76.91%	77.80%	78.50%	79.09%	79.60%	80.12%	80.61%	81.10%	81.62%	82.18%	82.75%	83.32%	83.92%	84.52%	85.10%	85.68%
2011	0.44%	6.89%	19.04%	26.69%	37.53%	47.05%	54.45%	59.38%	63.12%	67.61%	72.99%	75.53%	76.73%	77.92%	78.81%	79.53%	80.11%	80.61%	81.09%	81.57%	82.05%	82.53%	83.07%	83.63%	84.19%	84.76%	85.33%	85.91%	86.49%	87.06%
2012	0.80%	8.32%	15.90%	27.74%	38.07%	46.60%	52.55%	57.07%	62.29%	68.83%	71.95%	73.34%	74.54%	75.46%	76.21%	76.84%	77.38%	77.89%	78.38%	78.88%	79.39%	79.96%	80.54%	81.13%	81.73%	82.34%	82.96%	83.61%	84.24%	84.89%
2013	0.95%	5.63%	16.68%	27.05%	36.07%	43.02%	48.46%	54.61%	62.61%	66.03%	67.67%	69.03%	70.05%	70.91%	71.66%	72.30%	72.90%	73.47%	74.04%	74.63%	75.25%	75.89%	76.55%	77.20%	77.84%	78.50%	79.16%	79.82%	80.48%	81.15%
2014	1.48%	22.75%	35.76%	45.51%	52.28%	57.58%	63.60%	70.81%	73.93%	75.48%	76.81%	77.77%	78.54%	79.17%	79.70%	80.19%	80.65%	81.08%	81.51%	81.97%	82.45%	82.93%	83.42%	83.92%	84.40%	84.90%	85.41%	85.94%	86.47%	86.99%
2015	3.05%	16.30%	28.40%	37.55%	45.13%	54.98%	66.06%	70.04%	71.65%	73.15%	74.37%	75.37%	76.17%	76.86%	77.48%	78.05%	78.58%	79.10%	79.65%	80.22%	80.79%	81.35%	81.92%	82.48%	83.06%	83.65%	84.24%	84.86%	85.49%	86.10%
2016	2.83%	12.23%	21.21%	30.21%	43.00%	58.11%	63.52%	65.54%	67.27%	68.75%	70.07%	71.20%	72.12%	72.96%	73.72%	74.43%	75.12%	75.82%	76.51%	77.21%	77.92%	78.60%	79.27%	79.96%	80.64%	81.33%	82.03%	82.77%	83.52%	84.27%
2017	1.76%	9.73%	19.17%	35.40%	53.33%	60.10%	62.70%	64.84%	66.46%	67.83%	69.06%	70.09%	71.01%	71.89%	72.67%	73.46%	74.20%	74.93%	75.65%	76.37%	77.05%	77.73%	78.43%	79.11%	79.79%	80.47%	81.17%	81.91%	82.66%	83.40%
2018	1.41%	13.11%	33.03%	52.71%	61.07%	64.45%	67.20%	69.14%	70.64%	71.88%	72.97%	73.96%	74.83%	75.61%	76.40%	77.14%	77.84%	78.50%	79.13%	79.73%	80.34%	80.93%	81.52%	82.09%	82.65%	83.25%	83.87%	84.50%	85.15%	85.79%
2019	4.18%	28.46%	51.03%	61.18%	65.02%	68.15%	70.35%	72.05%	73.40%	74.51%	75.58%	76.52%	77.37%	78.19%	78.96%	79.70%	80.40%	81.00%	81.57%	82.14%	82.68%	83.22%	83.75%	84.26%	84.77%	85.30%	85.86%	86.44%	87.03%	87.62%
2020	4.20%	29.53%	39.10%	43.27%	47.05%	50.21%	52.82%	54.94%	56.73%	58.39%	59.97%	61.41%	62.80%	64.13%	65.37%	66.52%	67.57%	68.53%	69.45%	70.36%	71.26%	72.13%	73.01%	73.89%	74.76%	75.65%	76.56%	77.48%	78.40%	79.33%
2021	3.04%	11.18%	16.19%	21.18%	25.50%	29.39%	32.58%	35.20%	37.59%	39.88%	42.04%	44.07%	45.94%	47.73%	49.38%	50.91%	52.30%	53.60%	54.87%	56.13%	57.36%	58.58%	59.80%	61.01%	62.21%	63.43%	64.66%	65.90%	67.15%	68.36%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
FRM30

Table 10: Gross Claim Cost in Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10
1990	3,073,174	121,577,290	509,678,668	773,390,685	738,448,353	537,172,034	375,706,244	324,818,786	237,364,165	169,232,305
1991	2,394,083	102,519,986	429,268,515	562,926,254	489,773,748	372,034,291	338,451,613	258,966,731	181,931,080	123,956,954
1992	1,177,257	67,700,008	243,670,334	320,449,251	313,726,677	333,701,721	288,945,981	222,547,420	152,631,837	92,446,865
1993	2,839,718	92,043,966	325,238,304	471,767,764	615,156,734	566,902,676	440,587,971	297,536,938	165,566,183	113,529,563
1994	4,480,635	136,970,098	402,136,551	645,902,878	727,167,625	612,104,430	415,990,256	250,241,729	173,149,002	123,278,738
1995	1,691,029	58,973,972	276,698,219	469,775,507	467,489,891	356,610,248	232,633,573	151,613,076	132,278,968	85,648,840
1996	1,049,471	111,569,840	517,260,192	752,048,643	654,334,149	454,913,411	318,656,666	268,642,446	173,724,023	100,043,751
1997	1,650,692	119,024,450	484,505,733	599,396,116	469,783,175	393,128,231	336,746,911	227,761,417	138,225,292	83,273,750
1998	2,287,005	170,469,053	728,597,516	815,067,326	753,030,923	724,014,042	480,460,751	294,794,569	179,268,478	120,390,763
1999	2,986,126	261,173,509	892,841,790	1,232,218,401	1,363,948,906	946,339,688	565,145,005	325,047,674	211,687,140	177,558,621
2000	3,676,295	248,122,175	1,033,428,521	1,494,354,176	1,060,927,926	594,796,335	339,713,537	225,142,605	182,178,212	148,469,738
2001	1,387,781	318,119,492	1,459,672,872	1,652,674,192	1,137,122,070	692,522,199	452,547,769	370,345,004	311,953,833	341,667,995
2002	2,897,272	379,991,725	1,377,158,118	1,338,967,596	915,336,154	640,426,863	517,552,427	462,586,782	502,867,429	431,289,511
2003	2,691,212	460,790,452	1,050,779,991	915,957,948	740,884,617	699,998,663	680,618,665	809,639,300	691,856,603	666,977,509
2004	61,463,694	648,563,012	947,495,566	997,596,437	1,068,252,252	1,028,346,056	1,173,118,550	971,044,756	966,648,287	1,000,296,473
2005	22,921,065	271,863,229	697,690,875	917,007,413	1,036,435,590	1,153,609,934	981,470,795	941,893,637	992,533,335	703,393,922
2006	9,266,216	289,487,327	951,875,185	1,396,149,381	1,669,959,843	1,295,463,624	1,243,908,059	1,370,004,075	932,181,272	713,052,476
2007	8,600,030	434,692,499	1,494,953,688	2,149,601,164	1,570,536,929	1,749,801,730	2,305,680,408	1,427,221,410	1,010,024,526	829,882,522
2008	20,036,845	1,052,808,154	3,974,784,849	3,839,471,727	4,605,296,740	6,535,632,119	4,123,094,813	2,766,169,814	2,244,708,078	1,258,032,446
2009	32,130,229	1,312,897,432	2,969,467,491	4,345,139,957	6,981,320,228	5,238,627,479	3,693,680,343	2,953,814,482	1,683,287,015	950,861,390
2010	16,396,808	414,170,705	1,301,724,901	2,652,900,868	2,620,335,748	2,188,785,832	1,642,895,389	1,002,391,442	590,675,975	376,652,745
2011	9,597,200	228,456,624	780,519,235	978,205,652	942,567,533	780,922,258	528,401,365	304,472,297	207,162,352	128,292,243
2012	7,813,840	142,209,397	427,841,464	582,333,014	619,490,288	449,510,122	285,507,222	208,553,207	128,501,124	32,653,675
2013	6,443,894	160,040,444	425,177,500	587,140,152	557,982,307	387,508,084	288,960,422	186,475,539	48,083,138	135,478,797
2014	846,568	72,427,343	239,802,926	361,118,581	278,005,765	225,630,608	150,986,110	43,637,822	84,563,341	142,817,056
2015	1,227,990	55,711,958	265,891,577	333,340,558	340,850,938	243,580,244	62,364,408	152,433,615	291,222,725	224,626,195
2016	904,522	59,478,806	234,822,610	365,588,870	306,552,043	85,328,991	260,707,683	600,382,934	505,998,249	322,531,500
2017	1,410,313	57,634,450	259,502,531	334,028,599	96,949,423	322,334,684	810,792,195	677,078,241	599,688,756	494,563,471
2018	1,706,489	67,524,826	231,926,681	91,206,988	384,645,989	851,798,551	733,704,794	585,457,377	522,973,465	428,062,217
2019	1,247,112	40,957,519	49,929,145	424,653,070	919,681,949	783,731,319	648,942,025	479,950,428	439,622,206	403,358,428
2020	454,026	4,933,786	509,564,777	1,148,380,017	911,622,480	694,253,869	542,481,209	476,583,339	464,468,834	399,457,752
2021	20,672	241,710,483	936,837,283	746,756,168	661,327,875	698,117,744	545,604,829	501,733,808	569,237,869	396,685,130

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	114,091,398	64,176,679	44,175,715	34,384,165	23,630,775	14,793,867	10,620,098	8,537,081	7,818,831	6,023,987
1991	71,334,262	48,903,602	34,140,473	24,418,397	15,892,943	10,248,505	6,597,679	6,638,314	5,517,185	6,034,513
1992	61,574,841	39,751,300	26,040,547	15,356,005	10,907,035	6,921,680	6,687,572	5,666,781	5,378,303	6,441,159
1993	75,426,923	50,289,064	29,409,551	18,305,054	12,712,257	10,773,291	9,829,444	11,535,915	12,522,402	8,735,522
1994	78,222,093	47,907,219	29,096,287	20,571,489	15,819,236	16,816,263	21,782,789	16,730,524	14,055,716	18,323,195
1995	48,071,874	29,118,006	21,348,922	16,879,027	17,358,471	18,333,881	16,423,904	12,504,077	12,923,983	9,145,365
1996	62,157,369	40,666,914	33,647,776	31,421,899	37,357,956	28,787,215	27,669,569	27,748,526	19,180,557	21,679,071
1997	53,667,450	45,908,866	38,498,550	44,093,936	36,514,659	30,814,908	35,112,682	25,528,434	26,152,094	27,691,832
1998	99,976,668	91,918,495	100,163,144	88,829,625	76,460,757	80,755,846	60,363,506	61,953,348	61,433,102	32,550,734
1999	159,544,859	169,245,075	160,039,257	135,250,356	134,874,727	93,351,795	94,214,233	92,096,417	50,410,331	36,521,375
2000	159,277,843	126,471,660	104,084,973	105,375,919	75,218,293	76,182,291	70,973,059	43,753,813	34,697,722	17,955,784
2001	297,343,792	244,204,087	237,522,701	155,872,576	155,561,892	131,349,320	81,430,800	48,509,446	27,437,017	19,591,002
2002	383,801,997	388,677,789	253,230,235	231,466,836	204,871,007	114,344,799	68,733,019	41,947,656	24,807,002	7,255,275
2003	693,008,615	475,114,667	373,340,637	302,973,939	160,490,748	89,424,126	50,170,503	28,897,040	6,665,505	8,530,753
2004	703,919,456	560,255,915	450,572,600	232,650,402	132,398,684	69,483,757	45,649,381	11,661,021	12,642,088	30,141,835
2005	553,289,163	434,460,472	230,756,807	126,187,816	76,614,947	41,610,515	11,545,669	11,031,920	22,889,340	21,420,417
2006	574,570,973	315,856,979	195,251,397	106,714,345	65,192,551	18,516,349	14,904,367	28,806,592	23,178,935	21,502,529
2007	486,014,426	268,862,662	165,297,638	102,984,211	28,618,488	23,886,891	44,201,618	36,243,080	32,415,745	24,038,272
2008	697,577,174	431,620,485	269,318,011	73,398,438	77,828,666	128,136,479	94,982,183	70,829,046	51,397,583	40,563,069
2009	575,184,371	344,261,901	96,387,077	95,960,864	197,733,935	135,877,742	88,793,744	69,812,769	55,079,483	42,351,130
2010	223,117,312	55,611,833	77,290,137	172,734,428	111,095,700	77,381,507	59,431,234	48,553,911	35,667,416	29,105,390
2011	35,528,483	69,026,937	137,711,451	89,111,537	62,293,340	50,608,264	43,156,333	37,740,130	27,138,635	22,808,431
2012	91,132,868	194,689,395	121,381,709	80,135,288	56,344,074	46,735,416	34,995,699	29,641,569	19,727,255	20,366,799
2013	261,964,049	175,698,977	126,537,765	102,414,449	86,844,073	67,287,925	61,401,779	65,857,009	40,335,485	38,209,220
2014	96,575,898	76,555,289	67,365,468	57,792,849	50,534,808	37,583,325	34,455,605	24,519,026	25,274,753	21,406,140
2015	170,937,020	141,830,323	117,896,296	94,850,826	90,122,400	66,138,025	53,774,885	44,221,649	38,221,202	31,892,883
2016	240,352,696	189,436,175	161,886,588	116,984,647	118,572,391	86,157,840	74,647,880	65,035,814	53,569,134	41,100,466
2017	429,603,605	324,636,071	272,615,434	213,490,360	198,732,733	185,354,100	143,869,615	119,938,126	96,489,377	79,629,847
2018	382,570,796	312,433,354	274,514,464	243,122,284	219,478,275	189,066,558	148,615,856	120,112,161	101,459,192	105,621,075
2019	311,100,269	279,535,220	228,816,069	235,817,649	204,684,641	168,577,711	146,548,989	117,510,066	78,208,214	62,997,515
2020	390,458,904	302,813,982	289,487,567	253,286,762	212,423,870	179,570,722	161,149,064	101,173,831	90,977,169	63,965,687
2021	363,022,811	313,389,787	303,356,516	252,700,309	204,953,581	201,425,034	153,597,347	110,221,402	90,122,139	57,651,051

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	7,633,326	6,949,939	4,616,051	5,528,983	2,856,656	3,217,871	3,970,355	1,746,716	1,572,935	1,102,834
1991	6,472,318	4,938,751	5,559,679	3,447,390	3,988,209	4,460,169	2,246,564	1,623,222	1,640,204	647,469
1992	4,867,581	5,515,177	3,148,439	4,066,734	4,093,844	3,259,223	1,545,600	1,068,993	506,925	129,081
1993	12,011,671	7,513,181	10,326,163	9,145,330	6,790,221	2,779,068	1,808,701	1,253,452	354,698	158,191
1994	13,121,356	12,254,236	13,626,503	7,783,348	5,286,839	2,901,244	1,711,304	464,533	334,194	572,548
1995	11,190,815	12,609,968	6,503,498	5,315,678	3,667,200	1,127,469	458,434	380,204	326,958	586,011
1996	22,854,470	14,378,143	9,572,658	6,219,969	3,699,932	478,047	766,922	1,398,691	1,100,032	1,060,468
1997	17,861,662	11,547,381	6,667,698	5,358,758	1,161,952	831,062	2,139,137	2,323,709	1,537,290	1,083,666
1998	20,158,519	10,587,153	8,547,070	2,680,267	1,658,161	4,774,265	4,211,080	3,548,022	3,121,549	1,497,450
1999	19,489,118	12,192,354	3,403,104	2,921,253	5,379,938	6,509,724	5,976,866	4,200,475	3,605,790	2,852,542
2000	11,789,781	3,928,920	2,145,157	4,216,241	3,385,945	4,249,164	3,367,823	4,028,952	3,200,454	1,895,643
2001	6,814,726	3,975,572	8,378,306	7,371,438	5,517,457	6,194,927	4,937,153	4,403,559	2,559,551	2,049,244
2002	5,941,171	10,114,404	9,795,367	8,400,661	7,485,503	7,643,844	5,329,227	4,923,069	3,847,616	2,755,023
2003	19,391,076	13,873,127	10,082,871	8,168,777	9,397,725	7,704,958	7,551,329	6,118,234	5,587,075	3,717,991
2004	20,926,737	15,844,002	12,780,434	10,942,427	11,308,551	8,843,959	9,961,110	8,163,338	5,743,792	4,554,625
2005	15,141,158	11,562,826	11,192,229	10,534,703	8,338,368	9,089,714	8,293,288	6,488,715	5,465,815	3,471,783
2006	15,310,813	13,304,679	8,531,235	10,375,992	10,411,695	7,895,154	8,409,974	8,756,784	5,945,723	4,333,651
2007	18,133,600	14,864,545	12,669,459	13,211,924	11,579,747	9,570,369	8,974,943	8,854,858	8,376,233	6,509,452
2008	33,218,513	26,312,539	27,605,448	27,617,217	22,539,955	24,071,592	21,304,886	19,085,281	14,378,302	8,643,289
2009	34,217,481	29,705,869	25,031,777	21,638,305	19,826,114	18,374,163	14,503,896	11,371,706	8,681,928	5,602,030
2010	25,948,407	16,629,559	19,451,878	28,838,965	15,930,097	14,116,989	11,935,184	8,884,988	7,074,442	4,959,024
2011	19,943,654	14,905,557	15,279,606	15,185,573	12,328,007	11,540,121	8,809,513	10,059,100	6,286,037	3,919,510
2012	13,823,870	15,829,410	12,667,095	12,781,092	9,037,894	9,328,368	7,585,178	5,540,442	4,252,475	2,957,708
2013	29,452,051	24,054,178	20,179,541	17,568,612	15,694,680	10,994,391	9,580,837	9,463,213	8,562,573	5,539,576
2014	16,966,124	14,959,505	13,960,869	10,636,509	9,278,796	9,916,699	7,438,781	6,779,003	5,240,466	2,762,611
2015	25,858,128	20,193,764	15,849,404	16,199,307	14,067,498	13,948,687	9,037,602	7,015,441	6,790,426	4,206,810
2016	36,799,836	26,665,042	23,646,423	23,661,604	19,449,536	21,081,015	14,383,580	11,348,687	13,156,383	6,556,207
2017	63,968,146	51,909,816	44,288,972	37,914,705	40,265,566	35,315,960	30,337,640	26,335,370	18,172,741	13,445,172
2018	60,692,171	53,902,472	47,940,057	39,324,471	36,157,670	32,857,821	50,402,214	24,869,202	21,346,793	12,689,004
2019	55,456,917	44,621,753	58,522,227	35,638,596	38,911,366	29,733,234	25,305,149	20,017,528	14,034,662	13,277,925
2020	54,897,878	43,975,982	35,561,869	29,735,431	26,547,829	22,150,436	19,299,054	17,860,095	13,771,955	10,220,951
2021	47,712,107	39,611,730	34,976,793	30,501,836	25,189,483	19,896,052	19,087,310	14,831,529	13,420,875	7,266,109

Table 11: Claim Cost Net of Recovery in Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10
1990	2,480,479	65,402,184	251,312,072	381,267,308	374,896,828	275,889,918	199,648,445	163,101,175	105,809,382	76,021,239
1991	958,156	53,248,617	218,568,410	289,878,563	257,872,435	200,545,622	171,832,914	116,787,210	80,851,624	49,565,489
1992	521,537	36,260,058	131,332,599	169,124,776	169,426,858	168,095,579	124,011,074	95,053,542	59,912,812	31,147,076
1993	1,044,156	51,139,139	179,391,295	252,926,228	294,720,639	234,956,819	172,304,504	105,219,833	48,849,672	31,403,656
1994	2,504,299	80,319,697	230,016,527	310,059,651	288,879,519	229,645,403	140,017,828	72,044,428	45,921,811	34,026,471
1995	933,004	35,126,271	125,228,080	178,863,444	175,461,140	126,950,228	72,378,509	45,902,827	42,194,569	27,030,460
1996	452,238	44,011,510	191,793,960	277,350,561	220,680,690	139,746,919	92,599,205	84,452,790	53,302,388	35,499,459
1997	549,156	46,204,814	185,000,677	206,649,243	145,092,681	118,218,900	104,969,353	71,292,048	48,888,423	32,896,847
1998	735,346	67,593,345	248,728,580	242,553,390	209,103,110	218,637,146	144,201,652	98,903,343	69,061,580	61,936,084
1999	1,176,381	97,899,974	286,372,094	350,393,461	410,838,176	291,790,391	200,099,194	123,235,668	103,592,266	105,126,075
2000	1,306,399	86,892,367	325,862,261	503,757,172	358,806,954	219,689,453	141,830,835	113,186,854	111,290,141	92,147,542
2001	427,509	106,203,851	523,469,956	584,028,990	425,435,125	280,394,079	222,688,189	218,030,131	190,275,667	219,768,697
2002	998,154	139,851,836	523,793,885	533,225,365	370,541,854	307,680,488	286,446,061	274,810,328	318,219,490	284,583,945
2003	1,275,139	204,408,081	447,374,045	370,717,427	341,921,289	382,013,037	386,781,855	499,011,758	441,644,126	427,813,257
2004	28,605,580	289,642,825	390,850,693	461,884,436	583,717,738	600,097,396	726,860,154	640,655,901	631,849,740	621,968,613
2005	8,496,331	112,125,597	330,849,206	509,653,883	615,766,284	738,784,405	655,646,259	632,989,376	643,745,354	428,758,076
2006	4,335,720	139,091,415	542,701,421	859,878,146	1,106,467,317	906,454,369	862,679,973	920,368,450	593,596,720	466,293,491
2007	4,918,361	251,460,691	920,569,265	1,449,314,307	1,117,003,004	1,237,452,446	1,552,954,209	916,532,923	663,325,270	575,813,343
2008	11,782,575	651,286,638	2,602,149,408	2,683,058,919	3,185,665,420	4,178,180,582	2,504,764,777	1,721,831,844	1,490,976,119	897,767,544
2009	21,436,645	832,315,256	1,966,040,286	2,845,866,264	4,112,155,144	2,896,318,421	2,131,873,877	1,826,914,365	1,141,128,042	691,291,178
2010	11,096,377	275,878,071	823,771,266	1,454,975,008	1,311,044,510	1,146,179,588	957,807,701	647,884,935	406,078,226	264,951,117
2011	7,060,283	151,849,232	435,634,855	450,974,824	462,267,878	442,300,329	328,419,925	197,533,381	136,199,320	73,908,559
2012	3,944,514	90,403,739	203,627,482	288,706,177	336,358,577	278,606,327	187,677,799	131,642,735	75,368,776	22,766,482
2013	4,094,555	78,733,775	216,310,576	324,773,713	328,775,393	249,885,622	185,965,393	110,720,672	36,260,935	85,591,245
2014	273,515	33,390,206	116,850,196	193,354,284	167,564,622	136,804,815	84,801,761	30,974,647	54,440,201	79,330,725
2015	286,781	29,552,792	141,364,130	194,691,011	205,713,244	139,816,697	43,091,715	89,105,196	158,453,582	135,422,295
2016	495,821	36,441,825	142,503,790	228,291,231	179,579,949	61,193,291	158,123,296	334,279,107	298,784,917	190,502,924
2017	594,813	35,515,264	164,373,165	190,817,781	69,373,917	190,876,173	434,312,648	385,222,800	357,158,193	284,639,769
2018	799,188	45,234,496	132,719,910	68,740,388	242,531,598	473,186,243	433,058,924	336,453,033	294,093,489	243,427,509
2019	839,774	26,483,634	36,735,698	261,570,497	519,677,039	458,042,055	393,088,904	280,211,714	251,534,490	236,061,837
2020	0	3,520,242	314,027,773	658,340,425	541,712,509	427,884,109	318,127,937	276,729,801	277,245,101	224,356,142
2021	0	146,685,481	534,132,660	453,027,103	407,165,603	427,202,348	322,447,514	289,118,619	357,998,621	223,969,249

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	48,173,307	25,434,263	18,236,523	13,605,921	9,343,149	6,845,630	5,505,039	5,299,037	5,751,762	4,020,893
1991	27,463,177	17,193,507	11,687,099	9,127,773	6,567,685	5,023,429	4,252,566	4,922,209	3,638,417	3,995,865
1992	18,713,522	11,602,782	8,710,484	6,710,693	4,988,613	3,888,999	4,497,065	3,436,670	3,512,234	4,385,151
1993	22,453,669	15,669,819	10,657,270	8,197,025	6,410,648	6,696,673	6,204,472	6,894,300	7,724,334	5,199,397
1994	22,161,252	18,339,699	11,806,857	10,780,697	9,770,323	9,331,554	13,429,742	10,425,112	8,676,534	10,359,618
1995	17,389,167	11,658,503	11,820,950	10,567,374	10,512,227	11,868,625	10,660,088	7,841,769	7,113,241	5,163,846
1996	25,388,378	20,372,119	20,370,440	19,817,536	23,994,676	19,693,221	17,735,603	15,978,231	9,939,949	12,843,499
1997	27,507,512	27,953,373	23,422,632	28,404,194	23,705,122	19,621,540	21,441,877	13,609,111	14,896,438	16,111,435
1998	59,295,130	56,227,324	64,279,145	58,809,927	50,458,839	49,113,558	32,921,576	35,323,805	39,350,244	22,099,029
1999	94,699,638	105,732,451	107,535,075	87,278,041	81,925,487	54,259,659	55,103,635	56,822,896	33,407,689	23,835,047
2000	105,834,495	87,917,214	71,610,975	67,042,791	45,226,234	49,427,478	47,105,788	29,953,866	23,487,482	11,316,824
2001	202,713,039	163,358,787	149,824,113	94,866,704	96,780,916	86,634,691	54,480,387	33,326,729	18,243,133	14,043,993
2002	255,007,963	239,321,936	150,478,044	144,464,258	131,253,411	78,205,080	46,599,628	28,861,107	14,737,279	5,094,655
2003	420,622,738	269,330,314	215,957,790	187,407,012	107,511,853	63,825,603	34,786,751	17,211,758	4,507,893	5,841,195
2004	397,999,323	336,633,992	284,033,974	160,024,554	91,161,563	50,043,109	28,846,782	8,738,739	9,524,726	18,920,919
2005	343,459,975	287,605,866	166,357,367	91,805,743	55,804,436	27,626,609	7,246,898	8,528,553	15,727,677	14,307,146
2006	396,068,456	229,460,761	146,553,033	79,401,044	46,843,951	13,410,745	10,967,680	18,169,062	15,617,487	14,895,111
2007	349,232,218	202,361,383	125,484,000	73,767,559	22,091,625	17,626,177	29,121,547	25,412,156	23,300,452	15,046,137
2008	526,280,419	328,471,845	192,935,190	57,572,238	61,290,980	87,513,865	64,823,505	46,663,579	33,752,752	25,912,253
2009	420,343,914	237,782,457	74,006,598	70,214,103	134,651,390	86,085,879	58,263,214	44,723,131	33,197,472	27,051,189
2010	142,855,102	42,436,682	56,642,342	110,276,259	71,636,931	47,825,622	36,833,607	31,080,269	21,910,969	18,784,851
2011	24,226,118	48,108,303	79,804,850	55,648,471	40,068,670	30,051,932	26,335,002	22,656,245	15,734,169	13,261,899
2012	59,224,141	113,498,964	72,311,558	51,804,898	34,685,691	29,295,921	21,689,301	18,020,773	11,726,912	12,584,654
2013	147,553,909	101,859,695	78,084,276	60,954,155	51,260,699	39,734,048	33,472,376	42,152,022	23,482,083	22,194,205
2014	54,962,352	46,627,271	40,504,121	32,877,170	29,134,696	20,568,433	18,367,514	13,659,093	14,084,619	11,694,668
2015	103,337,597	83,427,487	68,517,443	54,787,479	50,098,073	36,367,432	29,047,836	25,580,739	21,814,617	18,066,397
2016	142,234,163	111,484,590	91,666,976	68,693,088	70,576,815	50,023,845	42,767,344	37,025,767	30,465,357	24,811,419
2017	250,531,572	177,854,175	147,276,215	119,379,177	110,952,810	102,731,070	77,969,074	68,313,746	51,758,507	45,092,566
2018	216,322,348	174,740,205	154,165,423	134,980,220	123,286,953	105,874,784	83,161,330	67,461,580	57,622,525	64,793,191
2019	171,050,291	157,738,894	130,304,084	139,523,382	119,107,350	97,578,572	87,068,994	73,210,400	46,915,398	35,339,430
2020	235,631,983	167,810,404	170,223,972	148,535,922	126,215,188	107,620,690	97,771,088	60,983,699	53,385,650	38,815,840
2021	208,900,869	178,122,441	174,151,913	145,713,752	121,585,459	119,130,133	91,267,199	65,820,859	54,026,922	35,176,349

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	5,463,216	4,997,342	3,094,163	3,207,508	1,513,325	1,993,388	2,398,457	754,149	773,662	470,757
1991	4,286,233	3,146,336	3,207,792	1,958,515	2,392,355	2,345,819	1,287,231	977,701	807,105	318,671
1992	2,806,725	3,189,454	1,602,331	2,030,533	2,103,506	1,891,993	731,334	264,316	174,432	22,651
1993	6,056,580	3,283,016	5,066,229	5,251,549	3,710,382	1,408,169	1,009,107	759,586	45,774	151,516
1994	6,157,210	6,587,242	7,999,507	4,017,958	2,101,551	2,040,679	890,174	225,916	238,127	364,531
1995	6,548,287	6,837,685	3,321,075	2,565,197	1,968,378	557,468	247,974	306,828	269,240	388,772
1996	13,634,417	8,778,837	5,516,503	3,882,469	1,767,279	211,437	455,100	888,769	811,401	623,173
1997	11,148,107	6,367,337	3,971,234	2,910,077	458,223	593,008	1,108,196	1,336,480	891,028	601,787
1998	11,917,193	6,529,630	4,799,024	1,576,689	1,144,247	2,970,781	2,756,057	2,451,737	1,631,551	930,472
1999	12,404,521	8,100,804	1,829,425	1,891,318	3,151,425	3,882,671	3,636,032	2,465,110	2,094,398	1,687,860
2000	7,805,025	2,931,409	1,489,016	2,522,465	2,005,359	2,625,857	2,111,979	2,428,345	1,845,938	1,040,361
2001	3,726,256	2,662,230	4,963,228	4,831,419	3,529,813	3,778,044	3,178,692	2,552,653	1,294,265	1,131,951
2002	4,666,699	6,315,100	6,047,315	5,215,897	4,452,442	4,271,979	3,155,522	2,914,014	1,994,385	1,471,025
2003	12,117,527	8,191,315	6,116,699	4,714,421	5,779,780	3,973,194	4,135,661	3,172,991	2,946,321	1,821,981
2004	13,793,695	10,576,589	7,504,942	6,334,808	6,764,405	4,720,723	5,416,668	4,502,923	2,972,151	2,398,859
2005	10,049,574	7,006,794	7,073,583	6,349,524	4,998,250	5,017,913	4,966,225	4,088,339	3,139,978	1,976,714
2006	9,759,028	8,163,365	5,540,951	6,700,552	6,670,184	4,631,330	4,964,137	4,960,247	3,610,856	2,433,217
2007	11,359,492	8,969,874	8,234,066	7,858,382	7,240,736	5,808,984	5,476,258	5,685,017	4,691,864	3,502,140
2008	22,074,678	16,020,915	17,119,790	17,956,407	14,677,645	14,570,545	13,345,537	12,109,874	8,868,401	5,478,910
2009	22,373,701	18,994,049	14,650,571	13,306,649	12,139,667	11,410,244	9,572,004	6,938,066	5,247,829	3,360,802
2010	14,846,220	10,697,706	11,101,199	20,162,038	9,732,438	8,900,571	7,355,100	5,252,861	4,316,100	2,618,984
2011	11,501,046	9,143,492	8,861,641	9,288,965	7,205,640	6,732,612	5,424,419	5,294,438	2,977,879	2,121,775
2012	8,103,093	9,651,804	7,232,370	7,359,020	5,240,532	5,122,681	4,564,216	3,348,379	2,444,576	1,539,955
2013	17,116,236	14,552,306	11,582,792	9,587,684	9,082,657	6,440,527	6,028,514	5,246,940	4,700,326	3,043,549
2014	10,048,904	8,171,275	7,636,679	5,936,260	5,186,870	5,376,893	4,558,161	3,855,693	3,023,090	1,633,226
2015	14,596,405	11,822,199	9,486,584	9,905,736	8,486,679	8,818,586	5,842,211	4,286,774	3,666,594	2,709,997
2016	21,872,076	16,906,653	14,021,491	14,415,258	10,681,990	12,711,503	8,769,474	6,571,972	8,041,788	3,560,187
2017	36,934,300	28,446,144	23,923,637	21,279,022	21,944,663	19,591,807	16,327,361	13,675,069	10,014,522	6,975,668
2018	34,613,956	31,107,679	27,607,092	23,086,416	19,979,531	18,396,117	35,648,476	14,098,216	11,371,803	7,394,125
2019	31,639,737	25,358,610	32,963,159	22,526,382	21,065,255	18,062,635	15,055,700	12,629,651	8,277,859	8,216,132
2020	33,924,205	25,728,198	22,199,231	18,585,433	13,855,306	13,296,908	11,496,202	10,116,288	7,709,024	5,227,874
2021	29,411,372	22,283,968	21,520,854	18,966,177	15,239,691	11,732,744	12,167,105	8,164,333	7,623,114	3,936,441

Table 12: Conditional Loss Severity = Table 11/Table 10
Loss Severity for Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10
1990	80.71%	53.79%	49.31%	49.30%	50.77%	51.36%	53.14%	50.21%	44.58%	44.92%
1991	40.02%	51.94%	50.92%	51.49%	52.65%	53.91%	50.77%	45.10%	44.44%	39.99%
1992	44.30%	53.56%	53.90%	52.78%	54.00%	50.37%	42.92%	42.71%	39.25%	33.69%
1993	36.77%	55.56%	55.16%	53.61%	47.91%	41.45%	39.11%	35.36%	29.50%	27.66%
1994	55.89%	58.64%	57.20%	48.00%	39.73%	37.52%	33.66%	28.79%	26.52%	27.60%
1995	55.17%	59.56%	45.26%	38.07%	37.53%	35.60%	31.11%	30.28%	31.90%	31.56%
1996	43.09%	39.45%	37.08%	36.88%	33.73%	30.72%	29.06%	31.44%	30.68%	35.48%
1997	33.27%	38.82%	38.18%	34.48%	30.89%	30.07%	31.17%	31.30%	35.37%	39.50%
1998	32.15%	39.65%	34.14%	29.76%	27.77%	30.20%	30.01%	33.55%	38.52%	51.45%
1999	39.39%	37.48%	32.07%	28.44%	30.12%	30.83%	35.41%	37.91%	48.94%	59.21%
2000	35.54%	35.02%	31.53%	33.71%	33.82%	36.94%	41.75%	50.27%	61.09%	62.06%
2001	30.81%	33.38%	35.86%	35.34%	37.41%	40.49%	49.21%	58.87%	60.99%	64.32%
2002	34.45%	36.80%	38.03%	39.82%	40.48%	48.04%	55.35%	59.41%	63.28%	65.98%
2003	47.38%	44.36%	42.58%	40.47%	46.15%	54.57%	56.83%	61.63%	63.83%	64.14%
2004	46.54%	44.66%	41.25%	46.30%	54.64%	58.36%	61.96%	65.98%	65.37%	62.18%
2005	37.07%	41.24%	47.42%	55.58%	59.41%	64.04%	66.80%	67.20%	64.86%	60.96%
2006	46.79%	48.05%	57.01%	61.59%	66.26%	69.97%	69.35%	67.18%	63.68%	65.39%
2007	57.19%	57.85%	61.58%	67.42%	71.12%	70.72%	67.35%	64.22%	65.67%	69.38%
2008	58.80%	61.86%	65.47%	69.88%	69.17%	63.93%	60.75%	62.25%	66.42%	71.36%
2009	66.72%	63.40%	66.21%	65.50%	58.90%	55.29%	57.72%	61.85%	67.79%	72.70%
2010	67.67%	66.61%	63.28%	54.84%	50.03%	52.37%	58.30%	64.63%	68.75%	70.34%
2011	73.57%	66.47%	55.81%	46.10%	49.04%	56.64%	62.15%	64.88%	65.75%	57.61%
2012	50.48%	63.57%	47.59%	49.58%	54.30%	61.98%	65.73%	63.12%	58.65%	69.72%
2013	63.54%	49.20%	50.88%	55.31%	58.92%	64.49%	64.36%	59.38%	75.41%	63.18%
2014	32.31%	46.10%	48.73%	53.54%	60.27%	60.63%	56.17%	70.98%	64.38%	55.55%
2015	23.35%	53.05%	53.17%	58.41%	60.35%	57.40%	69.10%	58.46%	54.41%	60.29%
2016	54.82%	61.27%	60.69%	62.44%	58.58%	71.71%	60.65%	55.68%	59.05%	59.06%
2017	42.18%	61.62%	63.34%	57.13%	71.56%	59.22%	53.57%	56.89%	59.56%	57.55%
2018	46.83%	66.99%	57.22%	75.37%	63.05%	55.55%	59.02%	57.47%	56.23%	56.87%
2019	67.34%	64.66%	73.58%	61.60%	56.51%	58.44%	60.57%	58.38%	57.22%	58.52%
2020	0.00%	71.35%	61.63%	57.33%	59.42%	61.63%	58.64%	58.07%	59.69%	56.17%
2021	0.00%	60.69%	57.01%	60.67%	61.57%	61.19%	59.10%	57.62%	62.89%	56.46%

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	42.22%	39.63%	41.28%	39.57%	39.54%	46.27%	51.84%	62.07%	73.56%	66.75%
1991	38.50%	35.16%	34.23%	37.38%	41.32%	49.02%	64.46%	74.15%	65.95%	66.22%
1992	30.39%	29.19%	33.45%	43.70%	45.74%	56.19%	67.25%	60.65%	65.30%	68.08%
1993	29.77%	31.16%	36.24%	44.78%	50.43%	62.16%	63.12%	59.76%	61.68%	59.52%
1994	28.33%	38.28%	40.58%	52.41%	61.76%	55.49%	61.65%	62.31%	61.73%	56.54%
1995	36.17%	40.04%	55.37%	62.61%	60.56%	64.74%	64.91%	62.71%	55.04%	56.46%
1996	40.85%	50.10%	60.54%	63.07%	64.23%	68.41%	64.10%	57.58%	51.82%	59.24%
1997	51.26%	60.89%	60.84%	64.42%	64.92%	63.68%	61.07%	53.31%	56.96%	58.18%
1998	59.31%	61.17%	64.17%	66.21%	65.99%	60.82%	54.54%	57.02%	64.05%	67.89%
1999	59.36%	62.47%	67.19%	64.53%	60.74%	58.12%	58.49%	61.70%	66.27%	65.26%
2000	66.45%	69.52%	68.80%	63.62%	60.13%	64.88%	66.37%	68.46%	67.69%	63.03%
2001	68.17%	66.89%	63.08%	60.86%	62.21%	65.96%	66.90%	68.70%	66.49%	71.69%
2002	66.44%	61.57%	59.42%	62.41%	64.07%	68.39%	67.80%	68.80%	59.41%	70.22%
2003	60.70%	56.69%	57.84%	61.86%	66.99%	71.37%	69.34%	59.56%	67.63%	68.47%
2004	56.54%	60.09%	63.04%	68.78%	68.85%	72.02%	63.19%	74.94%	75.34%	62.77%
2005	62.08%	66.20%	72.09%	72.75%	72.84%	66.39%	62.77%	77.31%	68.71%	66.79%
2006	68.93%	72.65%	75.06%	74.41%	71.85%	72.43%	73.59%	63.07%	67.38%	69.27%
2007	71.86%	75.27%	75.91%	71.63%	77.19%	73.79%	65.88%	70.12%	71.88%	62.59%
2008	75.44%	76.10%	71.64%	78.44%	78.75%	68.30%	68.25%	65.88%	65.67%	63.88%
2009	73.08%	69.07%	76.78%	73.17%	68.10%	63.36%	65.62%	64.06%	60.27%	63.87%
2010	64.03%	76.31%	73.29%	63.84%	64.48%	61.80%	61.98%	64.01%	61.43%	64.54%
2011	68.19%	69.69%	57.95%	62.45%	64.32%	59.38%	61.02%	60.03%	57.98%	58.14%
2012	64.99%	58.30%	59.57%	64.65%	61.56%	62.68%	61.98%	60.80%	59.45%	61.79%
2013	56.33%	57.97%	61.71%	59.52%	59.03%	59.05%	54.51%	64.01%	58.22%	58.09%
2014	56.91%	60.91%	60.13%	56.89%	57.65%	54.73%	53.31%	55.71%	55.73%	54.63%
2015	60.45%	58.82%	58.12%	57.76%	55.59%	54.99%	54.02%	57.85%	57.07%	56.65%
2016	59.18%	58.85%	56.62%	58.72%	59.52%	58.06%	57.29%	56.93%	56.87%	60.37%
2017	58.32%	54.79%	54.02%	55.92%	55.83%	55.42%	54.19%	56.96%	53.64%	56.63%
2018	56.54%	55.93%	56.16%	55.52%	56.17%	56.00%	55.96%	56.17%	56.79%	61.34%
2019	54.98%	56.43%	56.95%	59.17%	58.19%	57.88%	59.41%	62.30%	59.99%	56.10%
2020	60.35%	55.42%	58.80%	58.64%	59.42%	59.93%	60.67%	60.28%	58.68%	60.68%
2021	57.54%	56.84%	57.41%	57.66%	59.32%	59.14%	59.42%	59.72%	59.95%	61.02%

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	71.57%	71.90%	67.03%	58.01%	52.98%	61.95%	60.41%	43.18%	49.19%	42.69%
1991	66.22%	63.71%	57.70%	56.81%	59.99%	52.59%	57.30%	60.23%	49.21%	49.22%
1992	57.66%	57.83%	50.89%	49.93%	51.38%	58.05%	47.32%	24.73%	34.41%	17.55%
1993	50.42%	43.70%	49.06%	57.42%	54.64%	50.67%	55.79%	60.60%	12.91%	95.78%
1994	46.93%	53.75%	58.71%	51.62%	39.75%	70.34%	52.02%	48.63%	71.25%	63.67%
1995	58.51%	54.22%	51.07%	48.26%	53.68%	49.44%	54.09%	80.70%	82.35%	66.34%
1996	59.66%	61.06%	57.63%	62.42%	47.77%	44.23%	59.34%	63.54%	73.76%	58.76%
1997	62.41%	55.14%	59.56%	54.31%	39.44%	71.36%	51.81%	57.51%	57.96%	55.53%
1998	59.12%	61.68%	56.15%	58.83%	69.01%	62.22%	65.45%	69.10%	52.27%	62.14%
1999	63.65%	66.44%	53.76%	64.74%	58.58%	59.64%	60.84%	58.69%	58.08%	59.17%
2000	66.20%	74.61%	69.41%	59.83%	59.23%	61.80%	62.71%	60.27%	57.68%	54.88%
2001	54.68%	66.96%	59.24%	65.54%	63.98%	60.99%	64.38%	57.97%	50.57%	55.24%
2002	78.55%	62.44%	61.74%	62.09%	59.48%	55.89%	59.21%	59.19%	51.83%	53.39%
2003	62.49%	59.04%	60.66%	57.71%	61.50%	51.57%	54.77%	51.86%	52.73%	49.00%
2004	65.91%	66.75%	58.72%	57.89%	59.82%	53.38%	54.38%	55.16%	51.75%	52.67%
2005	66.37%	60.60%	63.20%	60.27%	59.94%	55.20%	59.88%	63.01%	57.45%	56.94%
2006	63.74%	61.36%	64.95%	64.58%	64.06%	58.66%	59.03%	56.64%	60.73%	56.15%
2007	62.64%	60.34%	64.99%	59.48%	62.53%	60.70%	61.02%	64.20%	56.01%	53.80%
2008	66.45%	60.89%	62.02%	65.02%	65.12%	60.53%	62.64%	63.45%	61.68%	63.39%
2009	65.39%	63.94%	58.53%	61.50%	61.23%	62.10%	66.00%	61.01%	60.45%	59.99%
2010	57.21%	64.33%	57.07%	69.91%	61.09%	63.05%	61.63%	59.12%	61.01%	52.81%
2011	57.67%	61.34%	58.00%	61.17%	58.45%	58.34%	61.57%	52.63%	47.37%	54.13%
2012	58.62%	60.97%	57.10%	57.58%	57.98%	54.92%	60.17%	60.44%	57.49%	52.07%
2013	58.12%	60.50%	57.40%	54.57%	57.87%	58.58%	62.92%	55.45%	54.89%	54.94%
2014	59.23%	54.62%	54.70%	55.81%	55.90%	54.22%	61.28%	56.88%	57.69%	59.12%
2015	56.45%	58.54%	59.85%	61.15%	60.33%	63.22%	64.64%	61.10%	54.00%	64.42%
2016	59.44%	63.40%	59.30%	60.92%	54.92%	60.30%	60.97%	57.91%	61.12%	54.30%
2017	57.74%	54.80%	54.02%	56.12%	54.50%	55.48%	53.82%	51.93%	55.11%	51.88%
2018	57.03%	57.71%	57.59%	58.71%	55.26%	55.99%	70.73%	56.69%	53.27%	58.27%
2019	57.05%	56.83%	56.33%	63.21%	54.14%	60.75%	59.50%	63.09%	58.98%	61.88%
2020	61.80%	58.51%	62.42%	62.50%	52.19%	60.03%	59.57%	56.64%	55.98%	51.15%
2021	61.64%	56.26%	61.53%	62.18%	60.50%	58.97%	63.74%	55.05%	56.80%	54.18%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
FRM30

Table 13: Cumulative Gross Claim Cost
Total Gross Losses for each Fiscal Year as of the End of the Evaluation Year

Evaluation Year (1–10)

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	3,073,174	124,650,464	634,329,132	1,407,719,817	2,146,168,170	2,683,340,204	3,059,046,448	3,383,865,234	3,621,229,399	3,790,461,704
1991	2,394,083	104,914,069	534,182,584	1,097,108,838	1,586,882,586	1,958,916,877	2,297,368,490	2,556,335,221	2,738,266,301	2,862,223,255
1992	1,177,257	68,877,265	312,547,599	632,996,850	946,723,527	1,280,425,248	1,569,371,229	1,791,918,649	1,944,550,486	2,036,997,351
1993	2,839,718	94,883,684	420,121,988	891,889,752	1,507,046,486	2,073,949,162	2,514,537,133	2,812,074,071	2,977,640,254	3,091,169,817
1994	4,480,635	141,450,733	543,587,284	1,189,490,162	1,916,657,787	2,528,762,217	2,944,752,473	3,194,994,202	3,368,143,204	3,491,421,942
1995	1,691,029	60,665,001	337,363,220	807,138,727	1,274,628,618	1,631,238,866	1,863,872,439	2,015,485,515	2,147,764,483	2,233,413,323
1996	1,049,471	112,619,311	629,879,503	1,381,928,146	2,036,262,295	2,491,175,706	2,809,832,372	3,078,474,818	3,252,198,841	3,352,242,592
1997	1,650,692	120,675,142	605,180,875	1,204,576,991	1,674,360,166	2,067,488,397	2,404,235,308	2,631,996,725	2,770,222,017	2,853,495,767
1998	2,287,005	172,756,058	901,353,574	1,716,420,900	2,469,451,823	3,193,465,865	3,673,926,616	3,968,721,185	4,147,989,663	4,268,380,426
1999	2,986,126	264,159,635	1,157,001,425	2,389,219,826	3,753,168,732	4,699,508,420	5,264,653,425	5,589,701,099	5,801,388,239	5,978,946,860
2000	3,676,295	251,798,470	1,285,226,991	2,779,581,167	3,840,509,093	4,435,305,428	4,775,018,965	5,000,161,570	5,182,339,782	5,330,809,520
2001	1,387,781	319,507,273	1,779,180,145	3,431,854,337	4,568,976,407	5,261,498,606	5,714,046,375	6,084,391,379	6,396,345,212	6,738,013,207
2002	2,897,272	382,888,997	1,760,047,115	3,099,014,711	4,014,350,865	4,654,777,728	5,172,330,155	5,634,916,937	6,137,784,366	6,569,073,877
2003	2,691,212	463,481,664	1,514,261,655	2,430,219,603	3,171,104,220	3,871,102,883	4,551,721,548	5,361,360,848	6,053,217,451	6,720,194,960
2004	61,463,694	710,026,706	1,657,522,272	2,655,118,709	3,723,370,961	4,751,717,017	5,924,835,567	6,895,880,323	7,862,528,610	8,862,825,083
2005	22,921,065	294,784,294	992,475,169	1,909,482,582	2,945,918,172	4,099,528,106	5,080,998,901	6,022,892,538	7,015,425,873	7,718,819,795
2006	9,266,216	298,753,543	1,250,628,728	2,646,778,109	4,316,737,952	5,612,201,576	6,856,109,635	8,226,113,710	9,158,294,982	9,871,347,458
2007	8,600,030	443,292,529	1,938,246,217	4,087,847,381	5,658,384,310	7,408,186,040	9,713,866,448	11,141,087,858	12,151,112,384	12,980,994,906
2008	20,036,845	1,072,844,999	5,047,629,848	8,887,101,575	13,492,398,315	20,028,030,434	24,151,125,247	26,917,295,061	29,162,003,139	30,420,035,585
2009	32,130,229	1,345,027,661	4,314,495,152	8,659,635,109	15,640,955,337	20,879,582,816	24,573,263,159	27,527,077,641	29,210,364,656	30,161,226,046
2010	16,396,808	430,567,513	1,732,292,414	4,385,193,282	7,005,529,030	9,194,314,862	10,837,210,251	11,839,601,693	12,430,277,668	12,806,930,413
2011	9,597,200	238,053,824	1,018,573,059	1,996,778,711	2,939,346,244	3,720,268,502	4,248,669,867	4,553,142,164	4,760,304,516	4,888,596,759
2012	7,813,840	150,023,237	577,864,701	1,160,197,715	1,779,688,003	2,229,198,125	2,514,705,347	2,723,258,554	2,851,759,678	2,884,413,353
2013	6,443,894	166,484,338	591,661,838	1,178,801,990	1,736,784,297	2,124,292,381	2,413,252,803	2,599,728,342	2,647,811,480	2,783,290,277
2014	846,568	73,273,911	313,076,837	674,195,418	952,201,183	1,177,831,791	1,328,817,901	1,372,455,723	1,457,019,064	1,599,836,120
2015	1,227,990	56,939,948	322,831,525	656,172,083	997,023,021	1,240,603,265	1,302,967,673	1,455,401,288	1,746,624,013	1,971,250,208
2016	904,522	60,383,328	295,205,938	660,794,808	967,346,851	1,052,675,842	1,313,383,525	1,913,766,459	2,419,764,708	2,742,296,209
2017	1,410,313	59,044,763	318,547,294	652,575,893	749,525,316	1,071,860,000	1,882,652,195	2,559,730,436	3,159,419,193	3,653,982,664
2018	1,706,489	69,231,315	301,157,996	392,364,984	777,010,973	1,628,809,524	2,362,514,319	2,947,971,695	3,470,945,160	3,899,007,378
2019	1,247,112	42,204,631	92,133,776	516,786,846	1,436,468,795	2,220,200,115	2,869,142,140	3,349,092,568	3,788,714,774	4,192,073,202
2020	454,026	5,387,812	514,952,589	1,663,332,605	2,574,955,085	3,269,208,955	3,811,690,164	4,288,273,503	4,752,742,337	5,152,200,089
2021	20,672	241,731,155	1,178,568,439	1,925,324,607	2,586,652,482	3,284,770,226	3,830,375,054	4,332,108,862	4,901,346,731	5,298,031,861

Evaluation Year (11–20)

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	3,904,553,102	3,968,729,781	4,012,905,496	4,047,289,661	4,070,920,436	4,085,714,303	4,096,334,401	4,104,871,482	4,112,690,313	4,118,714,300
1991	2,933,557,517	2,982,461,119	3,016,601,592	3,041,019,989	3,056,912,932	3,067,161,437	3,073,759,116	3,080,397,430	3,085,914,615	3,091,949,128
1992	2,098,572,192	2,138,323,492	2,164,364,039	2,179,720,044	2,190,627,079	2,197,548,759	2,204,236,331	2,209,903,112	2,215,281,415	2,221,722,574
1993	3,166,596,740	3,216,885,804	3,246,295,355	3,264,600,409	3,277,312,666	3,288,085,957	3,297,915,401	3,309,451,316	3,321,973,718	3,330,709,240
1994	3,569,644,035	3,617,551,254	3,646,647,541	3,667,219,030	3,683,038,266	3,699,854,529	3,721,637,318	3,738,367,842	3,752,423,558	3,770,746,753
1995	2,281,485,197	2,310,603,203	2,331,952,125	2,348,831,152	2,366,189,623	2,384,523,504	2,400,947,408	2,413,451,485	2,426,375,468	2,435,520,833
1996	3,414,399,961	3,455,066,875	3,488,714,651	3,520,136,550	3,557,494,506	3,586,281,721	3,613,951,290	3,641,699,816	3,660,880,373	3,682,559,444
1997	2,907,163,217	2,953,072,083	2,991,570,633	3,035,664,569	3,072,179,228	3,102,994,136	3,138,106,818	3,163,635,252	3,189,787,346	3,217,479,178
1998	4,368,357,094	4,460,275,589	4,560,438,733	4,649,268,358	4,725,729,115	4,806,484,961	4,866,848,467	4,928,801,815	4,990,234,917	5,022,785,651
1999	6,138,491,719	6,307,736,794	6,467,776,051	6,603,026,407	6,737,901,134	6,831,252,929	6,925,467,162	7,017,563,579	7,067,973,910	7,104,495,285
2000	5,490,087,363	5,616,559,023	5,720,643,996	5,826,019,915	5,901,238,208	5,977,420,499	6,048,393,558	6,092,147,371	6,126,845,093	6,144,800,877
2001	7,035,356,999	7,279,561,086	7,517,083,787	7,672,956,363	7,828,518,255	7,959,867,575	8,041,298,375	8,089,807,821	8,117,244,838	8,136,835,840
2002	6,952,875,874	7,341,553,663	7,594,783,898	7,826,250,734	8,031,121,741	8,145,466,540	8,214,199,559	8,256,147,215	8,280,954,217	8,288,209,492
2003	7,413,203,575	7,888,318,242	8,261,658,879	8,564,632,818	8,725,123,566	8,814,547,692	8,864,718,195	8,893,615,235	8,900,280,740	8,908,811,493
2004	9,566,744,539	10,127,000,454	10,577,573,054	10,810,223,456	10,942,622,140	11,012,105,897	11,057,755,278	11,069,416,299	11,082,058,387	11,112,200,222
2005	8,272,108,958	8,706,569,430	8,937,326,237	9,063,514,053	9,140,129,000	9,181,739,515	9,193,285,184	9,204,317,104	9,227,206,444	9,248,626,861
2006	10,445,918,431	10,761,775,410	10,957,026,807	11,063,741,152	11,128,933,703	11,147,450,052	11,162,354,419	11,191,161,011	11,214,339,946	11,235,842,475
2007	13,467,009,332	13,735,871,994	13,901,169,632	14,004,153,843	14,032,772,331	14,056,659,222	14,100,860,840	14,137,103,921	14,169,519,665	14,193,557,937
2008	31,117,612,759	31,549,233,244	31,818,551,255	31,891,949,693	31,969,778,359	32,097,914,837	32,192,897,021	32,263,726,066	32,315,123,649	32,355,686,719
2009	30,736,410,417	31,080,672,318	31,177,059,395	31,273,020,259	31,470,754,194	31,606,631,936	31,695,425,681	31,765,238,450	31,820,317,933	31,862,669,063
2010	13,030,047,725	13,085,659,558	13,162,949,695	13,335,684,123	13,446,779,823	13,524,161,330	13,583,592,564	13,632,146,475	13,667,813,891	13,696,919,281
2011	4,924,125,242	4,993,152,179	5,130,863,630	5,219,975,167	5,282,268,507	5,332,876,771	5,376,033,104	5,413,773,234	5,440,911,869	5,463,720,300
2012	2,975,546,221	3,170,235,616	3,291,617,325	3,371,752,613	3,428,096,686	3,474,832,103	3,509,827,801	3,539,469,370	3,559,196,625	3,579,563,424
2013	3,045,254,327	3,220,953,303	3,347,491,068	3,449,905,517	3,536,749,590	3,604,037,515	3,665,439,294	3,731,296,303	3,771,631,788	3,809,841,008
2014	1,696,412,018	1,772,967,307	1,840,332,774	1,898,125,623	1,948,660,431	1,986,243,756	2,020,699,361	2,045,218,386	2,070,493,139	2,091,899,280
2015	2,142,187,228	2,284,017,550	2,401,913,846	2,496,764,673	2,586,887,073	2,653,025,098	2,706,799,983	2,751,021,632	2,789,242,834	2,821,135,717
2016	2,982,648,904	3,172,085,080	3,333,971,667	3,450,956,314	3,569,528,705	3,655,686,545	3,730,334,425	3,795,370,239	3,848,939,373	3,890,039,839
2017	4,083,586,268	4,408,222,339	4,680,837,773	4,894,328,132	5,093,060,866	5,278,414,966	5,422,284,581	5,542,222,706	5,638,712,083	5,718,341,930
2018	4,281,578,174	4,594,011,528	4,868,525,992	5,111,648,276	5,331,126,551	5,520,193,110	5,668,808,965	5,788,921,126	5,890,380,319	5,996,001,394
2019	4,503,173,471	4,782,708,690	5,011,524,759	5,247,342,408	5,452,027,049	5,620,604,759	5,767,153,748	5,884,663,814	5,962,872,028	6,025,869,543
2020	5,542,658,993	5,845,472,975	6,134,960,543	6,388,247,304	6,600,671,174	6,780,241,896	6,941,390,960	7,042,564,791	7,133,541,960	7,197,507,647
2021	5,661,054,672	5,974,444,460	6,277,800,976	6,530,501,285	6,735,454,866	6,936,879,900	7,090,477,246	7,200,698,649	7,290,820,788	7,348,471,839

Evaluation Year (21–30)

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	4,126,347,626	4,133,297,565	4,137,913,616	4,143,442,599	4,146,299,255	4,149,517,126	4,153,487,481	4,155,234,197	4,156,807,132	4,157,909,966
1991	3,098,421,446	3,103,360,197	3,108,919,876	3,112,367,266	3,116,355,475	3,120,815,644	3,123,062,208	3,124,685,430	3,126,325,634	3,126,973,103
1992	2,226,590,155	2,232,105,332	2,235,253,771	2,239,320,505	2,243,414,349	2,246,673,572	2,248,219,172	2,249,288,165	2,249,795,090	2,249,924,171
1993	3,342,720,911	3,350,234,092	3,360,560,255	3,369,705,585	3,376,495,806	3,379,274,874	3,381,083,575	3,382,337,027	3,382,691,725	3,382,849,916
1994	3,783,868,109	3,796,122,345	3,809,748,848	3,817,532,196	3,822,819,035	3,825,720,279	3,827,431,583	3,827,896,116	3,828,230,310	3,828,802,858
1995	2,446,711,648	2,459,321,616	2,465,825,114	2,471,140,792	2,474,807,992	2,475,935,461	2,476,393,895	2,476,774,099	2,477,101,057	2,477,687,069
1996	3,705,413,914	3,719,792,057	3,729,364,715	3,735,584,684	3,739,284,616	3,739,762,663	3,740,529,585	3,741,928,277	3,743,028,309	3,744,088,777
1997	3,235,340,840	3,246,888,221	3,253,555,919	3,258,914,677	3,260,076,629	3,260,907,691	3,263,046,828	3,265,370,538	3,266,907,828	3,267,991,494
1998	5,042,944,170	5,053,531,323	5,062,078,393	5,064,758,660	5,066,416,821	5,071,191,086	5,075,402,166	5,078,950,188	5,082,071,737	5,083,569,186
1999	7,123,984,403	7,136,176,757	7,139,579,861	7,142,501,114	7,147,881,052	7,154,390,775	7,160,367,641	7,164,568,117	7,168,173,907	7,171,026,449
2000	6,156,590,658	6,160,519,578	6,162,664,735	6,166,880,976	6,170,266,921	6,174,516,085	6,177,883,908	6,181,912,860	6,185,113,314	6,187,008,958
2001	8,143,650,566	8,147,626,138	8,156,004,445	8,163,375,883	8,168,893,340	8,175,088,267	8,180,025,420	8,184,428,979	8,186,988,530	8,189,037,774
2002	8,294,150,663	8,304,265,067	8,314,060,434	8,322,461,095	8,329,946,598	8,337,590,443	8,342,919,670	8,347,842,739	8,351,690,355	8,354,445,378
2003	8,928,202,569	8,942,075,695	8,952,158,566	8,960,327,343	8,969,725,069	8,977,430,027	8,984,981,355	8,991,099,590	8,996,686,664	9,000,404,656
2004	11,133,126,959	11,148,970,961	11,161,751,395	11,172,693,822	11,184,002,373	11,192,846,332	11,202,807,442	11,210,970,781	11,216,714,572	11,221,269,198
2005	9,263,768,019	9,275,330,845	9,286,523,074	9,297,057,777	9,305,396,144	9,314,485,858	9,322,779,146	9,329,267,861	9,334,733,677	9,338,205,460
2006	11,251,153,287	11,264,457,967	11,272,989,202	11,283,365,193	11,293,776,889	11,301,672,043	11,310,082,017	11,318,838,801	11,324,784,524	11,329,118,175
2007	14,211,691,537	14,226,556,082	14,239,225,541	14,252,437,465	14,264,017,212	14,273,587,581	14,282,562,524	14,291,417,382	14,299,793,615	14,306,303,067
2008	32,388,905,232	32,415,217,771	32,442,823,219	32,470,440,435	32,492,980,390	32,517,051,982	32,538,356,867	32,557,442,149	32,571,820,450	32,580,463,739
2009	31,896,886,544	31,926,592,414	31,951,624,191	31,973,262,496	31,993,088,610	32,011,462,773	32,025,966,669	32,037,338,374	32,046,020,302	32,051,622,333
2010	13,722,867,688	13,739,497,247	13,758,949,125	13,787,788,090	13,803,718,186	13,817,835,175	13,829,770,359	13,838,655,347	13,845,729,788	13,850,688,812
2011	5,483,663,954	5,498,569,511	5,513,849,117	5,529,034,690	5,541,362,697	5,552,902,818	5,561,712,330	5,571,771,430	5,578,057,467	5,581,976,977
2012	3,593,387,294	3,609,216,704	3,621,883,799	3,634,664,891	3,643,702,785	3,653,031,153	3,660,616,331	3,666,156,772	3,670,409,248	3,673,366,955
2013	3,839,293,058	3,863,347,237	3,883,526,777	3,901,095,389	3,916,790,069	3,927,784,460	3,937,365,298	3,946,828,510	3,955,391,083	3,960,930,659
2014	2,108,865,403	2,123,824,908	2,137,785,778	2,148,422,287	2,157,701,082	2,167,617,781	2,175,056,562	2,181,835,566	2,187,076,031	2,189,838,643
2015	2,846,993,845	2,867,187,609	2,883,037,014	2,899,236,321	2,913,303,818	2,927,252,506	2,936,290,107	2,943,305,548	2,950,095,974	2,954,302,784
2016	3,926,839,676	3,953,504,717	3,977,151,140	4,000,812,744	4,020,262,280	4,041,343,296	4,055,726,876	4,067,075,563	4,080,231,946	4,086,788,153
2017	5,782,310,076	5,834,219,892	5,878,508,864	5,916,423,569	5,956,689,135	5,992,005,095	6,022,342,735	6,048,678,105	6,066,850,847	6,080,296,018
2018	6,056,693,564	6,110,596,037	6,158,536,093	6,197,860,564	6,234,018,234	6,266,876,056	6,317,278,270	6,342,147,472	6,363,494,265	6,376,183,269
2019	6,081,326,460	6,125,948,213	6,184,470,440	6,220,109,036	6,259,020,402	6,288,753,636	6,314,058,785	6,334,076,313	6,348,110,975	6,361,388,900
2020	7,252,405,525	7,296,381,507	7,331,943,376	7,361,678,807	7,388,226,635	7,410,377,071	7,429,676,125	7,447,536,221	7,461,308,176	7,471,529,127
2021	7,396,183,945	7,435,795,675	7,470,772,468	7,501,274,304	7,526,463,787	7,546,359,839	7,565,447,149	7,580,278,677	7,593,699,552	7,600,965,661

Table 14: Cumulative Claim Cost Net of Recovery
Total Losses Net of Recovery for each Fiscal Year as of the End of the Evaluation Year

Evaluation Year (1–10)

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	2,480,479	67,882,664	319,194,735	700,462,043	1,075,358,871	1,351,248,789	1,550,897,234	1,713,998,408	1,819,807,790	1,895,829,029
1991	958,156	54,206,774	272,775,183	562,653,746	820,526,181	1,021,071,803	1,192,904,717	1,309,691,927	1,390,543,551	1,440,109,040
1992	521,537	36,781,595	168,114,194	337,238,970	506,665,828	674,761,407	798,772,481	893,826,023	953,738,835	984,885,911
1993	1,044,156	52,183,295	231,574,590	484,500,818	779,221,456	1,014,178,276	1,186,482,780	1,291,702,613	1,340,552,285	1,371,955,941
1994	2,504,299	82,823,996	312,840,523	622,900,174	911,779,693	1,141,425,096	1,281,442,924	1,353,487,352	1,399,409,163	1,433,435,634
1995	933,004	36,059,275	161,287,355	340,150,799	515,611,939	642,562,167	714,940,676	760,843,504	803,038,072	830,068,532
1996	452,238	44,463,748	236,257,708	513,608,269	734,288,959	874,035,878	966,635,083	1,051,087,874	1,104,390,262	1,139,889,721
1997	549,156	46,753,970	231,754,646	438,403,889	583,496,570	701,715,470	806,684,824	877,976,871	926,865,294	959,762,141
1998	735,346	68,328,691	317,057,271	559,610,661	768,713,771	987,350,917	1,131,552,569	1,230,455,912	1,299,517,492	1,361,453,576
1999	1,176,381	99,076,355	385,448,448	735,841,909	1,146,680,085	1,438,470,476	1,638,569,670	1,761,805,338	1,865,397,604	1,970,523,679
2000	1,306,399	88,198,766	414,061,027	917,818,199	1,276,625,153	1,496,314,606	1,638,145,442	1,751,332,295	1,862,622,437	1,954,769,979
2001	427,509	106,631,360	630,101,316	1,214,130,306	1,639,565,431	1,919,959,510	2,142,647,699	2,360,677,831	2,550,953,498	2,770,722,195
2002	998,154	140,849,991	664,643,876	1,197,869,241	1,568,411,094	1,876,091,583	2,162,537,644	2,437,347,972	2,755,567,462	3,040,151,406
2003	1,275,139	205,683,220	653,057,264	1,023,774,691	1,365,695,980	1,747,709,017	2,134,490,872	2,633,502,630	3,075,146,755	3,502,960,012
2004	28,605,580	318,248,405	709,099,098	1,170,983,533	1,754,701,272	2,354,798,668	3,081,658,822	3,722,314,722	4,354,164,463	4,976,133,076
2005	8,496,331	120,621,928	451,471,135	961,125,018	1,576,891,301	2,315,675,706	2,971,321,966	3,604,311,342	4,248,056,696	4,676,814,772
2006	4,335,720	143,427,135	686,128,556	1,546,006,702	2,652,474,019	3,558,928,388	4,421,608,361	5,341,976,811	5,935,573,530	6,401,867,021
2007	4,918,361	256,379,052	1,176,948,317	2,626,262,624	3,743,265,628	4,980,718,073	6,533,672,282	7,450,205,206	8,113,530,476	8,689,343,819
2008	11,782,575	663,069,213	3,265,218,621	5,948,277,541	9,133,942,961	13,312,123,543	15,816,888,319	17,538,720,163	19,029,696,282	19,927,463,826
2009	21,436,645	853,751,900	2,819,792,186	5,665,658,450	9,777,813,594	12,674,132,015	14,806,005,892	16,632,920,257	17,774,048,300	18,465,339,477
2010	11,096,377	286,974,448	1,110,745,714	2,565,720,723	3,876,765,233	5,022,944,820	5,980,752,521	6,628,637,456	7,034,715,681	7,299,666,798
2011	7,060,283	158,909,515	594,544,370	1,045,519,194	1,507,787,071	1,950,087,401	2,278,507,326	2,476,040,707	2,612,240,027	2,686,148,586
2012	3,944,514	94,348,253	297,975,735	586,681,912	923,040,489	1,201,646,816	1,389,324,615	1,520,967,350	1,596,336,127	1,619,102,609
2013	4,094,555	82,828,330	299,138,906	623,912,619	952,688,012	1,202,573,635	1,388,539,027	1,499,259,699	1,535,520,634	1,621,111,880
2014	273,515	33,663,721	150,513,917	343,868,201	511,432,823	648,237,638	733,039,399	764,014,046	818,454,247	897,784,972
2015	286,781	29,839,573	171,203,703	365,894,715	571,607,959	711,424,655	754,516,371	843,621,567	1,002,075,148	1,137,497,443
2016	495,821	36,937,646	179,441,436	407,732,666	587,312,616	648,505,906	806,629,202	1,140,908,309	1,439,693,226	1,630,196,150
2017	594,813	36,110,077	200,483,242	391,301,023	460,674,940	651,551,113	1,085,863,761	1,471,086,561	1,828,244,754	2,112,884,524
2018	799,188	46,033,685	178,753,595	247,493,982	490,025,581	963,211,824	1,396,270,747	1,732,723,780	2,026,817,268	2,270,244,777
2019	839,774	27,323,407	64,059,105	325,629,602	845,306,641	1,303,348,696	1,696,437,599	1,976,649,314	2,228,183,803	2,464,245,641
2020	0	3,520,242	317,548,015	975,888,440	1,517,600,949	1,945,485,057	2,263,612,994	2,540,342,794	2,817,587,896	3,041,944,037
2021	0	146,685,481	680,818,141	1,133,845,244	1,541,010,847	1,968,213,195	2,290,660,709	2,579,779,328	2,937,777,949	3,161,747,199

Evaluation Year (11–20)

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	1,944,002,336	1,969,436,599	1,987,673,122	2,001,279,042	2,010,622,191	2,017,467,822	2,022,972,860	2,028,271,897	2,034,023,659	2,038,044,551
1991	1,467,572,217	1,484,765,724	1,496,452,824	1,505,580,597	1,512,148,282	1,517,171,711	1,521,424,277	1,526,346,486	1,529,984,903	1,533,980,768
1992	1,003,599,433	1,015,202,216	1,023,912,700	1,030,623,393	1,035,612,006	1,039,501,005	1,043,998,070	1,047,434,740	1,050,946,974	1,055,332,125
1993	1,394,409,610	1,410,079,429	1,420,736,699	1,428,933,724	1,435,344,372	1,442,041,045	1,448,245,517	1,455,139,817	1,462,864,150	1,468,063,548
1994	1,455,596,886	1,473,936,585	1,485,743,442	1,496,524,139	1,506,294,462	1,515,626,016	1,529,055,758	1,539,480,869	1,548,157,404	1,558,517,022
1995	847,457,700	859,116,203	870,937,153	881,504,527	892,016,754	903,885,378	914,545,467	922,387,236	929,500,476	934,664,322
1996	1,165,278,098	1,185,650,218	1,206,020,658	1,225,838,194	1,249,832,870	1,269,526,091	1,287,261,694	1,303,239,924	1,313,179,873	1,326,023,372
1997	987,269,653	1,015,223,026	1,038,645,658	1,067,049,852	1,090,754,974	1,110,376,514	1,131,818,391	1,145,427,501	1,160,323,940	1,176,435,374
1998	1,420,748,706	1,476,976,030	1,541,255,175	1,600,065,102	1,650,523,940	1,699,637,499	1,732,559,074	1,767,882,879	1,807,233,123	1,829,332,153
1999	2,065,223,317	2,170,955,767	2,278,490,842	2,365,768,884	2,447,694,370	2,501,954,030	2,557,057,665	2,613,880,560	2,647,288,250	2,671,123,297
2000	2,060,604,474	2,148,521,687	2,220,132,662	2,287,175,454	2,332,401,688	2,381,829,166	2,428,934,954	2,458,888,820	2,482,376,302	2,493,693,125
2001	2,973,435,234	3,136,794,022	3,286,618,135	3,381,484,838	3,478,265,754	3,564,900,445	3,619,380,832	3,652,707,561	3,670,950,694	3,684,994,686
2002	3,295,159,370	3,534,481,305	3,684,959,350	3,829,423,608	3,960,677,020	4,038,882,099	4,085,481,727	4,114,342,834	4,129,080,113	4,134,174,768
2003	3,923,582,750	4,192,913,065	4,408,870,854	4,596,277,866	4,703,789,719	4,767,615,322	4,802,402,074	4,819,613,831	4,824,121,724	4,829,962,919
2004	5,374,132,399	5,710,766,391	5,994,800,365	6,154,824,919	6,245,986,481	6,296,029,590	6,324,876,372	6,333,615,111	6,343,139,837	6,362,060,757
2005	5,020,274,746	5,307,880,612	5,474,237,980	5,566,043,723	5,621,848,159	5,649,474,768	5,656,721,666	5,665,250,219	5,680,977,896	5,695,285,042
2006	6,797,935,477	7,027,396,238	7,173,949,271	7,253,350,315	7,300,194,266	7,313,605,011	7,324,572,691	7,342,741,754	7,358,359,241	7,373,254,352
2007	9,038,576,037	9,240,937,420	9,366,421,420	9,440,188,979	9,462,280,604	9,479,906,781	9,509,028,328	9,534,440,483	9,557,740,935	9,572,787,073
2008	20,453,744,244	20,782,216,090	20,975,151,280	21,032,723,518	21,094,014,497	21,181,528,362	21,246,351,868	21,293,015,447	21,326,768,199	21,352,680,452
2009	18,885,683,392	19,123,465,848	19,197,472,446	19,267,686,549	19,402,337,939	19,488,423,818	19,546,687,032	19,591,410,163	19,624,607,634	19,651,658,823
2010	7,442,521,900	7,484,958,582	7,541,600,924	7,651,877,183	7,723,514,114	7,771,339,736	7,808,173,342	7,839,253,611	7,861,164,580	7,879,949,431
2011	2,710,374,704	2,758,483,007	2,838,287,857	2,893,936,327	2,934,004,997	2,964,056,929	2,990,391,931	3,013,048,176	3,028,782,345	3,042,044,244
2012	1,678,326,750	1,791,825,714	1,864,137,272	1,915,942,170	1,950,627,861	1,979,923,782	2,001,613,083	2,019,633,856	2,031,360,768	2,043,945,422
2013	1,768,665,789	1,870,525,484	1,948,609,760	2,009,563,915	2,060,824,614	2,100,558,662	2,134,031,038	2,176,183,061	2,199,665,144	2,221,859,349
2014	952,747,324	999,374,595	1,039,878,715	1,072,755,886	1,101,890,582	1,122,459,015	1,140,826,529	1,154,485,622	1,168,570,241	1,180,264,909
2015	1,240,835,040	1,324,262,527	1,392,779,970	1,447,567,448	1,497,665,521	1,534,032,953	1,563,080,789	1,588,661,528	1,610,476,145	1,628,542,542
2016	1,772,430,313	1,883,914,903	1,975,581,879	2,044,274,967	2,114,851,782	2,164,875,628	2,207,642,971	2,244,668,738	2,275,134,096	2,299,945,515
2017	2,363,416,096	2,541,270,270	2,688,546,485	2,807,925,662	2,918,878,472	3,021,609,542	3,099,578,616	3,167,892,363	3,219,650,870	3,264,743,436
2018	2,486,567,125	2,661,307,330	2,815,472,753	2,950,452,973	3,073,739,926	3,179,614,710	3,262,776,040	3,330,237,620	3,387,860,145	3,452,653,336
2019	2,635,295,932	2,793,034,826	2,923,338,910	3,062,862,291	3,181,969,641	3,279,548,213	3,366,617,207	3,439,827,607	3,486,743,006	3,522,082,435
2020	3,277,576,020	3,445,386,424	3,615,610,395	3,764,146,317	3,890,361,505	3,997,982,196	4,095,753,284	4,156,736,983	4,210,122,633	4,248,938,473
2021	3,370,648,068	3,548,770,509	3,722,922,422	3,868,636,175	3,990,221,634	4,109,351,767	4,200,618,967	4,266,439,826	4,320,466,748	4,355,643,098

Evaluation Year (21–30)

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	2,043,507,767	2,048,505,109	2,051,599,271	2,054,806,779	2,056,320,104	2,058,313,493	2,060,711,950	2,061,466,099	2,062,239,761	2,062,710,518
1991	1,538,267,000	1,541,413,336	1,544,621,129	1,546,579,643	1,548,971,998	1,551,317,817	1,552,605,048	1,553,582,749	1,554,389,854	1,554,708,526
1992	1,058,138,850	1,061,328,303	1,062,930,634	1,064,961,168	1,067,064,674	1,068,956,667	1,069,688,001	1,069,952,317	1,070,126,749	1,070,149,399
1993	1,474,120,128	1,477,403,144	1,482,469,373	1,487,720,922	1,491,431,304	1,492,839,473	1,493,848,579	1,494,608,165	1,494,653,939	1,494,805,455
1994	1,564,674,232	1,571,261,474	1,579,260,981	1,583,278,939	1,585,380,490	1,587,421,169	1,588,311,343	1,588,537,259	1,588,775,385	1,589,139,916
1995	941,212,610	948,050,294	951,371,369	953,936,567	955,904,945	956,462,413	956,710,387	957,017,215	957,286,455	957,675,227
1996	1,339,657,789	1,348,436,626	1,353,953,129	1,357,835,598	1,359,602,877	1,359,814,314	1,360,269,414	1,361,158,184	1,361,969,585	1,362,592,758
1997	1,187,583,481	1,193,950,818	1,197,922,052	1,200,832,129	1,201,290,352	1,201,883,360	1,202,991,555	1,204,328,035	1,205,219,063	1,205,820,850
1998	1,841,249,345	1,847,778,976	1,852,578,000	1,854,154,689	1,855,298,936	1,858,269,717	1,861,025,774	1,863,477,512	1,865,109,062	1,866,039,534
1999	2,683,527,818	2,691,628,622	2,693,458,047	2,695,349,365	2,698,500,790	2,702,383,462	2,706,019,494	2,708,484,604	2,710,579,002	2,712,266,862
2000	2,501,498,151	2,504,429,560	2,505,918,576	2,508,441,040	2,510,446,399	2,513,072,257	2,515,184,236	2,517,612,581	2,519,458,519	2,520,498,879
2001	3,688,720,942	3,691,383,172	3,696,346,400	3,701,177,819	3,704,707,632	3,708,485,676	3,711,664,368	3,714,217,021	3,715,511,287	3,716,643,237
2002	4,138,841,467	4,145,156,567	4,151,203,882	4,156,419,779	4,160,872,222	4,165,144,201	4,168,299,723	4,171,213,737	4,173,208,122	4,174,679,148
2003	4,842,080,446	4,850,271,761	4,856,388,459	4,861,102,881	4,866,882,660	4,870,855,854	4,874,991,515	4,878,164,506	4,881,110,828	4,882,932,809
2004	6,375,854,452	6,386,431,041	6,393,935,983	6,400,270,791	6,407,035,197	6,411,755,920	6,417,172,588	6,421,675,512	6,424,647,663	6,427,046,522
2005	5,705,334,616	5,712,341,409	5,719,414,992	5,725,764,516	5,730,762,767	5,735,780,680	5,740,746,904	5,744,835,243	5,747,975,221	5,749,951,934
2006	7,383,013,381	7,391,176,745	7,396,717,697	7,403,418,249	7,410,088,433	7,414,719,763	7,419,683,900	7,424,644,147	7,428,255,003	7,430,688,220
2007	9,584,146,565	9,593,116,438	9,601,350,504	9,609,208,886	9,616,449,622	9,622,258,606	9,627,734,864	9,633,419,881	9,638,111,745	9,641,613,885
2008	21,374,755,130	21,390,776,044	21,407,895,834	21,425,852,241	21,440,529,886	21,455,100,431	21,468,445,968	21,480,555,843	21,489,424,243	21,494,903,153
2009	19,674,032,524	19,693,026,573	19,707,677,145	19,720,983,793	19,733,123,460	19,744,533,704	19,754,105,709	19,761,043,775	19,766,291,605	19,769,652,407
2010	7,894,795,652	7,905,493,358	7,916,594,557	7,936,756,595	7,946,489,032	7,955,389,603	7,962,744,704	7,967,997,565	7,972,313,665	7,974,932,649
2011	3,053,545,289	3,062,688,781	3,071,550,422	3,080,839,387	3,088,045,027	3,094,777,639	3,100,202,058	3,105,496,496	3,108,474,375	3,110,596,150
2012	2,052,048,515	2,061,700,319	2,068,932,689	2,076,291,710	2,081,532,242	2,086,654,923	2,091,219,138	2,094,567,518	2,097,012,094	2,098,552,049
2013	2,238,975,585	2,253,527,891	2,265,110,683	2,274,698,367	2,283,781,024	2,290,221,551	2,296,250,065	2,301,497,005	2,306,197,330	2,309,240,880
2014	1,190,313,814	1,198,485,089	1,206,121,768	1,212,058,028	1,217,244,897	1,222,621,790	1,227,179,952	1,231,035,645	1,234,058,734	1,235,691,960
2015	1,643,138,947	1,654,961,147	1,664,447,731	1,674,353,467	1,682,840,146	1,691,658,732	1,697,500,943	1,701,787,716	1,705,454,310	1,708,164,307
2016	2,321,817,591	2,338,724,243	2,352,745,734	2,367,160,992	2,377,842,982	2,390,554,485	2,399,323,959	2,405,895,931	2,413,937,719	2,417,497,906
2017	3,301,677,735	3,330,123,879	3,354,047,517	3,375,326,539	3,397,271,202	3,416,863,009	3,433,190,370	3,446,865,439	3,456,879,961	3,463,855,629
2018	3,487,267,292	3,518,374,972	3,545,982,064	3,569,068,480	3,589,048,011	3,607,444,127	3,643,092,604	3,657,190,819	3,668,562,622	3,675,956,747
2019	3,553,722,173	3,579,080,783	3,612,043,942	3,634,570,324	3,655,635,579	3,673,698,214	3,688,753,914	3,701,383,565	3,709,661,423	3,717,877,556
2020	4,282,862,678	4,308,590,876	4,330,790,108	4,349,375,541	4,363,230,846	4,376,527,754	4,388,023,956	4,398,140,244	4,405,849,268	4,411,077,142
2021	4,385,054,469	4,407,338,437	4,428,859,291	4,447,825,467	4,463,065,158	4,474,797,903	4,486,965,008	4,495,129,341	4,502,752,455	4,506,688,896

Table 15: Cumulative Loss Severity = Table 14/Table 13
Loss Severity for Each Evaluation Year

Evaluation Year (1–10)

Fiscal Year	1	2	3	4	5	6	7	8	9	10
1990	80.71%	54.46%	50.32%	49.76%	50.11%	50.36%	50.70%	50.65%	50.25%	50.02%
1991	40.02%	51.67%	51.06%	51.29%	51.71%	52.12%	51.92%	51.23%	50.78%	50.31%
1992	44.30%	53.40%	53.79%	53.28%	53.52%	52.70%	50.90%	49.88%	49.05%	48.35%
1993	36.77%	55.00%	55.12%	54.32%	51.71%	48.90%	47.18%	45.93%	45.02%	44.38%
1994	55.89%	58.55%	57.55%	52.37%	47.57%	45.14%	43.52%	42.36%	41.55%	41.06%
1995	55.17%	59.44%	47.81%	42.14%	40.45%	39.39%	38.36%	37.75%	37.39%	37.17%
1996	43.09%	39.48%	37.51%	37.17%	36.06%	35.09%	34.40%	34.14%	33.96%	34.00%
1997	33.27%	38.74%	38.30%	36.39%	34.85%	33.94%	33.55%	33.36%	33.46%	33.63%
1998	32.15%	39.55%	35.18%	32.60%	31.13%	30.92%	30.80%	31.00%	31.33%	31.90%
1999	39.39%	37.51%	33.31%	30.80%	30.55%	30.61%	31.12%	31.52%	32.15%	32.96%
2000	35.54%	35.03%	32.22%	33.02%	33.24%	33.74%	34.31%	35.03%	35.94%	36.67%
2001	30.81%	33.37%	35.42%	35.38%	35.88%	36.49%	37.50%	38.80%	39.88%	41.12%
2002	34.45%	36.79%	37.76%	38.65%	39.07%	40.30%	41.81%	43.25%	44.90%	46.28%
2003	47.38%	44.38%	43.13%	42.13%	43.07%	45.15%	46.89%	49.12%	50.80%	52.13%
2004	46.54%	44.82%	42.78%	44.10%	47.13%	49.56%	52.01%	53.98%	55.38%	56.15%
2005	37.07%	40.92%	45.49%	50.33%	53.53%	56.49%	58.48%	59.84%	60.55%	60.59%
2006	46.79%	48.01%	54.86%	58.41%	61.45%	63.41%	64.49%	64.94%	64.81%	64.85%
2007	57.19%	57.84%	60.72%	64.25%	66.15%	67.23%	67.26%	66.87%	66.77%	66.94%
2008	58.80%	61.80%	64.69%	66.93%	67.70%	66.47%	65.49%	65.16%	65.26%	65.51%
2009	66.72%	63.47%	65.36%	65.43%	62.51%	60.70%	60.25%	60.42%	60.85%	61.22%
2010	67.67%	66.65%	64.12%	58.51%	55.34%	54.63%	55.19%	55.99%	56.59%	57.00%
2011	73.57%	66.75%	58.37%	52.36%	51.30%	52.42%	53.63%	54.38%	54.88%	54.95%
2012	50.48%	62.89%	51.56%	50.57%	51.87%	53.90%	55.25%	55.85%	55.98%	56.13%
2013	63.54%	49.75%	50.56%	52.93%	54.85%	56.61%	57.54%	57.67%	57.99%	58.24%
2014	32.31%	45.94%	48.08%	51.00%	53.71%	55.04%	55.16%	55.67%	56.17%	56.12%
2015	23.35%	52.41%	53.03%	55.76%	57.33%	57.35%	57.91%	57.96%	57.37%	57.70%
2016	54.82%	61.17%	60.79%	61.70%	60.71%	61.61%	61.42%	59.62%	59.50%	59.45%
2017	42.18%	61.16%	62.94%	59.96%	61.46%	60.79%	57.68%	57.47%	57.87%	57.82%
2018	46.83%	66.49%	59.36%	63.08%	63.07%	59.14%	59.10%	58.78%	58.39%	58.23%
2019	67.34%	64.74%	69.53%	63.01%	58.85%	58.70%	59.13%	59.02%	58.81%	58.78%
2020	0.00%	65.34%	61.67%	58.67%	58.94%	59.51%	59.39%	59.24%	59.28%	59.04%
2021	0.00%	60.68%	57.77%	58.89%	59.58%	59.92%	59.80%	59.55%	59.94%	59.68%

Evaluation Year (11–20)

Fiscal Year	11	12	13	14	15	16	17	18	19	20
1990	49.79%	49.62%	49.53%	49.45%	49.39%	49.38%	49.38%	49.41%	49.46%	49.48%
1991	50.03%	49.78%	49.61%	49.51%	49.47%	49.47%	49.50%	49.55%	49.58%	49.61%
1992	47.82%	47.48%	47.31%	47.28%	47.27%	47.30%	47.36%	47.40%	47.44%	47.50%
1993	44.03%	43.83%	43.76%	43.77%	43.80%	43.86%	43.91%	43.97%	44.04%	44.08%
1994	40.78%	40.74%	40.74%	40.81%	40.90%	40.96%	41.09%	41.18%	41.26%	41.33%
1995	37.15%	37.18%	37.35%	37.53%	37.70%	37.91%	38.09%	38.22%	38.31%	38.38%
1996	34.13%	34.32%	34.57%	34.82%	35.13%	35.40%	35.62%	35.79%	35.87%	36.01%
1997	33.96%	34.38%	34.72%	35.15%	35.50%	35.78%	36.07%	36.21%	36.38%	36.56%
1998	32.52%	33.11%	33.80%	34.42%	34.93%	35.36%	35.60%	35.87%	36.22%	36.42%
1999	33.64%	34.42%	35.23%	35.83%	36.33%	36.63%	36.92%	37.25%	37.45%	37.60%
2000	37.53%	38.25%	38.81%	39.26%	39.52%	39.85%	40.16%	40.36%	40.52%	40.58%
2001	42.26%	43.09%	43.72%	44.07%	44.43%	44.79%	45.01%	45.15%	45.22%	45.29%
2002	47.39%	48.14%	48.52%	48.93%	49.32%	49.58%	49.74%	49.83%	49.86%	49.88%
2003	52.93%	53.15%	53.37%	53.67%	53.91%	54.09%	54.17%	54.19%	54.20%	54.22%
2004	56.18%	56.39%	56.67%	56.94%	57.08%	57.17%	57.20%	57.22%	57.24%	57.25%
2005	60.69%	60.96%	61.25%	61.41%	61.51%	61.53%	61.53%	61.55%	61.57%	61.58%
2006	65.08%	65.30%	65.47%	65.56%	65.60%	65.61%	65.62%	65.61%	65.62%	65.62%
2007	67.12%	67.28%	67.38%	67.41%	67.43%	67.44%	67.44%	67.44%	67.45%	67.44%
2008	65.73%	65.87%	65.92%	65.95%	65.98%	65.99%	66.00%	66.00%	66.00%	65.99%
2009	61.44%	61.53%	61.58%	61.61%	61.65%	61.66%	61.67%	61.68%	61.67%	61.68%
2010	57.12%	57.20%	57.29%	57.38%	57.44%	57.46%	57.48%	57.51%	57.52%	57.53%
2011	55.04%	55.25%	55.32%	55.44%	55.54%	55.58%	55.62%	55.66%	55.67%	55.68%
2012	56.40%	56.52%	56.63%	56.82%	56.90%	56.98%	57.03%	57.06%	57.07%	57.10%
2013	58.08%	58.07%	58.21%	58.25%	58.27%	58.28%	58.22%	58.32%	58.32%	58.32%
2014	56.16%	56.37%	56.50%	56.52%	56.55%	56.51%	56.46%	56.45%	56.44%	56.42%
2015	57.92%	57.98%	57.99%	57.98%	57.89%	57.82%	57.75%	57.75%	57.74%	57.73%
2016	59.42%	59.39%	59.26%	59.24%	59.25%	59.22%	59.18%	59.14%	59.11%	59.12%
2017	57.88%	57.65%	57.44%	57.37%	57.31%	57.24%	57.16%	57.16%	57.10%	57.09%
2018	58.08%	57.93%	57.83%	57.72%	57.66%	57.60%	57.56%	57.53%	57.52%	57.58%
2019	58.52%	58.40%	58.33%	58.37%	58.36%	58.35%	58.38%	58.45%	58.47%	58.45%
2020	59.13%	58.94%	58.93%	58.92%	58.94%	58.97%	59.00%	59.02%	59.02%	59.03%
2021	59.54%	59.40%	59.30%	59.24%	59.24%	59.24%	59.24%	59.25%	59.26%	59.27%

Evaluation Year (21–30)

Fiscal Year	21	22	23	24	25	26	27	28	29	30
1990	49.52%	49.56%	49.58%	49.59%	49.59%	49.60%	49.61%	49.61%	49.61%	49.61%
1991	49.65%	49.67%	49.68%	49.69%	49.70%	49.71%	49.71%	49.72%	49.72%	49.72%
1992	47.52%	47.55%	47.55%	47.56%	47.56%	47.58%	47.58%	47.57%	47.57%	47.56%
1993	44.10%	44.10%	44.11%	44.15%	44.17%	44.18%	44.18%	44.19%	44.19%	44.19%
1994	41.35%	41.39%	41.45%	41.47%	41.47%	41.49%	41.50%	41.50%	41.50%	41.50%
1995	38.47%	38.55%	38.58%	38.60%	38.63%	38.63%	38.63%	38.64%	38.65%	38.65%
1996	36.15%	36.25%	36.31%	36.35%	36.36%	36.36%	36.37%	36.38%	36.39%	36.39%
1997	36.71%	36.77%	36.82%	36.85%	36.85%	36.86%	36.87%	36.88%	36.89%	36.90%
1998	36.51%	36.56%	36.60%	36.61%	36.62%	36.64%	36.67%	36.69%	36.70%	36.71%
1999	37.67%	37.72%	37.73%	37.74%	37.75%	37.77%	37.79%	37.80%	37.81%	37.82%
2000	40.63%	40.65%	40.66%	40.68%	40.69%	40.70%	40.71%	40.73%	40.73%	40.74%
2001	45.30%	45.31%	45.32%	45.34%	45.35%	45.36%	45.37%	45.38%	45.38%	45.39%
2002	49.90%	49.92%	49.93%	49.94%	49.95%	49.96%	49.96%	49.97%	49.97%	49.97%
2003	54.23%	54.24%	54.25%	54.25%	54.26%	54.26%	54.26%	54.26%	54.25%	54.25%
2004	57.27%	57.28%	57.28%	57.28%	57.29%	57.28%	57.28%	57.28%	57.28%	57.28%
2005	61.59%	61.59%	61.59%	61.59%	61.59%	61.58%	61.58%	61.58%	61.58%	61.57%
2006	65.62%	65.62%	65.61%	65.61%	65.61%	65.61%	65.60%	65.60%	65.59%	65.59%
2007	67.44%	67.43%	67.43%	67.42%	67.42%	67.41%	67.41%	67.41%	67.40%	67.39%
2008	65.99%	65.99%	65.99%	65.99%	65.99%	65.98%	65.98%	65.98%	65.98%	65.97%
2009	61.68%	61.68%	61.68%	61.68%	61.68%	61.68%	61.68%	61.68%	61.68%	61.68%
2010	57.53%	57.54%	57.54%	57.56%	57.57%	57.57%	57.58%	57.58%	57.58%	57.58%
2011	55.68%	55.70%	55.71%	55.72%	55.73%	55.73%	55.74%	55.74%	55.73%	55.73%
2012	57.11%	57.12%	57.12%	57.12%	57.13%	57.12%	57.13%	57.13%	57.13%	57.13%
2013	58.32%	58.33%	58.33%	58.31%	58.31%	58.31%	58.32%	58.31%	58.31%	58.30%
2014	56.44%	56.43%	56.42%	56.42%	56.41%	56.40%	56.42%	56.42%	56.43%	56.43%
2015	57.71%	57.72%	57.73%	57.75%	57.76%	57.79%	57.81%	57.82%	57.81%	57.82%
2016	59.13%	59.16%	59.16%	59.17%	59.15%	59.15%	59.16%	59.16%	59.16%	59.15%
2017	57.10%	57.08%	57.06%	57.05%	57.03%	57.02%	57.01%	56.99%	56.98%	56.97%
2018	57.58%	57.58%	57.58%	57.59%	57.57%	57.56%	57.67%	57.66%	57.65%	57.65%
2019	58.44%	58.42%	58.41%	58.43%	58.41%	58.42%	58.42%	58.44%	58.44%	58.44%
2020	59.05%	59.05%	59.07%	59.08%	59.06%	59.06%	59.06%	59.05%	59.05%	59.04%
2021	59.29%	59.27%	59.28%	59.29%	59.30%	59.30%	59.31%	59.30%	59.30%	59.29%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Active Loans
FRM15

Table 1: Number of Loans Active at the End of Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	26,921	26,161	23,761	18,337	13,748	12,318	10,593	9,342	7,935	6,663	5,830	5,051	4,214	3,360	2,470	318
1991	29,468	28,170	23,138	17,556	15,772	13,607	11,926	9,947	8,096	7,064	6,072	4,958	3,892	3,146	2,316	257
1992	41,059	38,180	32,616	29,998	26,419	23,453	19,657	16,031	14,102	11,991	9,513	7,229	5,629	4,420	3,138	224
1993	116,811	109,498	103,091	93,668	84,804	73,503	61,526	54,630	47,053	38,340	28,532	22,627	18,213	14,233	10,341	660
1994	143,241	137,352	127,070	116,698	103,100	88,597	79,374	69,271	57,672	44,603	35,714	29,385	23,698	19,050	11,594	331
1995	18,057	16,906	15,599	13,560	11,491	10,337	8,956	7,434	5,894	4,890	4,151	3,576	3,059	2,587	1,727	112
1996	31,745	30,401	27,432	23,583	21,213	18,400	15,074	11,259	8,916	7,390	6,120	5,238	4,439	3,624	2,523	92
1997	20,055	18,671	16,239	14,829	13,029	10,586	7,960	6,354	5,267	4,497	3,810	3,353	2,916	2,494	1,800	124
1998	36,525	34,390	32,100	28,745	24,017	17,320	13,607	11,254	9,501	8,243	7,178	6,317	5,477	4,554	3,368	289
1999	43,371	41,691	37,905	32,262	23,856	18,871	15,705	13,478	11,879	10,604	9,409	8,461	7,298	6,084	4,302	116
2000	10,197	8,822	6,784	4,607	3,487	2,819	2,353	2,024	1,808	1,637	1,458	1,336	1,215	1,015	730	44
2001	25,106	22,445	15,067	11,148	8,817	7,489	6,563	5,824	5,297	4,795	4,293	3,836	3,345	2,784	2,055	233
2002	46,782	37,668	30,215	24,757	21,333	18,917	17,158	15,717	14,388	13,089	11,638	10,199	8,821	7,190	5,079	449
2003	59,596	53,430	45,995	40,300	36,135	32,986	30,311	27,922	25,597	23,185	20,210	17,829	15,219	12,239	8,239	11
2004	52,263	46,736	41,364	37,396	34,522	32,183	29,889	27,737	25,480	22,702	19,997	17,709	15,008	11,831	5,796	20
2005	19,801	18,011	16,287	14,982	13,976	13,017	12,107	11,196	10,160	9,118	7,853	6,941	5,948	4,731	2,960	90
2006	10,420	9,413	8,425	7,536	6,870	6,344	5,795	5,171	4,708	4,214	3,677	3,244	2,772	2,297	1,418	10
2007	7,224	6,428	5,428	4,823	4,400	3,929	3,426	3,038	2,739	2,437	2,129	1,861	1,644	1,371	935	1
2008	24,117	20,750	18,233	16,261	14,158	11,813	10,359	9,211	8,146	7,259	6,405	5,730	4,966	4,020	2,882	17
2009	59,685	55,673	49,780	42,259	34,228	30,006	26,152	22,974	20,235	17,903	15,803	13,742	11,273	9,140	6,546	48
2010	84,857	79,565	69,364	57,591	51,082	44,656	39,032	34,247	30,372	27,089	23,514	19,762	16,219	13,227	8,124	34
2011	87,603	76,620	63,999	56,815	49,176	42,541	36,865	32,596	28,937	24,993	20,599	17,442	14,603	11,611	7,248	58
2012	99,358	90,186	81,741	72,613	63,921	56,458	50,680	45,785	39,992	33,497	28,445	24,291	19,741	15,370	9,351	18
2013	65,579	62,328	56,932	51,369	46,110	41,623	37,743	33,197	28,097	24,265	21,122	17,952	14,802	11,475	6,962	117
2014	29,419	25,929	22,418	19,263	16,885	14,924	12,919	10,815	9,535	8,584	7,516	6,453	5,379	4,295	2,812	63
2015	29,689	26,595	22,932	19,799	17,328	14,849	12,192	10,733	9,621	8,506	7,406	6,389	5,332	4,392	2,941	55
2016	31,078	28,192	24,731	21,845	18,576	15,030	13,038	11,637	10,267	8,988	7,767	6,613	5,522	4,471	2,945	47
2017	32,209	29,157	25,663	21,646	17,185	14,779	13,100	11,550	10,179	8,916	7,720	6,636	5,568	4,486	2,872	59
2018	20,381	18,157	14,459	10,881	9,232	8,091	7,120	6,291	5,546	4,846	4,233	3,661	3,094	2,476	1,486	32
2019	15,541	12,227	8,686	7,115	6,112	5,251	4,573	3,966	3,494	3,075	2,649	2,280	1,887	1,508	922	12
2020	12,070	8,832	7,257	6,306	5,469	4,800	4,164	3,662	3,246	2,853	2,427	2,077	1,695	1,300	771	19
2021	16,431	14,651	12,999	11,463	10,044	8,711	7,591	6,727	5,929	5,188	4,457	3,740	2,992	2,277	1,423	35

Mutual Mortgage Insurance Fund
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Table 2: Number of Claims in Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	41	147	209	204	201	134	88	59	41	36	12	5	7	4	1
1991	1	32	121	156	188	158	106	75	55	28	14	7	4	4	6	2
1992	0	21	92	99	116	79	84	50	30	22	9	5	6	3	2	0
1993	0	47	160	193	193	172	122	101	54	38	24	18	9	6	4	1
1994	5	98	270	336	345	263	206	107	89	53	35	18	17	9	4	1
1995	3	19	54	80	69	58	34	27	26	18	5	10	3	2	1	0
1996	0	19	70	100	105	86	64	45	33	25	17	11	1	3	3	2
1997	0	12	53	71	69	43	25	21	25	17	7	1	4	2	4	0
1998	0	11	71	66	96	67	46	36	15	17	6	12	12	1	6	1
1999	0	15	66	85	110	83	48	22	19	16	17	14	10	11	12	2
2000	0	6	42	72	61	31	29	13	11	14	11	5	4	3	5	2
2001	0	21	77	98	78	54	28	16	26	27	24	10	13	10	12	3
2002	1	37	112	104	87	50	39	33	41	50	33	43	18	24	30	6
2003	0	39	85	90	64	78	80	95	86	83	89	70	45	54	25	7
2004	8	47	103	103	98	109	148	116	125	110	86	73	70	34	18	2
2005	1	64	135	119	127	123	89	70	87	68	67	56	37	15	9	2
2006	3	103	138	158	128	91	93	101	69	63	47	49	23	10	10	0
2007	2	63	149	137	87	119	139	85	66	65	42	27	18	10	2	0
2008	3	91	268	256	328	489	312	216	181	127	69	58	29	7	9	6
2009	7	120	187	323	534	408	401	262	172	111	74	48	21	8	10	7
2010	1	45	161	307	283	276	238	177	111	72	64	10	19	18	18	2
2011	1	40	131	159	169	153	112	91	56	30	10	13	20	13	9	4
2012	1	34	82	103	119	103	64	44	33	8	14	26	17	13	13	3
2013	0	9	46	66	89	57	46	37	10	9	27	23	16	17	9	4
2014	0	13	22	54	53	32	19	9	18	10	16	19	7	6	3	2
2015	0	10	29	42	35	34	11	18	18	18	20	12	8	10	6	1
2016	1	6	37	44	36	32	23	44	36	26	17	16	10	6	3	1
2017	0	8	31	22	18	37	64	48	34	20	19	11	14	8	7	1
2018	0	10	16	16	27	68	44	44	32	22	13	9	11	7	3	0
2019	0	5	6	24	58	49	48	38	19	15	8	8	7	8	2	0
2020	0	1	20	28	41	27	26	13	15	7	7	5	5	1	1	1
2021	0	11	32	32	38	33	19	18	9	9	11	5	6	0	2	1

Mutual Mortgage Insurance Fund
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Table 3: Conditional Claim Rate = Table 2 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Claim During the Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0.00%	0.16%	0.62%	1.14%	1.48%	1.63%	1.26%	0.94%	0.74%	0.62%	0.62%	0.24%	0.12%	0.21%	0.16%	0.31%
1991	0.00%	0.11%	0.52%	0.89%	1.19%	1.16%	0.89%	0.75%	0.68%	0.40%	0.23%	0.14%	0.10%	0.13%	0.26%	0.78%
1992	0.00%	0.06%	0.28%	0.33%	0.44%	0.34%	0.43%	0.31%	0.21%	0.18%	0.09%	0.07%	0.11%	0.07%	0.06%	0.00%
1993	0.00%	0.04%	0.16%	0.21%	0.23%	0.23%	0.20%	0.18%	0.11%	0.10%	0.08%	0.08%	0.05%	0.04%	0.04%	0.15%
1994	0.00%	0.07%	0.21%	0.29%	0.33%	0.30%	0.26%	0.15%	0.15%	0.12%	0.10%	0.06%	0.07%	0.05%	0.03%	0.30%
1995	0.02%	0.11%	0.35%	0.59%	0.60%	0.56%	0.38%	0.36%	0.44%	0.37%	0.12%	0.28%	0.10%	0.08%	0.06%	0.00%
1996	0.00%	0.06%	0.26%	0.42%	0.49%	0.47%	0.42%	0.40%	0.37%	0.34%	0.28%	0.21%	0.02%	0.08%	0.12%	2.17%
1997	0.00%	0.06%	0.33%	0.48%	0.53%	0.41%	0.31%	0.33%	0.47%	0.38%	0.18%	0.03%	0.14%	0.08%	0.22%	0.00%
1998	0.00%	0.03%	0.22%	0.23%	0.40%	0.39%	0.34%	0.32%	0.16%	0.21%	0.08%	0.19%	0.22%	0.02%	0.18%	0.35%
1999	0.00%	0.04%	0.17%	0.26%	0.46%	0.44%	0.31%	0.16%	0.16%	0.15%	0.18%	0.17%	0.14%	0.18%	0.28%	1.72%
2000	0.00%	0.07%	0.62%	1.56%	1.75%	1.10%	1.23%	0.64%	0.61%	0.86%	0.75%	0.37%	0.33%	0.30%	0.68%	4.55%
2001	0.00%	0.09%	0.51%	0.88%	0.88%	0.72%	0.43%	0.27%	0.49%	0.56%	0.56%	0.26%	0.39%	0.36%	0.58%	1.29%
2002	0.00%	0.10%	0.37%	0.42%	0.41%	0.26%	0.23%	0.21%	0.28%	0.38%	0.28%	0.42%	0.20%	0.33%	0.59%	1.34%
2003	0.00%	0.07%	0.18%	0.22%	0.18%	0.24%	0.26%	0.34%	0.34%	0.36%	0.44%	0.39%	0.30%	0.44%	0.30%	63.64%
2004	0.02%	0.10%	0.25%	0.28%	0.28%	0.34%	0.50%	0.42%	0.49%	0.48%	0.43%	0.41%	0.47%	0.29%	0.31%	10.00%
2005	0.01%	0.36%	0.83%	0.79%	0.91%	0.94%	0.74%	0.63%	0.86%	0.75%	0.85%	0.81%	0.62%	0.32%	0.30%	2.22%
2006	0.03%	1.09%	1.64%	2.10%	1.86%	1.43%	1.60%	1.95%	1.47%	1.50%	1.28%	1.51%	0.83%	0.44%	0.71%	0.00%
2007	0.03%	0.98%	2.75%	2.84%	1.98%	3.03%	4.06%	2.80%	2.41%	2.67%	1.97%	1.45%	1.09%	0.73%	0.21%	0.00%
2008	0.01%	0.44%	1.47%	1.57%	2.32%	4.14%	3.01%	2.35%	2.22%	1.75%	1.08%	1.01%	0.58%	0.17%	0.31%	35.29%
2009	0.01%	0.22%	0.38%	0.76%	1.56%	1.36%	1.53%	1.14%	0.85%	0.62%	0.47%	0.35%	0.19%	0.09%	0.15%	14.58%
2010	0.00%	0.06%	0.23%	0.53%	0.55%	0.62%	0.61%	0.52%	0.37%	0.27%	0.27%	0.05%	0.12%	0.14%	0.22%	5.88%
2011	0.00%	0.05%	0.20%	0.28%	0.34%	0.36%	0.30%	0.28%	0.19%	0.12%	0.05%	0.07%	0.14%	0.11%	0.12%	6.90%
2012	0.00%	0.04%	0.10%	0.14%	0.19%	0.18%	0.13%	0.10%	0.08%	0.02%	0.05%	0.11%	0.09%	0.08%	0.14%	16.67%
2013	0.00%	0.01%	0.08%	0.13%	0.19%	0.14%	0.12%	0.11%	0.04%	0.04%	0.13%	0.13%	0.11%	0.15%	0.13%	3.42%
2014	0.00%	0.05%	0.10%	0.28%	0.31%	0.21%	0.15%	0.08%	0.19%	0.12%	0.21%	0.29%	0.13%	0.14%	0.11%	3.17%
2015	0.00%	0.04%	0.13%	0.21%	0.20%	0.23%	0.09%	0.17%	0.19%	0.21%	0.27%	0.19%	0.15%	0.23%	0.20%	1.82%
2016	0.00%	0.02%	0.15%	0.20%	0.19%	0.21%	0.18%	0.38%	0.35%	0.29%	0.22%	0.24%	0.18%	0.13%	0.10%	2.13%
2017	0.00%	0.03%	0.12%	0.10%	0.10%	0.25%	0.49%	0.42%	0.33%	0.22%	0.25%	0.17%	0.25%	0.18%	0.24%	1.69%
2018	0.00%	0.06%	0.11%	0.15%	0.29%	0.84%	0.62%	0.70%	0.58%	0.45%	0.31%	0.25%	0.36%	0.28%	0.20%	0.00%
2019	0.00%	0.04%	0.07%	0.34%	0.95%	0.93%	1.05%	0.96%	0.54%	0.49%	0.30%	0.35%	0.37%	0.53%	0.22%	0.00%
2020	0.00%	0.01%	0.28%	0.44%	0.75%	0.56%	0.62%	0.35%	0.46%	0.25%	0.29%	0.24%	0.29%	0.08%	0.13%	5.26%
2021	0.00%	0.08%	0.25%	0.28%	0.38%	0.38%	0.25%	0.27%	0.15%	0.17%	0.25%	0.13%	0.20%	0.00%	0.14%	2.86%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Claim Rate
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Table 4: Cumulative Number of Claims as of Each Evaluation Year
Total Number of Claims for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	41	188	397	601	802	936	1,024	1,083	1,124	1,160	1,172	1,177	1,184	1,188	1,189
1991	1	33	154	310	498	656	762	837	892	920	934	941	945	949	955	957
1992	0	21	113	212	328	407	491	541	571	593	602	607	613	616	618	618
1993	0	47	207	400	593	765	887	988	1,042	1,080	1,104	1,122	1,131	1,137	1,141	1,142
1994	5	103	373	709	1,054	1,317	1,523	1,630	1,719	1,772	1,807	1,825	1,842	1,851	1,855	1,856
1995	3	22	76	156	225	283	317	344	370	388	393	403	406	408	409	409
1996	0	19	89	189	294	380	444	489	522	547	564	575	576	579	582	584
1997	0	12	65	136	205	248	273	294	319	336	343	344	348	350	354	354
1998	0	11	82	148	244	311	357	393	408	425	431	443	455	456	462	463
1999	0	15	81	166	276	359	407	429	448	464	481	495	505	516	528	530
2000	0	6	48	120	181	212	241	254	265	279	290	295	299	302	307	309
2001	0	21	98	196	274	328	356	372	398	425	449	459	472	482	494	497
2002	1	38	150	254	341	391	430	463	504	554	587	630	648	672	702	708
2003	0	39	124	214	278	356	436	531	617	700	789	859	904	958	983	990
2004	8	55	158	261	359	468	616	732	857	967	1,053	1,126	1,196	1,230	1,248	1,250
2005	1	65	200	319	446	569	658	728	815	883	950	1,006	1,043	1,058	1,067	1,069
2006	3	106	244	402	530	621	714	815	884	947	994	1,043	1,066	1,076	1,086	1,086
2007	2	65	214	351	438	557	696	781	847	912	954	981	999	1,009	1,011	1,011
2008	3	94	362	618	946	1,435	1,747	1,963	2,144	2,271	2,340	2,398	2,427	2,434	2,443	2,449
2009	7	127	314	637	1,171	1,579	1,980	2,242	2,414	2,525	2,599	2,647	2,668	2,676	2,686	2,693
2010	1	46	207	514	797	1,073	1,311	1,488	1,599	1,671	1,735	1,745	1,764	1,782	1,800	1,802
2011	1	41	172	331	500	653	765	856	912	942	952	965	985	998	1,007	1,011
2012	1	35	117	220	339	442	506	550	583	591	605	631	648	661	674	677
2013	0	9	55	121	210	267	313	350	360	369	396	419	435	452	461	465
2014	0	13	35	89	142	174	193	202	220	230	246	265	272	278	281	283
2015	0	10	39	81	116	150	161	179	197	215	235	247	255	265	271	272
2016	1	7	44	88	124	156	179	223	259	285	302	318	328	334	337	338
2017	0	8	39	61	79	116	180	228	262	282	301	312	326	334	341	342
2018	0	10	26	42	69	137	181	225	257	279	292	301	312	319	322	322
2019	0	5	11	35	93	142	190	228	247	262	270	278	285	293	295	295
2020	0	1	21	49	90	117	143	156	171	178	185	190	195	196	197	198
2021	0	11	43	75	113	146	165	183	192	201	212	217	223	223	225	226

Mutual Mortgage Insurance Fund
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Table 5: Cumulative Claim Rate = Table 4 / Table 1 (Evaluation Year 1)
Cumulative Claims as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0.00%	0.15%	0.70%	1.47%	2.23%	2.98%	3.48%	3.80%	4.02%	4.18%	4.31%	4.35%	4.37%	4.40%	4.41%	4.42%
1991	0.00%	0.11%	0.52%	1.05%	1.69%	2.23%	2.59%	2.84%	3.03%	3.12%	3.17%	3.19%	3.21%	3.22%	3.24%	3.25%
1992	0.00%	0.05%	0.28%	0.52%	0.80%	0.99%	1.20%	1.32%	1.39%	1.44%	1.47%	1.48%	1.49%	1.50%	1.51%	1.51%
1993	0.00%	0.04%	0.18%	0.34%	0.51%	0.65%	0.76%	0.85%	0.89%	0.92%	0.95%	0.96%	0.97%	0.97%	0.98%	0.98%
1994	0.00%	0.07%	0.26%	0.49%	0.74%	0.92%	1.06%	1.14%	1.20%	1.24%	1.26%	1.27%	1.29%	1.29%	1.30%	1.30%
1995	0.02%	0.12%	0.42%	0.86%	1.25%	1.57%	1.76%	1.91%	2.05%	2.15%	2.18%	2.23%	2.25%	2.26%	2.27%	2.27%
1996	0.00%	0.06%	0.28%	0.60%	0.93%	1.20%	1.40%	1.54%	1.64%	1.72%	1.78%	1.81%	1.81%	1.82%	1.83%	1.84%
1997	0.00%	0.06%	0.32%	0.68%	1.02%	1.24%	1.36%	1.47%	1.59%	1.68%	1.71%	1.72%	1.74%	1.75%	1.77%	1.77%
1998	0.00%	0.03%	0.22%	0.41%	0.67%	0.85%	0.98%	1.08%	1.12%	1.16%	1.18%	1.21%	1.25%	1.25%	1.26%	1.27%
1999	0.00%	0.03%	0.19%	0.38%	0.64%	0.83%	0.94%	0.99%	1.03%	1.07%	1.11%	1.14%	1.16%	1.19%	1.22%	1.22%
2000	0.00%	0.06%	0.47%	1.18%	1.78%	2.08%	2.36%	2.49%	2.60%	2.74%	2.84%	2.89%	2.93%	2.96%	3.01%	3.03%
2001	0.00%	0.08%	0.39%	0.78%	1.09%	1.31%	1.42%	1.48%	1.59%	1.69%	1.79%	1.83%	1.88%	1.92%	1.97%	1.98%
2002	0.00%	0.08%	0.32%	0.54%	0.73%	0.84%	0.92%	0.99%	1.08%	1.18%	1.25%	1.35%	1.39%	1.44%	1.50%	1.51%
2003	0.00%	0.07%	0.21%	0.36%	0.47%	0.60%	0.73%	0.89%	1.04%	1.17%	1.32%	1.44%	1.52%	1.61%	1.65%	1.66%
2004	0.02%	0.11%	0.30%	0.50%	0.69%	0.90%	1.18%	1.40%	1.64%	1.85%	2.01%	2.15%	2.29%	2.35%	2.39%	2.39%
2005	0.01%	0.33%	1.01%	1.61%	2.25%	2.87%	3.32%	3.68%	4.12%	4.46%	4.80%	5.08%	5.27%	5.34%	5.39%	5.40%
2006	0.03%	1.02%	2.34%	3.86%	5.09%	5.96%	6.85%	7.82%	8.48%	9.09%	9.54%	10.01%	10.23%	10.33%	10.42%	10.42%
2007	0.03%	0.90%	2.96%	4.86%	6.06%	7.71%	9.63%	10.81%	11.72%	12.62%	13.21%	13.58%	13.83%	13.97%	14.00%	14.00%
2008	0.01%	0.39%	1.50%	2.56%	3.92%	5.95%	7.24%	8.14%	8.89%	9.42%	9.70%	9.94%	10.06%	10.09%	10.13%	10.15%
2009	0.01%	0.21%	0.53%	1.07%	1.96%	2.65%	3.32%	3.76%	4.04%	4.23%	4.35%	4.43%	4.47%	4.48%	4.50%	4.51%
2010	0.00%	0.05%	0.24%	0.61%	0.94%	1.26%	1.54%	1.75%	1.88%	1.97%	2.04%	2.06%	2.08%	2.10%	2.12%	2.12%
2011	0.00%	0.05%	0.20%	0.38%	0.57%	0.75%	0.87%	0.98%	1.04%	1.08%	1.09%	1.10%	1.12%	1.14%	1.15%	1.15%
2012	0.00%	0.04%	0.12%	0.22%	0.34%	0.44%	0.51%	0.55%	0.59%	0.59%	0.61%	0.64%	0.65%	0.67%	0.68%	0.68%
2013	0.00%	0.01%	0.08%	0.18%	0.32%	0.41%	0.48%	0.53%	0.55%	0.56%	0.60%	0.64%	0.66%	0.69%	0.70%	0.71%
2014	0.00%	0.04%	0.12%	0.30%	0.48%	0.59%	0.66%	0.69%	0.75%	0.78%	0.84%	0.90%	0.92%	0.94%	0.96%	0.96%
2015	0.00%	0.03%	0.13%	0.27%	0.39%	0.51%	0.54%	0.60%	0.66%	0.72%	0.79%	0.83%	0.86%	0.89%	0.91%	0.92%
2016	0.00%	0.02%	0.14%	0.28%	0.40%	0.50%	0.58%	0.72%	0.83%	0.92%	0.97%	1.02%	1.06%	1.07%	1.08%	1.09%
2017	0.00%	0.02%	0.12%	0.19%	0.25%	0.36%	0.56%	0.71%	0.81%	0.88%	0.93%	0.97%	1.01%	1.04%	1.06%	1.06%
2018	0.00%	0.05%	0.13%	0.21%	0.34%	0.67%	0.89%	1.10%	1.26%	1.37%	1.43%	1.48%	1.53%	1.57%	1.58%	1.58%
2019	0.00%	0.03%	0.07%	0.23%	0.60%	0.91%	1.22%	1.47%	1.59%	1.69%	1.74%	1.79%	1.83%	1.89%	1.90%	1.90%
2020	0.00%	0.01%	0.17%	0.41%	0.75%	0.97%	1.18%	1.29%	1.42%	1.47%	1.53%	1.57%	1.62%	1.62%	1.63%	1.64%
2021	0.00%	0.07%	0.26%	0.46%	0.69%	0.89%	1.00%	1.11%	1.17%	1.22%	1.29%	1.32%	1.36%	1.36%	1.37%	1.38%

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Table 6: Number of Non-Claim Terminations in Each Evaluation Year

	Evaluation Year														
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	107	719	2,253	5,215	4,385	1,228	1,591	1,162	1,346	1,230	772	762	830	836	744
1991	130	1,266	4,911	5,426	1,596	2,007	1,575	1,903	1,796	1,000	960	1,103	1,061	733	723
1992	213	2,858	5,472	2,519	3,463	2,887	3,712	3,576	1,898	2,086	2,430	2,279	1,589	1,203	1,211
1993	1,143	7,266	6,247	9,230	8,670	11,126	11,854	6,792	7,515	8,671	9,642	5,875	4,386	3,965	3,548
1994	1,949	5,791	10,012	10,036	13,250	14,236	9,004	9,979	11,474	12,901	8,479	6,258	5,589	4,571	5,272
1995	195	1,132	1,253	1,959	2,000	1,094	1,346	1,491	1,513	966	668	552	509	403	434
1996	238	1,325	2,899	3,749	2,265	2,727	3,262	3,770	2,310	1,497	1,180	863	789	793	986
1997	161	1,372	2,379	1,339	1,731	2,398	2,601	1,584	1,060	747	559	450	408	406	543
1998	306	2,124	2,219	3,289	4,632	6,630	3,666	2,315	1,736	1,227	991	838	821	910	1,066
1999	410	1,665	3,720	5,558	8,296	4,902	3,118	2,204	1,575	1,252	1,036	923	1,139	1,193	1,614
2000	88	1,369	1,996	2,105	1,059	637	436	316	204	152	145	111	117	194	202
2001	284	2,640	7,301	3,821	2,253	1,274	898	723	501	474	436	437	475	549	680
2002	750	9,077	7,341	5,354	3,337	2,366	1,720	1,406	1,287	1,245	1,277	1,364	1,355	1,604	1,978
2003	1,822	6,127	7,350	5,605	4,101	3,071	2,595	2,294	2,238	2,321	2,545	2,308	2,556	2,906	3,816
2004	1,895	5,480	5,269	3,865	2,775	2,230	2,146	2,034	2,131	2,508	2,261	2,208	2,615	3,119	3,937
2005	629	1,726	1,589	1,186	877	834	819	833	943	948	883	842	941	1,154	1,419
2006	368	904	850	731	537	435	456	523	394	414	348	383	444	463	648
2007	251	733	851	468	335	352	364	303	233	234	237	241	198	262	343
2008	381	3,276	2,249	1,716	1,775	1,856	1,142	932	884	756	722	616	734	938	1,028
2009	2,140	3,892	5,706	7,198	7,497	3,814	3,453	2,915	2,567	2,202	1,918	2,011	2,441	2,123	2,306
2010	706	5,247	10,040	11,466	6,226	6,149	5,386	4,607	3,764	3,191	3,363	3,738	3,519	2,964	4,503
2011	699	10,943	12,490	7,025	7,470	6,482	5,564	4,178	3,603	3,897	4,205	3,144	2,817	2,977	4,068
2012	1,227	9,138	8,363	9,025	8,573	7,360	5,714	4,851	5,759	6,476	4,840	4,124	4,518	4,351	5,719
2013	652	3,242	5,350	5,497	5,170	4,430	3,834	4,509	5,090	3,807	2,873	3,125	3,116	3,284	4,125
2014	697	3,477	3,489	3,101	2,324	1,929	1,986	2,095	1,262	932	952	1,021	1,052	1,059	1,273
2015	594	3,084	3,634	3,091	2,436	2,445	2,646	1,441	1,093	1,086	1,000	998	1,043	915	1,313
2016	584	2,880	3,424	2,842	3,233	3,514	1,969	1,357	1,332	1,246	1,131	1,133	1,073	1,037	1,427
2017	573	3,044	3,463	3,995	4,443	2,369	1,615	1,501	1,336	1,236	1,089	1,064	1,039	1,062	1,444
2018	399	2,214	3,682	3,562	1,622	1,073	927	785	712	673	547	552	548	605	850
2019	478	3,309	3,535	1,547	945	812	630	568	451	398	367	357	381	365	518
2020	579	3,237	1,555	923	796	642	610	489	401	383	371	341	370	382	482
2021	492	1,769	1,620	1,504	1,381	1,298	1,101	846	788	731	625	678	699	679	806

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Table 7: Non-Claim Termination Rate = Table 6 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Termination by Other Than Claim During the Evaluation Year

	Evaluation Year														
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	0.40%	2.75%	9.48%	28.44%	31.90%	9.97%	15.02%	12.44%	16.96%	18.46%	13.24%	15.09%	19.70%	24.88%	30.12%
1991	0.44%	4.49%	21.22%	30.91%	10.12%	14.75%	13.21%	19.13%	22.18%	14.16%	15.81%	22.25%	27.26%	23.30%	31.22%
1992	0.52%	7.49%	16.78%	8.40%	13.11%	12.31%	18.88%	22.31%	13.46%	17.40%	25.54%	31.53%	28.23%	27.22%	38.59%
1993	0.98%	6.64%	6.06%	9.85%	10.22%	15.14%	19.27%	12.43%	15.97%	22.62%	33.79%	25.96%	24.08%	27.86%	34.31%
1994	1.36%	4.22%	7.88%	8.60%	12.85%	16.07%	11.34%	14.41%	19.90%	28.92%	23.74%	21.30%	23.58%	23.99%	45.47%
1995	1.08%	6.70%	8.03%	14.45%	17.40%	10.58%	15.03%	20.06%	25.67%	19.75%	16.09%	15.44%	16.64%	15.58%	25.13%
1996	0.75%	4.36%	10.57%	15.90%	10.68%	14.82%	21.64%	33.48%	25.91%	20.26%	19.28%	16.48%	17.77%	21.88%	39.08%
1997	0.80%	7.35%	14.65%	9.03%	13.29%	22.65%	32.68%	24.93%	20.13%	16.61%	14.67%	13.42%	13.99%	16.28%	30.17%
1998	0.84%	6.18%	6.91%	11.44%	19.29%	38.28%	26.94%	20.57%	18.27%	14.89%	13.81%	13.27%	14.99%	19.98%	31.65%
1999	0.95%	3.99%	9.81%	17.23%	34.78%	25.98%	19.85%	16.35%	13.26%	11.81%	11.01%	10.91%	15.61%	19.61%	37.52%
2000	0.86%	15.52%	29.42%	45.69%	30.37%	22.60%	18.53%	15.61%	11.28%	9.29%	9.95%	8.31%	9.63%	19.11%	27.67%
2001	1.13%	11.76%	48.46%	34.28%	25.55%	17.01%	13.68%	12.41%	9.46%	9.89%	10.16%	11.39%	14.20%	19.72%	33.09%
2002	1.60%	24.10%	24.30%	21.63%	15.64%	12.51%	10.02%	8.95%	8.94%	9.51%	10.97%	13.37%	15.36%	22.31%	38.94%
2003	3.06%	11.47%	15.98%	13.91%	11.35%	9.31%	8.56%	8.22%	8.74%	10.01%	12.59%	12.95%	16.79%	23.74%	46.32%
2004	3.63%	11.73%	12.74%	10.34%	8.04%	6.93%	7.18%	7.33%	8.36%	11.05%	11.31%	12.47%	17.42%	26.36%	67.93%
2005	3.18%	9.58%	9.76%	7.92%	6.28%	6.41%	6.76%	7.44%	9.28%	10.40%	11.24%	12.13%	15.82%	24.39%	47.94%
2006	3.53%	9.60%	10.09%	9.70%	7.82%	6.86%	7.87%	10.11%	8.37%	9.82%	9.46%	11.81%	16.02%	20.16%	45.70%
2007	3.47%	11.40%	15.68%	9.70%	7.61%	8.96%	10.62%	9.97%	8.51%	9.60%	11.13%	12.95%	12.04%	19.11%	36.68%
2008	1.58%	15.79%	12.33%	10.55%	12.54%	15.71%	11.02%	10.12%	10.85%	10.41%	11.27%	10.75%	14.78%	23.33%	35.67%
2009	3.59%	6.99%	11.46%	17.03%	21.90%	12.71%	13.20%	12.69%	12.69%	12.30%	12.14%	14.63%	21.65%	23.23%	35.23%
2010	0.83%	6.59%	14.47%	19.91%	12.19%	13.77%	13.80%	13.45%	12.39%	11.78%	14.30%	18.92%	21.70%	22.41%	55.43%
2011	0.80%	14.28%	19.52%	12.36%	15.19%	15.24%	15.09%	12.82%	12.45%	15.59%	20.41%	18.03%	19.29%	25.64%	56.13%
2012	1.23%	10.13%	10.23%	12.43%	13.41%	13.04%	11.27%	10.60%	14.40%	19.33%	17.02%	16.98%	22.89%	28.31%	61.16%
2013	0.99%	5.20%	9.40%	10.70%	11.21%	10.64%	10.16%	13.58%	18.12%	15.69%	13.60%	17.41%	21.05%	28.62%	59.25%
2014	2.37%	13.41%	15.56%	16.10%	13.76%	12.93%	15.37%	19.37%	13.24%	10.86%	12.67%	15.82%	19.56%	24.66%	45.27%
2015	2.00%	11.60%	15.85%	15.61%	14.06%	16.47%	21.70%	13.43%	11.36%	12.77%	13.50%	15.62%	19.56%	20.83%	44.64%
2016	1.88%	10.22%	13.84%	13.01%	17.40%	23.38%	15.10%	11.66%	12.97%	13.86%	14.56%	17.13%	19.43%	23.19%	48.46%
2017	1.78%	10.44%	13.49%	18.46%	25.85%	16.03%	12.33%	13.00%	13.13%	13.86%	14.11%	16.03%	18.66%	23.67%	50.28%
2018	1.96%	12.19%	25.47%	32.74%	17.57%	13.26%	13.02%	12.48%	12.84%	13.89%	12.92%	15.08%	17.71%	24.43%	57.20%
2019	3.08%	27.06%	40.70%	21.74%	15.46%	15.46%	13.78%	14.32%	12.91%	12.94%	13.85%	15.66%	20.19%	24.20%	56.18%
2020	4.80%	36.65%	21.43%	14.64%	14.55%	13.38%	14.65%	13.35%	12.35%	13.42%	15.29%	16.42%	21.83%	29.38%	62.52%
2021	2.99%	12.07%	12.46%	13.12%	13.75%	14.90%	14.50%	12.58%	13.29%	14.09%	14.02%	18.13%	23.36%	29.82%	56.64%

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Table 8: Cumulative Number of Non-Claim Terminations as of Each Evaluation Year
Total Number of Non-Claim Terminations for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	107	826	3,079	8,294	12,679	13,907	15,498	16,660	18,006	19,236	20,008	20,770	21,600	22,436	23,180	23,545
1991	130	1,396	6,307	11,733	13,329	15,336	16,911	18,814	20,610	21,610	22,570	23,673	24,734	25,467	26,190	26,692
1992	213	3,071	8,543	11,062	14,525	17,412	21,124	24,700	26,598	28,684	31,114	33,393	34,982	36,185	37,396	38,119
1993	1,143	8,409	14,656	23,886	32,556	43,682	55,536	62,328	69,843	78,514	88,156	94,031	98,417	102,382	105,930	108,422
1994	1,949	7,740	17,752	27,788	41,038	55,274	64,278	74,257	85,731	98,632	107,111	113,369	118,958	123,529	128,801	130,381
1995	195	1,327	2,580	4,539	6,539	7,633	8,979	10,470	11,983	12,949	13,617	14,169	14,678	15,081	15,515	15,857
1996	238	1,563	4,462	8,211	10,476	13,203	16,465	20,235	22,545	24,042	25,222	26,085	26,874	27,667	28,653	29,243
1997	161	1,533	3,912	5,251	6,982	9,380	11,981	13,565	14,625	15,372	15,931	16,381	16,789	17,195	17,738	18,089
1998	306	2,430	4,649	7,938	12,570	19,200	22,866	25,181	26,917	28,144	29,135	29,973	30,794	31,704	32,770	33,698
1999	410	2,075	5,795	11,353	19,649	24,551	27,669	29,873	31,448	32,700	33,736	34,659	35,798	36,991	38,605	39,509
2000	88	1,457	3,453	5,558	6,617	7,254	7,690	8,006	8,210	8,362	8,507	8,618	8,735	8,929	9,131	9,257
2001	284	2,924	10,225	14,046	16,299	17,573	18,471	19,194	19,695	20,169	20,605	21,042	21,517	22,066	22,746	23,396
2002	750	9,827	17,168	22,522	25,859	28,225	29,945	31,351	32,638	33,883	35,160	36,524	37,879	39,483	41,461	42,974
2003	1,822	7,949	15,299	20,904	25,005	28,076	30,671	32,965	35,203	37,524	40,069	42,377	44,933	47,839	51,655	54,088
2004	1,895	7,375	12,644	16,509	19,284	21,514	23,660	25,694	27,825	30,333	32,594	34,802	37,417	40,536	44,473	45,649
2005	629	2,355	3,944	5,130	6,007	6,841	7,660	8,493	9,436	10,384	11,267	12,109	13,050	14,204	15,623	16,228
2006	368	1,272	2,122	2,853	3,390	3,825	4,281	4,804	5,198	5,612	5,960	6,343	6,787	7,250	7,898	8,101
2007	251	984	1,835	2,303	2,638	2,990	3,354	3,657	3,890	4,124	4,361	4,602	4,800	5,062	5,405	5,596
2008	381	3,657	5,906	7,622	9,397	11,253	12,395	13,327	14,211	14,967	15,689	16,305	17,039	17,977	19,005	19,644
2009	2,140	6,032	11,738	18,936	26,433	30,247	33,700	36,615	39,182	41,384	43,302	45,313	47,754	49,877	52,183	53,893
2010	706	5,953	15,993	27,459	33,685	39,834	45,220	49,827	53,591	56,782	60,145	63,883	67,402	70,366	74,869	76,783
2011	699	11,642	24,132	31,157	38,627	45,109	50,673	54,851	58,454	62,351	66,556	69,700	72,517	75,494	79,562	81,413
2012	1,227	10,365	18,728	27,753	36,326	43,686	49,400	54,251	60,010	66,486	71,326	75,450	79,968	84,319	90,038	92,723
2013	652	3,894	9,244	14,741	19,911	24,341	28,175	32,684	37,774	41,581	44,454	47,579	50,695	53,979	58,104	59,804
2014	697	4,174	7,663	10,764	13,088	15,017	17,003	19,098	20,360	21,292	22,244	23,265	24,317	25,376	26,649	27,273
2015	594	3,678	7,312	10,403	12,839	15,284	17,930	19,371	20,464	21,550	22,550	23,548	24,591	25,506	26,819	27,516
2016	584	3,464	6,888	9,730	12,963	16,477	18,446	19,803	21,135	22,381	23,512	24,645	25,718	26,755	28,182	28,884
2017	573	3,617	7,080	11,075	15,518	17,887	19,502	21,003	22,339	23,575	24,664	25,728	26,767	27,829	29,273	29,964
2018	399	2,613	6,295	9,857	11,479	12,552	13,479	14,264	14,976	15,649	16,196	16,748	17,296	17,901	18,751	19,125
2019	478	3,787	7,322	8,869	9,814	10,626	11,256	11,824	12,275	12,673	13,040	13,397	13,778	14,143	14,661	14,884
2020	579	3,816	5,371	6,294	7,090	7,732	8,342	8,831	9,232	9,615	9,986	10,327	10,697	11,079	11,561	11,758
2021	492	2,261	3,881	5,385	6,766	8,064	9,165	10,011	10,799	11,530	12,155	12,833	13,532	14,211	15,017	15,017

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Non-Claim Termination Rate
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Table 9: Cumulative Non-Claim Termination Rate = Table 8 / Table 1 (Evaluation Year 1)
Cumulative Non-Claim Terminations as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0.40%	3.07%	11.44%	30.81%	47.10%	51.66%	57.57%	61.88%	66.88%	71.45%	74.32%	77.15%	80.23%	83.34%	86.10%	87.46%
1991	0.44%	4.74%	21.40%	39.82%	45.23%	52.04%	57.39%	63.85%	69.94%	73.33%	76.59%	80.33%	83.94%	86.42%	88.88%	90.58%
1992	0.52%	7.48%	20.81%	26.94%	35.38%	42.41%	51.45%	60.16%	64.78%	69.86%	75.78%	81.33%	85.20%	88.13%	91.08%	92.84%
1993	0.98%	7.20%	12.55%	20.45%	27.87%	37.40%	47.54%	53.36%	59.79%	67.21%	75.47%	80.50%	84.25%	87.65%	90.68%	92.82%
1994	1.36%	5.40%	12.39%	19.40%	28.65%	38.59%	44.87%	51.84%	59.85%	68.86%	74.78%	79.15%	83.05%	86.24%	89.92%	91.02%
1995	1.08%	7.35%	14.29%	25.14%	36.21%	42.27%	49.73%	57.98%	66.36%	71.71%	75.41%	78.47%	81.29%	83.52%	85.92%	87.82%
1996	0.75%	4.92%	14.06%	25.87%	33.00%	41.59%	51.87%	63.74%	71.02%	75.73%	79.45%	82.17%	84.66%	87.15%	90.26%	92.12%
1997	0.80%	7.64%	19.51%	26.18%	34.81%	46.77%	59.74%	67.64%	72.92%	76.65%	79.44%	81.68%	83.71%	85.74%	88.45%	90.20%
1998	0.84%	6.65%	12.73%	21.73%	34.41%	52.57%	62.60%	68.94%	73.69%	77.05%	79.77%	82.06%	84.31%	86.80%	89.72%	92.26%
1999	0.95%	4.78%	13.36%	26.18%	45.30%	56.61%	63.80%	68.88%	72.51%	75.40%	77.78%	79.91%	82.54%	85.29%	89.01%	91.10%
2000	0.86%	14.29%	33.86%	54.51%	64.89%	71.14%	75.41%	78.51%	80.51%	82.00%	83.43%	84.52%	85.66%	87.56%	89.55%	90.78%
2001	1.13%	11.65%	40.73%	55.95%	64.92%	70.00%	73.57%	76.45%	78.45%	80.34%	82.07%	83.81%	85.70%	87.89%	90.60%	93.19%
2002	1.60%	21.01%	36.70%	48.14%	55.28%	60.33%	64.01%	67.02%	69.77%	72.43%	75.16%	78.07%	80.97%	84.40%	88.63%	91.86%
2003	3.06%	13.34%	25.67%	35.08%	41.96%	47.11%	51.46%	55.31%	59.07%	62.96%	67.23%	71.11%	75.40%	80.27%	86.68%	90.76%
2004	3.63%	14.11%	24.19%	31.59%	36.90%	41.16%	45.27%	49.16%	53.24%	58.04%	62.37%	66.59%	71.59%	77.56%	85.09%	87.34%
2005	3.18%	11.89%	19.92%	25.91%	30.34%	34.55%	38.68%	42.89%	47.65%	52.44%	56.90%	61.15%	65.91%	71.73%	78.90%	81.96%
2006	3.53%	12.21%	20.36%	27.38%	32.53%	36.71%	41.08%	46.10%	49.88%	53.86%	57.20%	60.87%	65.13%	69.58%	75.80%	77.74%
2007	3.47%	13.62%	25.40%	31.88%	36.52%	41.39%	46.43%	50.62%	53.85%	57.09%	60.37%	63.70%	66.45%	70.07%	74.82%	77.46%
2008	1.58%	15.16%	24.49%	31.60%	38.96%	46.66%	51.40%	55.26%	58.93%	62.06%	65.05%	67.61%	70.65%	74.54%	78.80%	81.45%
2009	3.59%	10.11%	19.67%	31.73%	44.29%	50.68%	56.46%	61.35%	65.65%	69.34%	72.55%	75.92%	80.01%	83.57%	87.43%	90.30%
2010	0.83%	7.02%	18.85%	32.36%	39.70%	46.94%	53.29%	58.72%	63.15%	66.91%	70.88%	75.28%	79.43%	82.92%	88.23%	90.49%
2011	0.80%	13.29%	27.55%	35.57%	44.09%	51.49%	57.84%	62.61%	66.73%	71.17%	75.97%	79.56%	82.78%	86.18%	90.82%	92.93%
2012	1.23%	10.43%	18.85%	27.93%	36.56%	43.97%	49.72%	54.60%	60.40%	66.92%	71.79%	75.94%	80.48%	84.86%	90.62%	93.32%
2013	0.99%	5.94%	14.10%	22.48%	30.36%	37.12%	42.96%	49.84%	57.60%	63.41%	67.79%	72.55%	77.30%	82.31%	88.60%	91.19%
2014	2.37%	14.19%	26.05%	36.59%	44.49%	51.05%	57.80%	64.92%	69.21%	72.37%	75.61%	79.08%	82.66%	86.26%	90.58%	92.71%
2015	2.00%	12.39%	24.63%	35.04%	43.24%	51.48%	60.39%	65.25%	68.93%	72.59%	75.95%	79.32%	82.83%	85.91%	90.33%	92.68%
2016	1.88%	11.15%	22.16%	31.31%	41.71%	53.02%	59.35%	63.72%	68.01%	72.02%	75.65%	79.30%	82.75%	86.09%	90.68%	92.94%
2017	1.78%	11.23%	21.98%	34.38%	48.18%	55.53%	60.55%	65.21%	69.36%	73.19%	76.57%	79.88%	83.10%	86.40%	90.88%	93.03%
2018	1.96%	12.82%	30.89%	48.36%	56.32%	61.59%	66.14%	69.99%	73.48%	76.78%	79.47%	82.17%	84.86%	87.83%	92.00%	93.84%
2019	3.08%	24.37%	47.11%	57.07%	63.15%	68.37%	72.43%	76.08%	78.98%	81.55%	83.91%	86.20%	88.66%	91.00%	94.34%	95.77%
2020	4.80%	31.62%	44.50%	52.15%	58.74%	64.06%	69.11%	73.16%	76.49%	79.66%	82.73%	85.56%	88.62%	91.79%	95.78%	97.42%
2021	2.99%	13.76%	23.62%	32.77%	41.18%	49.08%	55.78%	60.93%	65.72%	70.17%	73.98%	78.10%	82.36%	86.49%	91.39%	91.39%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
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Table 10: Gross Claim Cost in Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	2,168,528	8,763,714	14,848,102	15,087,031	16,949,785	10,910,415	6,055,554	4,176,642	2,957,965	2,615,312	800,792	290,602	410,293	139,077	20,731
1991	136,231	1,886,419	8,167,024	10,980,244	16,198,596	13,544,960	7,717,807	5,824,144	3,789,445	1,786,810	895,402	448,271	195,135	151,639	311,052	45,863
1992	0	1,343,200	4,825,773	6,195,078	7,994,236	4,940,792	4,756,493	2,930,220	1,358,807	1,077,381	424,729	116,601	121,115	64,252	51,128	0
1993	0	2,487,651	9,325,163	12,127,402	11,295,457	9,277,565	6,890,699	5,416,736	2,705,372	1,679,451	726,845	556,879	239,549	174,445	120,610	31,873
1994	325,955	5,174,579	15,170,876	19,228,492	20,125,777	14,416,697	10,202,223	5,095,303	3,889,599	1,944,439	1,133,717	643,993	442,192	187,529	79,338	23,382
1995	137,429	971,586	2,793,684	4,255,452	3,393,157	2,693,227	1,723,302	1,123,384	975,841	564,994	201,697	332,279	78,513	44,432	33,289	0
1996	0	1,041,300	4,008,598	5,820,592	5,299,525	4,359,861	3,275,845	1,910,928	1,552,742	846,531	606,206	382,178	37,557	62,858	82,047	26,062
1997	0	795,031	3,481,783	3,904,536	3,862,416	2,198,578	1,287,706	1,026,028	1,280,162	747,971	204,591	21,375	105,820	105,609	138,584	0
1998	0	506,108	4,588,439	4,123,154	6,025,282	3,393,248	2,538,837	1,817,526	902,044	546,810	227,138	438,303	582,452	14,565	285,462	35,858
1999	0	785,721	4,283,679	4,951,771	6,949,808	4,666,631	2,683,489	1,125,759	827,821	827,459	850,518	544,176	373,107	350,678	512,340	92,445
2000	0	417,225	2,627,898	5,118,965	4,199,612	1,971,958	1,496,279	822,956	554,906	742,428	607,023	184,953	104,164	137,060	190,437	116,131
2001	0	1,556,678	5,955,128	7,352,863	5,635,035	3,799,170	2,247,528	1,111,703	1,654,557	1,332,111	1,309,297	430,724	608,490	625,328	584,703	526,066
2002	3,460	2,268,974	8,803,904	7,946,700	6,882,406	3,413,960	2,527,478	2,324,689	2,310,952	2,804,874	1,774,033	2,311,075	898,260	1,652,608	1,595,154	284,984
2003	0	3,259,540	7,504,361	6,701,792	4,512,474	5,508,972	5,633,949	6,118,987	5,512,608	4,969,980	5,804,432	4,971,093	2,750,738	3,530,623	1,257,557	452,695
2004	590,005	3,456,581	7,630,908	7,579,453	7,289,796	7,537,832	10,054,448	7,365,425	8,404,997	6,281,886	5,764,667	4,013,567	4,326,070	1,160,111	1,261,666	14,864
2005	123,918	6,165,842	11,569,901	10,045,221	10,549,554	10,069,405	7,108,274	4,789,891	6,988,047	5,206,544	4,344,309	3,407,263	1,928,401	692,770	237,617	136,095
2006	380,605	10,137,439	13,537,951	15,554,961	12,626,406	8,185,283	8,631,017	8,536,361	6,588,323	4,990,651	3,719,198	2,598,088	1,472,081	535,527	385,215	0
2007	222,568	6,045,262	14,156,009	13,650,298	8,365,658	12,407,435	13,881,017	7,735,205	5,373,113	5,780,245	3,821,601	1,866,005	1,279,589	461,221	62,090	0
2008	431,991	10,502,155	28,704,579	27,763,072	34,283,687	51,479,387	30,183,602	19,826,351	16,203,919	11,685,530	3,501,827	3,790,612	2,000,269	305,908	170,277	48,560
2009	608,657	13,275,539	18,879,150	32,222,585	61,622,052	42,470,038	37,059,403	24,468,454	12,847,995	7,576,701	4,679,687	2,719,354	1,688,637	317,432	287,309	96,814
2010	15,278	4,142,559	15,762,964	31,685,736	28,471,109	27,049,554	20,661,806	11,977,539	7,216,094	3,607,797	2,919,408	372,216	429,776	814,846	524,548	48,996
2011	60,641	4,069,712	12,379,373	15,520,124	16,981,992	13,694,941	8,182,272	4,684,746	3,408,793	1,169,575	303,664	299,518	950,616	360,514	163,834	25,147
2012	103,845	3,223,324	8,311,758	10,756,227	10,968,290	8,100,573	4,012,452	2,934,500	1,464,850	541,224	448,054	1,436,924	637,490	432,867	238,430	51,517
2013	0	962,631	3,518,457	4,961,029	5,698,047	3,527,333	3,056,372	2,308,882	686,332	443,729	1,278,214	791,868	657,901	460,428	100,978	101,065
2014	0	865,559	1,836,136	4,670,297	4,003,114	1,703,592	1,026,148	424,233	615,866	687,438	684,553	634,489	347,387	217,171	76,412	10,989
2015	0	708,312	2,035,277	2,449,545	2,150,941	1,779,926	563,576	881,634	1,093,947	715,514	874,861	363,121	292,515	291,776	162,226	51,944
2016	107,263	325,902	2,328,596	2,287,649	2,015,616	1,386,988	1,151,921	2,325,618	1,820,955	1,222,989	955,270	775,377	520,581	240,704	60,681	4,157
2017	0	668,151	2,209,172	1,138,564	942,706	1,718,025	4,740,998	2,605,524	1,750,051	1,267,210	1,113,523	812,579	673,647	361,624	163,011	24,938
2018	0	604,302	1,034,662	794,500	1,669,160	5,094,223	2,845,317	2,682,323	2,024,519	1,839,005	815,095	608,798	512,026	179,497	109,952	0
2019	0	205,024	443,900	1,077,402	4,146,626	3,358,861	3,450,211	2,496,425	1,374,662	1,090,013	481,561	509,660	379,646	405,598	56,815	0
2020	0	23,599	1,351,155	1,919,269	2,910,297	2,256,158	1,466,912	759,951	744,567	452,949	581,701	332,429	336,172	12,073	20,700	32,314
2021	0	658,922	2,494,028	2,997,655	2,433,088	2,011,815	1,538,955	1,531,966	535,035	479,413	694,441	212,542	319,504	0	18,429	30,687

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
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Table 11: Claim Cost Net of Recovery in Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	1,355,718	5,166,962	9,577,641	10,314,347	13,060,906	8,419,627	3,662,183	2,615,340	1,570,490	1,360,768	349,569	122,362	163,991	96,222	19,182
1991	46,891	951,855	4,529,024	6,937,453	12,153,941	10,379,713	4,835,228	3,340,612	2,072,140	908,518	347,106	172,034	29,895	51,919	(136,131)	(9,613)
1992	0	617,859	2,280,752	4,138,880	5,336,518	2,851,796	2,381,209	1,314,941	577,428	505,450	127,158	32,264	26,826	61,222	59,221	0
1993	0	1,338,268	5,828,008	6,590,116	5,137,706	3,441,287	3,051,653	2,197,158	953,146	600,712	187,852	244,113	7,977	92,452	100,479	(458)
1994	95,848	2,783,429	8,494,430	8,421,910	7,577,776	5,439,398	3,873,778	1,825,826	1,499,772	634,015	433,059	320,564	312,093	178,281	40,704	15,323
1995	47,920	283,239	1,003,106	1,595,129	1,232,106	942,993	480,932	412,936	242,160	192,646	76,915	204,506	43,033	47,684	(5,022)	0
1996	0	447,824	1,470,049	2,039,818	2,303,738	1,430,511	926,304	603,407	650,601	437,181	304,831	240,778	27,397	21,413	13,383	27,274
1997	0	285,939	1,194,443	1,530,560	1,626,493	751,308	544,505	461,198	329,666	261,699	98,090	23,843	62,111	43,891	22,540	0
1998	0	188,031	1,533,596	1,347,850	2,097,206	1,159,268	826,010	733,161	489,778	252,221	89,196	221,529	414,307	0	224,110	0
1999	0	303,212	1,251,676	1,725,734	2,271,989	1,633,348	1,116,574	544,829	479,316	362,372	482,095	357,850	179,834	201,570	234,087	18,769
2000	0	143,357	1,001,034	1,684,177	1,656,261	991,748	722,292	375,325	356,154	419,331	413,404	136,337	38,631	28,219	74,124	0
2001	0	436,581	2,175,999	2,882,580	2,231,060	1,656,132	1,186,981	595,663	793,356	730,399	931,814	341,166	263,224	246,394	294,445	37,029
2002	0	961,445	3,469,719	3,195,542	2,429,415	1,436,828	1,503,347	1,424,991	1,359,789	1,604,479	1,128,069	1,266,188	289,693	601,019	799,130	189,162
2003	0	1,160,691	3,166,811	2,720,599	2,026,113	2,502,080	3,122,807	3,685,666	3,069,631	3,086,812	2,536,445	1,303,315	929,107	1,444,687	394,819	284,973
2004	197,201	1,349,421	2,916,416	3,520,598	3,778,608	4,373,201	5,858,298	4,425,560	4,543,220	3,016,751	2,341,641	2,112,114	1,879,021	448,150	632,897	0
2005	0	2,288,062	4,995,732	4,878,508	5,252,999	5,676,227	4,039,481	2,902,635	3,831,690	2,162,706	2,250,048	1,531,540	1,030,214	56,769	86,341	30,445
2006	167,017	4,749,132	7,170,972	8,792,086	7,283,499	5,322,231	5,600,418	4,828,242	3,540,666	2,615,465	1,802,317	1,669,010	780,391	185,668	195,134	0
2007	98,263	3,240,730	8,541,515	8,843,001	5,725,362	8,338,847	7,857,203	4,441,641	3,013,354	3,301,674	1,817,983	1,248,908	620,774	227,180	16,389	0
2008	180,714	5,053,501	17,127,472	17,888,687	21,776,693	30,183,601	16,965,676	11,133,809	9,444,156	6,863,486	2,033,056	2,154,408	1,190,824	262,699	121,241	48,560
2009	310,239	7,641,425	11,955,227	20,390,209	32,659,266	20,585,641	19,041,647	13,014,982	7,296,586	4,226,522	2,494,650	1,722,845	1,008,088	191,623	109,962	66,733
2010	0	2,258,486	9,667,062	16,733,653	13,117,747	12,867,799	11,286,440	6,594,915	3,860,063	1,744,330	1,455,868	75,357	308,379	593,282	344,080	18,274
2011	0	2,539,877	6,219,472	6,413,372	7,910,189	6,903,460	4,170,414	2,658,163	778,893	704,120	65,285	203,610	494,093	189,982	90,967	21,087
2012	61,140	1,515,694	3,340,360	4,668,440	4,895,210	3,711,571	2,258,445	1,331,062	1,023,481	173,053	348,670	831,156	375,333	226,396	178,576	16,500
2013	0	99,333	1,689,860	2,372,878	3,209,164	1,866,279	1,672,849	1,284,106	611,471	260,572	576,201	565,394	379,289	306,182	78,762	40,203
2014	0	345,717	830,534	2,060,262	2,088,830	829,346	488,399	169,845	360,158	256,031	332,824	347,900	125,967	95,848	29,511	10,989
2015	0	370,298	1,170,944	1,480,450	1,106,512	851,646	359,953	493,248	737,942	388,774	420,334	288,017	220,591	197,064	67,677	42,754
2016	0	97,395	1,287,151	1,220,343	1,051,366	959,703	545,517	1,438,750	1,042,966	766,224	622,115	555,641	307,165	160,871	53,822	4,157
2017	0	216,270	943,486	678,539	534,774	991,228	2,389,059	1,427,434	916,659	662,992	534,157	304,137	371,831	228,256	107,857	24,938
2018	0	251,501	504,292	460,123	947,147	2,967,765	1,361,911	1,436,864	1,206,600	812,283	548,934	263,047	285,453	124,402	61,642	0
2019	0	20,348	368,287	827,785	2,170,263	1,757,325	1,971,966	1,240,073	556,391	634,073	223,399	285,054	257,323	262,925	52,460	0
2020	0	0	818,459	1,234,461	1,674,006	1,157,892	907,095	422,982	437,606	248,330	345,154	275,527	198,624	12,073	11,014	20,925
2021	0	412,623	1,342,726	1,647,153	1,534,897	1,488,304	717,634	931,998	452,403	304,318	263,821	148,017	243,746	0	18,429	20,070

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
FRM15

Table 12: Conditional Loss Severity = Table 11/Table 10
Loss Severity for Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0.00%	62.52%	58.96%	64.50%	68.37%	77.06%	77.17%	60.48%	62.62%	53.09%	52.03%	43.65%	42.11%	39.97%	69.19%	92.53%
1991	34.42%	50.46%	55.46%	63.18%	75.03%	76.63%	62.65%	57.36%	54.68%	50.85%	38.77%	38.38%	15.32%	34.24%	-43.76%	-20.96%
1992	0.00%	46.00%	47.26%	66.81%	66.75%	57.72%	50.06%	44.88%	42.50%	46.91%	29.94%	27.67%	22.15%	95.28%	115.83%	0.00%
1993	0.00%	53.80%	62.50%	54.34%	45.48%	37.09%	44.29%	40.56%	35.23%	35.77%	25.84%	43.84%	3.33%	53.00%	83.31%	-1.44%
1994	29.41%	53.79%	55.99%	43.80%	37.65%	37.73%	37.97%	35.83%	38.56%	32.61%	38.20%	49.78%	70.58%	95.07%	51.31%	65.54%
1995	34.87%	29.15%	35.91%	37.48%	36.31%	35.01%	27.91%	36.76%	24.82%	34.10%	38.13%	61.55%	54.81%	107.32%	-15.09%	0.00%
1996	0.00%	43.01%	36.67%	35.04%	43.47%	32.81%	28.28%	31.58%	41.90%	51.64%	50.28%	63.00%	72.95%	34.07%	16.31%	104.65%
1997	0.00%	35.97%	34.31%	39.20%	42.11%	34.17%	42.28%	44.95%	25.75%	34.99%	47.94%	111.55%	58.70%	41.56%	16.26%	0.00%
1998	0.00%	37.15%	33.42%	32.69%	34.81%	34.16%	32.53%	40.34%	54.30%	46.13%	39.27%	50.54%	71.13%	0.00%	78.51%	0.00%
1999	0.00%	38.59%	29.22%	34.85%	32.69%	35.00%	41.61%	48.40%	57.90%	43.79%	56.68%	65.76%	48.20%	57.48%	45.69%	20.30%
2000	0.00%	34.36%	38.09%	32.90%	39.44%	50.29%	48.27%	45.61%	64.18%	56.48%	68.10%	73.71%	37.09%	20.59%	38.92%	0.00%
2001	0.00%	28.05%	36.54%	39.20%	39.59%	43.59%	52.81%	53.58%	47.95%	54.83%	71.17%	79.21%	43.26%	39.40%	50.36%	7.04%
2002	0.00%	42.37%	39.41%	40.21%	35.30%	42.09%	59.48%	61.30%	58.84%	57.20%	63.59%	54.79%	32.25%	36.37%	50.10%	66.38%
2003	0.00%	35.61%	42.20%	40.60%	44.90%	45.42%	55.43%	60.23%	55.68%	62.11%	43.70%	26.22%	33.78%	40.92%	31.40%	62.95%
2004	33.42%	39.04%	38.22%	46.45%	51.83%	58.02%	58.27%	60.09%	54.05%	48.02%	40.62%	52.62%	43.43%	38.63%	50.16%	0.00%
2005	0.00%	37.11%	43.18%	48.57%	49.79%	56.37%	56.83%	60.60%	54.83%	41.54%	51.79%	44.95%	53.42%	8.19%	36.34%	22.37%
2006	43.88%	46.85%	52.97%	56.52%	57.68%	65.02%	64.89%	56.56%	53.74%	52.41%	48.46%	64.24%	53.01%	34.67%	50.66%	0.00%
2007	44.15%	53.61%	60.34%	64.78%	68.44%	67.21%	56.60%	57.42%	56.08%	57.12%	47.57%	66.93%	48.51%	49.26%	26.40%	0.00%
2008	41.83%	48.12%	59.67%	64.43%	63.52%	58.63%	56.21%	56.16%	58.28%	58.73%	58.06%	56.84%	59.53%	85.88%	71.20%	100.00%
2009	50.97%	57.56%	63.33%	63.28%	53.00%	48.47%	51.38%	53.19%	56.79%	55.78%	53.31%	63.35%	59.70%	60.37%	38.27%	68.93%
2010	0.00%	54.52%	61.33%	52.81%	46.07%	47.57%	54.62%	55.06%	53.49%	48.35%	49.87%	20.25%	71.75%	72.81%	65.60%	37.30%
2011	0.00%	62.41%	50.24%	41.32%	46.58%	50.41%	50.97%	56.74%	22.85%	60.20%	21.50%	67.98%	51.98%	52.70%	55.52%	83.85%
2012	58.88%	47.02%	40.19%	43.40%	44.63%	45.82%	56.29%	45.36%	69.87%	31.97%	77.82%	57.84%	58.88%	52.30%	74.90%	32.03%
2013	0.00%	10.32%	48.03%	47.83%	56.32%	52.91%	54.73%	55.62%	89.09%	58.72%	45.08%	71.40%	57.65%	66.50%	78.00%	39.78%
2014	0.00%	39.94%	45.23%	44.11%	52.18%	48.68%	47.60%	40.04%	58.48%	37.24%	48.62%	54.83%	36.26%	44.13%	38.62%	100.00%
2015	0.00%	52.28%	57.53%	60.44%	51.44%	47.85%	63.87%	55.95%	67.46%	54.33%	48.05%	79.32%	75.41%	67.54%	41.72%	82.31%
2016	0.00%	29.88%	55.28%	53.34%	52.16%	69.19%	47.36%	61.87%	57.28%	62.65%	65.12%	71.66%	59.00%	66.83%	88.70%	100.00%
2017	0.00%	32.37%	42.71%	59.60%	56.73%	57.70%	50.39%	54.78%	52.38%	52.32%	47.97%	37.43%	55.20%	63.12%	66.17%	100.00%
2018	0.00%	41.62%	48.74%	57.91%	56.74%	58.26%	47.87%	53.57%	59.60%	44.17%	67.35%	43.21%	55.75%	69.31%	56.06%	0.00%
2019	0.00%	9.92%	82.97%	76.83%	52.34%	52.32%	57.15%	49.67%	40.47%	58.17%	46.39%	55.93%	67.78%	64.82%	92.34%	0.00%
2020	0.00%	0.00%	60.57%	64.32%	57.52%	51.32%	61.84%	55.66%	58.77%	54.83%	59.34%	82.88%	59.08%	100.00%	53.21%	64.75%
2021	0.00%	62.62%	53.84%	54.95%	63.08%	73.98%	46.63%	60.84%	84.56%	63.48%	37.99%	69.64%	76.29%	0.00%	100.00%	65.40%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
FRM15

Table 13: Cumulative Gross Claim Cost
Total Gross Losses for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	2,168,528	10,932,242	25,780,344	40,867,375	57,817,160	68,727,575	74,783,129	78,959,771	81,917,736	84,533,048	85,333,840	85,624,442	86,034,735	86,173,812	86,194,543
1991	136,231	2,022,650	10,189,674	21,169,918	37,368,514	50,913,474	58,631,281	64,455,425	68,244,870	70,031,680	70,927,082	71,375,353	71,570,488	71,722,127	72,033,179	72,079,042
1992	0	1,343,200	6,168,973	12,364,051	20,358,287	25,299,079	30,055,572	32,985,792	34,344,599	35,421,980	35,846,709	35,963,310	36,084,425	36,148,677	36,199,805	36,199,805
1993	0	2,487,651	11,812,814	23,940,216	35,235,673	44,513,238	51,403,937	56,820,673	59,526,045	61,205,496	61,932,341	62,489,220	62,728,769	62,903,214	63,023,824	63,055,697
1994	325,955	5,500,534	20,671,410	39,899,902	60,025,679	74,442,376	84,644,599	89,739,902	93,629,501	95,573,940	96,707,657	97,351,650	97,793,842	97,981,371	98,060,709	98,084,091
1995	137,429	1,109,015	3,902,699	8,158,151	11,551,308	14,244,535	15,967,837	17,091,221	18,067,062	18,632,056	18,833,753	19,166,032	19,244,545	19,288,977	19,322,266	19,322,266
1996	0	1,041,300	5,049,898	10,870,490	16,170,015	20,529,876	23,805,721	25,716,649	27,269,391	28,115,922	28,722,128	29,104,306	29,141,863	29,204,721	29,286,768	29,312,830
1997	0	795,031	4,276,814	8,181,350	12,043,766	14,242,344	15,530,050	16,556,078	17,836,240	18,584,211	18,788,802	18,810,177	18,915,997	19,021,606	19,160,190	19,160,190
1998	0	506,108	5,094,547	9,217,701	15,242,983	18,636,231	21,175,068	22,992,594	23,894,638	24,441,448	24,668,586	25,106,889	25,689,341	25,703,906	25,989,368	26,025,226
1999	0	785,721	5,069,400	10,021,171	16,970,979	21,637,610	24,321,099	25,446,858	26,274,679	27,102,138	27,952,656	28,496,832	28,869,939	29,220,617	29,732,957	29,825,402
2000	0	417,225	3,045,123	8,164,088	12,363,700	14,335,658	15,831,937	16,654,893	17,209,799	17,952,227	18,559,250	18,744,203	18,848,367	18,985,427	19,175,864	19,291,995
2001	0	1,556,678	7,511,806	14,864,669	20,499,704	24,298,874	26,546,402	27,658,105	29,312,662	30,644,773	31,954,070	32,384,794	32,993,284	33,618,612	34,203,315	34,729,381
2002	3,460	2,272,434	11,076,338	19,023,038	25,905,444	29,319,404	31,846,882	34,171,571	36,482,523	39,287,397	41,061,430	43,372,505	44,270,765	45,923,373	47,518,527	47,803,511
2003	0	3,259,540	10,763,901	17,465,693	21,978,167	27,487,139	33,121,088	39,240,075	44,752,683	49,722,663	55,527,095	60,498,188	63,248,926	66,779,549	68,037,106	68,489,801
2004	590,005	4,046,586	11,677,494	19,256,947	26,546,743	34,084,575	44,139,023	51,504,448	59,909,445	66,191,331	71,955,998	75,969,565	80,295,635	81,455,746	82,717,412	82,732,276
2005	123,918	6,289,760	17,859,661	27,904,882	38,454,436	48,523,841	55,632,115	60,422,006	67,410,053	72,616,597	76,960,906	80,368,169	82,296,570	82,989,340	83,226,957	83,363,052
2006	380,605	10,518,044	24,055,995	39,610,956	52,237,362	60,422,645	69,053,662	77,590,023	84,178,346	89,168,997	92,888,195	95,486,283	96,958,364	97,493,891	97,879,106	97,879,106
2007	222,568	6,267,830	20,423,839	34,074,137	42,439,795	54,847,230	68,728,247	76,463,452	81,836,565	87,616,810	91,438,411	93,304,416	94,584,005	95,045,226	95,107,316	95,107,316
2008	431,991	10,934,146	39,638,725	67,401,797	101,685,484	153,164,871	183,348,473	203,174,824	219,378,743	231,064,273	234,566,100	238,356,712	240,356,981	240,662,889	240,833,166	240,881,725
2009	608,657	13,884,196	32,763,346	64,985,931	126,607,983	169,078,021	206,137,424	230,605,878	243,453,873	251,030,574	255,710,261	258,429,615	260,118,252	260,435,684	260,722,993	260,819,807
2010	15,278	4,157,837	19,920,801	51,606,537	80,077,646	107,127,200	127,789,006	139,766,545	146,982,639	150,590,436	153,509,844	153,882,060	154,311,836	155,126,682	155,651,230	155,700,226
2011	60,641	4,130,353	16,509,726	32,029,850	49,011,842	62,706,783	70,889,055	75,573,801	78,982,594	80,152,169	80,455,833	80,755,351	81,705,967	82,066,481	82,230,315	82,255,462
2012	103,845	3,327,169	11,638,927	22,395,154	33,363,444	41,464,017	45,476,469	48,410,969	49,875,819	50,417,043	50,865,097	52,302,022	52,939,512	53,372,379	53,610,809	53,662,327
2013	0	962,631	4,481,088	9,442,117	15,140,164	18,667,497	21,723,869	24,032,751	24,719,083	25,162,812	26,441,026	27,232,894	27,890,794	28,351,223	28,452,200	28,553,265
2014	0	865,559	2,701,695	7,371,992	11,375,106	13,078,698	14,104,846	14,529,079	15,144,945	15,832,384	16,516,937	17,151,426	17,498,813	17,715,984	17,792,396	17,803,385
2015	0	708,312	2,743,589	5,193,134	7,344,075	9,124,001	9,687,577	10,569,211	11,663,158	12,378,671	13,253,533	13,616,654	13,909,169	14,200,945	14,363,172	14,415,116
2016	107,263	433,165	2,761,761	5,049,410	7,065,026	8,452,014	9,603,935	11,929,554	13,750,508	14,973,497	15,928,767	16,704,145	17,224,726	17,465,429	17,526,110	17,530,267
2017	0	668,151	2,877,323	4,015,887	4,958,593	6,676,618	11,417,616	14,023,140	15,773,191	17,040,402	18,153,924	18,966,503	19,640,150	20,001,775	20,164,786	20,189,723
2018	0	604,302	1,638,964	2,433,464	4,102,624	9,196,846	12,042,163	14,724,486	16,749,005	18,588,010	19,403,105	20,011,902	20,523,928	20,703,426	20,813,378	20,813,378
2019	0	205,024	648,924	1,726,326	5,872,952	9,231,813	12,682,024	15,178,449	16,553,111	17,643,124	18,124,685	18,634,345	19,013,991	19,419,589	19,476,404	19,476,404
2020	0	23,599	1,374,754	3,294,023	6,204,320	8,460,478	9,927,390	10,687,342	11,431,909	11,884,858	12,466,558	12,798,988	13,135,159	13,147,233	13,167,933	13,200,247
2021	0	658,922	3,152,950	6,150,605	8,583,693	10,595,508	12,134,463	13,666,429	14,201,464	14,680,877	15,375,318	15,587,861	15,907,364	15,907,364	15,925,794	15,956,481

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
FRM15

Table 14: Cumulative Claim Cost Net of Recovery
Total Losses Net of Recovery for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0	1,355,718	6,522,680	16,100,321	26,414,668	39,475,573	47,895,200	51,557,383	54,172,724	55,743,214	57,103,982	57,453,550	57,575,913	57,739,904	57,836,126	57,855,309
1991	46,891	998,746	5,527,770	12,465,222	24,619,163	34,998,876	39,834,104	43,174,716	45,246,856	46,155,375	46,502,481	46,674,514	46,704,409	46,756,328	46,620,198	46,610,584
1992	0	617,859	2,898,610	7,037,490	12,374,008	15,225,804	17,607,013	18,921,953	19,499,381	20,004,831	20,131,989	20,164,253	20,191,079	20,252,301	20,311,522	20,311,522
1993	0	1,338,268	7,166,276	13,756,392	18,894,098	22,335,385	25,387,038	27,584,195	28,537,342	29,138,054	29,325,906	29,570,019	29,577,996	29,670,449	29,770,928	29,770,470
1994	95,848	2,879,276	11,373,706	19,795,617	27,373,393	32,812,791	36,686,569	38,512,395	40,012,167	40,646,182	41,079,241	41,399,804	41,711,897	41,890,179	41,930,883	41,946,207
1995	47,920	331,159	1,334,265	2,929,393	4,161,499	5,104,493	5,585,425	5,998,360	6,240,521	6,433,166	6,510,081	6,714,588	6,757,620	6,805,304	6,800,282	6,800,282
1996	0	447,824	1,917,872	3,957,690	6,261,428	7,691,939	8,618,243	9,221,650	9,872,251	10,309,432	10,614,263	10,855,040	10,882,438	10,903,850	10,917,234	10,944,508
1997	0	285,939	1,480,382	3,010,941	4,637,435	5,388,743	5,933,247	6,394,445	6,724,111	6,985,810	7,083,900	7,107,744	7,169,855	7,213,746	7,236,286	7,236,286
1998	0	188,031	1,721,627	3,069,477	5,166,683	6,325,951	7,151,961	7,885,122	8,374,901	8,627,121	8,716,317	8,937,846	9,352,153	9,352,153	9,576,263	9,576,263
1999	0	303,212	1,554,888	3,280,622	5,552,611	7,185,959	8,302,532	8,847,362	9,326,677	9,689,049	10,171,145	10,528,995	10,708,829	10,910,400	11,144,486	11,163,256
2000	0	143,357	1,144,391	2,828,568	4,484,828	5,476,576	6,198,869	6,574,193	6,930,347	7,349,679	7,763,083	7,899,420	7,938,051	7,966,269	8,040,394	8,040,394
2001	0	436,581	2,612,580	5,495,160	7,726,220	9,382,352	10,569,333	11,164,996	11,958,352	12,688,751	13,620,565	13,961,731	14,224,955	14,471,349	14,765,794	14,802,823
2002	0	961,445	4,431,164	7,626,706	10,056,121	11,492,948	12,996,295	14,421,286	15,781,075	17,385,554	18,513,623	19,779,810	20,069,503	20,670,523	21,469,652	21,658,814
2003	0	1,160,691	4,327,502	7,048,101	9,074,214	11,576,293	14,699,100	18,384,766	21,454,396	24,541,208	27,077,653	28,380,968	29,310,075	30,754,763	31,149,581	31,434,554
2004	197,201	1,546,623	4,463,039	7,983,637	11,762,245	16,135,447	21,993,744	26,419,305	30,962,524	33,979,276	36,320,917	38,433,031	40,312,052	40,760,202	41,393,099	41,393,099
2005	0	2,288,062	7,283,794	12,162,302	17,415,301	23,091,528	27,131,008	30,033,644	33,865,334	36,028,040	38,278,087	39,809,627	40,839,842	40,896,611	40,982,952	41,013,398
2006	167,017	4,916,149	12,087,120	20,879,206	28,162,705	33,484,936	39,085,354	43,913,596	47,454,262	50,069,727	51,872,043	53,541,053	54,321,444	54,507,112	54,702,246	54,702,246
2007	98,263	3,338,993	11,880,508	20,723,509	26,448,871	34,787,718	42,644,922	47,086,563	50,099,917	53,401,590	55,219,574	56,468,482	57,089,256	57,316,436	57,332,825	57,332,825
2008	180,714	5,234,215	22,361,687	40,250,374	62,027,067	92,210,667	109,176,343	120,310,152	129,754,307	136,617,793	138,650,849	140,805,257	141,996,081	142,258,780	142,380,021	142,428,580
2009	310,239	7,951,664	19,906,891	40,297,100	72,956,366	93,542,007	112,583,654	125,598,636	132,895,222	137,121,743	139,616,393	141,339,238	142,347,327	142,538,950	142,648,912	142,715,645
2010	0	2,258,486	11,925,548	28,659,201	41,776,948	54,644,747	65,931,187	72,526,102	76,386,165	78,130,495	79,586,363	79,661,720	79,970,100	80,563,382	80,907,462	80,925,735
2011	0	2,539,877	8,759,349	15,172,721	23,082,910	29,986,370	34,156,784	36,814,948	37,593,841	38,297,961	38,363,246	38,566,856	39,060,949	39,250,931	39,341,898	39,362,985
2012	61,140	1,576,834	4,917,194	9,585,634	14,480,843	18,192,414	20,450,859	21,781,922	22,805,403	22,978,456	23,327,126	24,158,282	24,533,616	24,760,011	24,938,588	24,955,088
2013	0	99,333	1,789,192	4,162,071	7,371,235	9,237,514	10,910,363	12,194,470	12,805,941	13,066,512	13,642,714	14,208,108	14,587,396	14,893,579	14,972,341	15,012,543
2014	0	345,717	1,176,251	3,236,512	5,325,343	6,154,688	6,643,088	6,812,932	7,173,091	7,429,122	7,761,946	8,109,846	8,235,813	8,331,661	8,361,172	8,372,161
2015	0	370,298	1,541,241	3,021,691	4,128,204	4,979,850	5,339,803	5,833,051	6,570,993	6,959,766	7,380,101	7,668,117	7,888,708	8,085,772	8,153,449	8,196,203
2016	0	97,395	1,384,546	2,604,889	3,656,255	4,615,958	5,161,475	6,600,225	7,643,190	8,409,415	9,031,529	9,587,170	9,894,335	10,055,206	10,109,028	10,113,185
2017	0	216,270	1,159,756	1,838,295	2,373,069	3,364,297	5,753,356	7,180,790	8,097,449	8,760,441	9,294,599	9,598,736	9,970,566	10,198,822	10,306,679	10,331,617
2018	0	251,501	755,793	1,215,917	2,163,064	5,130,829	6,492,740	7,929,604	9,136,203	9,948,486	10,497,420	10,760,467	11,045,919	11,170,321	11,231,964	11,231,964
2019	0	20,348	388,635	1,216,420	3,386,684	5,144,008	7,115,974	8,356,047	8,912,438	9,546,511	9,769,910	10,054,964	10,312,288	10,575,212	10,627,673	10,627,673
2020	0	0	818,459	2,052,920	3,726,926	4,884,818	5,791,913	6,214,895	6,652,501	6,900,831	7,245,985	7,521,512	7,720,136	7,732,209	7,743,223	7,764,147
2021	0	412,623	1,755,349	3,402,502	4,937,399	6,425,703	7,143,337	8,075,335	8,527,738	8,832,055	9,095,876	9,243,893	9,487,639	9,487,639	9,506,069	9,526,139

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
FRM15

Table 15: Cumulative Loss Severity = Table 14/Table 13
Loss Severity for Each Evaluation Year

	Evaluation Year															
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1990	0.00%	62.52%	59.66%	62.45%	64.64%	68.28%	69.69%	68.94%	68.61%	68.05%	67.55%	67.33%	67.24%	67.11%	67.12%	67.12%
1991	34.42%	49.38%	54.25%	58.88%	65.88%	68.74%	67.94%	66.98%	66.30%	65.91%	65.56%	65.39%	65.26%	65.19%	64.72%	64.67%
1992	0.00%	46.00%	46.99%	56.92%	60.78%	60.18%	58.58%	57.36%	56.78%	56.48%	56.16%	56.07%	55.96%	56.03%	56.11%	56.11%
1993	0.00%	53.80%	60.67%	57.46%	53.62%	50.18%	49.39%	48.55%	47.94%	47.61%	47.35%	47.32%	47.15%	47.17%	47.24%	47.21%
1994	29.41%	52.35%	55.02%	49.61%	45.60%	44.08%	43.34%	42.92%	42.73%	42.53%	42.48%	42.53%	42.65%	42.75%	42.76%	42.77%
1995	34.87%	29.86%	34.19%	35.91%	36.03%	35.83%	34.98%	35.10%	34.54%	34.53%	34.57%	35.03%	35.11%	35.28%	35.19%	35.19%
1996	0.00%	43.01%	37.98%	36.41%	38.72%	37.47%	36.20%	35.86%	36.20%	36.67%	36.96%	37.30%	37.34%	37.34%	37.28%	37.34%
1997	0.00%	35.97%	34.61%	36.80%	38.50%	37.84%	38.20%	38.62%	37.70%	37.59%	37.70%	37.79%	37.90%	37.92%	37.77%	37.77%
1998	0.00%	37.15%	33.79%	33.30%	33.90%	33.94%	33.78%	34.29%	35.05%	35.30%	35.33%	35.60%	36.40%	36.38%	36.85%	36.80%
1999	0.00%	38.59%	30.67%	32.74%	32.72%	33.21%	34.14%	34.77%	35.50%	35.75%	36.39%	36.95%	37.09%	37.34%	37.48%	37.43%
2000	0.00%	34.36%	37.58%	34.65%	36.27%	38.20%	39.15%	39.47%	40.27%	40.94%	41.83%	42.14%	42.12%	41.96%	41.93%	41.68%
2001	0.00%	28.05%	34.78%	36.97%	37.69%	38.61%	39.81%	40.37%	40.80%	41.41%	42.63%	43.11%	43.11%	43.05%	43.17%	42.62%
2002	0.00%	42.31%	40.01%	40.09%	38.82%	39.20%	40.81%	42.20%	43.26%	44.25%	45.09%	45.60%	45.33%	45.01%	45.18%	45.31%
2003	0.00%	35.61%	40.20%	40.35%	41.29%	42.12%	44.38%	46.85%	47.94%	49.36%	48.76%	46.91%	46.34%	46.05%	45.78%	45.90%
2004	33.42%	38.22%	38.22%	41.46%	44.31%	47.34%	49.83%	51.30%	51.68%	51.33%	50.48%	50.59%	50.20%	50.04%	50.04%	50.03%
2005	0.00%	36.38%	40.78%	43.58%	45.29%	47.59%	48.77%	49.71%	50.24%	49.61%	49.74%	49.53%	49.63%	49.28%	49.24%	49.20%
2006	43.88%	46.74%	50.25%	52.71%	53.91%	55.42%	56.60%	56.60%	56.37%	56.15%	55.84%	56.07%	56.03%	55.91%	55.89%	55.89%
2007	44.15%	53.27%	58.17%	60.82%	62.32%	63.43%	62.05%	61.58%	61.22%	60.95%	60.39%	60.52%	60.36%	60.30%	60.28%	60.28%
2008	41.83%	47.87%	56.41%	59.72%	61.00%	60.20%	59.55%	59.22%	59.15%	59.13%	59.11%	59.07%	59.08%	59.11%	59.12%	59.13%
2009	50.97%	57.27%	60.76%	62.01%	57.62%	55.32%	54.62%	54.46%	54.59%	54.62%	54.60%	54.69%	54.72%	54.73%	54.71%	54.72%
2010	0.00%	54.32%	59.86%	55.53%	52.17%	51.01%	51.59%	51.89%	51.97%	51.88%	51.84%	51.77%	51.82%	51.93%	51.98%	51.98%
2011	0.00%	61.49%	53.06%	47.37%	47.10%	47.82%	48.18%	48.71%	47.60%	47.78%	47.68%	47.76%	47.81%	47.83%	47.84%	47.85%
2012	58.88%	47.39%	42.25%	42.80%	43.40%	43.88%	44.97%	44.99%	45.72%	45.58%	45.86%	46.19%	46.34%	46.39%	46.52%	46.50%
2013	0.00%	10.32%	39.93%	44.08%	48.69%	49.48%	50.22%	50.74%	51.81%	51.93%	51.60%	52.17%	52.30%	52.53%	52.62%	52.58%
2014	0.00%	39.94%	43.54%	43.90%	46.82%	47.06%	47.10%	46.89%	47.36%	46.92%	46.99%	47.28%	47.06%	47.03%	46.99%	47.03%
2015	0.00%	52.28%	56.18%	58.19%	56.21%	54.58%	55.12%	55.19%	56.34%	56.22%	55.68%	56.31%	56.72%	56.94%	56.77%	56.86%
2016	0.00%	22.48%	50.13%	51.59%	51.75%	54.61%	53.74%	55.33%	55.58%	56.16%	56.70%	57.39%	57.44%	57.57%	57.68%	57.69%
2017	0.00%	32.37%	40.31%	45.78%	47.86%	50.39%	50.39%	51.21%	51.34%	51.41%	51.20%	50.61%	50.77%	50.99%	51.11%	51.17%
2018	0.00%	41.62%	46.11%	49.97%	52.72%	55.79%	53.92%	53.85%	54.55%	53.52%	54.10%	53.77%	53.82%	53.95%	53.97%	53.97%
2019	0.00%	9.92%	59.89%	70.46%	57.67%	55.72%	56.11%	55.05%	53.84%	54.11%	53.90%	53.96%	54.24%	54.46%	54.57%	54.57%
2020	0.00%	0.00%	59.53%	62.32%	60.07%	57.74%	58.34%	58.15%	58.19%	58.06%	58.12%	58.77%	58.77%	58.81%	58.80%	58.82%
2021	0.00%	62.62%	55.67%	55.32%	57.52%	60.65%	58.87%	59.09%	60.05%	60.16%	59.16%	59.30%	59.64%	59.64%	59.69%	59.70%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Active Loans
ARM

Table 1: Number of Loans Active at the End of Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1990	6,596	6,454	6,064	5,399	4,678	4,227	3,622	3,134	2,538	2,078	1,782	1,427	1,123	870	704	599	492	434	404	378	360	345	332	318	305	277	261	242	211	173	23
1991	29,312	28,776	26,865	24,241	22,186	19,161	16,499	13,233	10,501	9,008	7,040	5,313	3,924	3,066	2,553	2,042	1,746	1,587	1,464	1,394	1,340	1,284	1,224	1,171	1,111	1,034	952	858	781	657	67
1992	91,048	87,694	80,783	73,926	62,864	53,823	41,985	32,734	27,836	21,688	16,369	11,935	9,391	7,763	6,455	5,471	4,844	4,529	4,275	4,084	3,903	3,691	3,484	3,254	3,007	2,784	2,516	2,224	1,983	1,534	127
1993	115,416	109,563	102,198	87,644	75,669	59,146	45,951	39,121	29,173	21,360	14,996	11,329	9,100	7,489	6,269	5,595	5,202	4,925	4,722	4,528	4,315	4,087	3,841	3,562	3,292	3,010	2,682	2,421	2,049	1,758	163
1994	182,416	174,900	154,513	133,565	102,894	79,919	68,044	51,134	37,644	26,364	19,625	15,495	12,531	10,413	9,227	8,623	8,182	7,840	7,542	7,190	6,820	6,423	5,987	5,537	5,056	4,611	4,265	3,776	3,462	2,990	291
1995	124,995	112,383	94,193	61,706	44,635	37,101	27,051	19,653	13,878	10,182	7,739	6,033	4,949	4,383	4,129	3,930	3,782	3,657	3,476	3,318	3,143	2,946	2,762	2,529	2,324	2,150	1,945	1,816	1,703	1,484	132
1996	184,910	172,247	114,757	75,373	60,647	40,904	29,025	20,404	14,810	11,277	8,852	7,145	6,216	5,777	5,443	5,217	5,004	4,772	4,510	4,251	3,978	3,689	3,443	3,197	2,983	2,711	2,547	2,419	2,246	1,980	348
1997	240,742	199,702	131,391	103,195	62,548	43,564	30,315	22,027	16,710	12,851	10,233	8,861	8,222	7,740	7,425	7,136	6,801	6,425	6,060	5,652	5,224	4,853	4,499	4,176	3,855	3,580	3,385	3,191	2,967	2,622	276
1998	96,737	71,704	58,202	36,560	25,305	17,449	12,421	9,131	6,877	5,293	4,453	4,066	3,826	3,642	3,466	3,261	3,075	2,913	2,711	2,517	2,343	2,160	2,011	1,864	1,747	1,649	1,525	1,404	1,286	1,095	24
1999	62,340	58,800	39,020	26,298	17,849	12,903	9,204	6,625	4,794	3,915	3,550	3,288	3,122	2,955	2,757	2,582	2,414	2,222	2,041	1,880	1,734	1,590	1,451	1,355	1,273	1,184	1,102	1,005	938	839	185
2000	67,297	47,565	33,733	23,538	17,433	12,579	9,093	6,574	5,295	4,777	4,409	4,198	3,955	3,653	3,412	3,177	2,908	2,656	2,415	2,199	2,016	1,809	1,685	1,590	1,488	1,367	1,263	1,167	1,086	958	39
2001	27,305	21,100	14,967	10,916	7,408	5,013	3,388	2,708	2,378	2,185	2,039	1,920	1,773	1,637	1,508	1,386	1,241	1,123	1,021	941	836	760	705	657	611	558	514	475	423	360	57
2002	86,132	60,223	45,096	30,791	20,498	13,345	10,189	8,938	8,082	7,526	7,008	6,400	5,901	5,393	4,902	4,439	3,964	3,560	3,242	2,855	2,647	2,483	2,299	2,108	1,931	1,757	1,617	1,485	1,358	1,190	76
2003	56,235	40,765	27,326	17,613	11,283	8,387	7,315	6,546	6,076	5,650	5,127	4,735	4,338	3,893	3,433	3,055	2,684	2,442	2,159	1,979	1,825	1,691	1,541	1,397	1,272	1,159	1,057	954	876	739	3
2004	90,708	62,693	41,944	27,150	20,434	17,703	16,007	14,991	13,936	12,700	11,692	10,703	9,668	8,676	7,734	6,916	6,281	5,561	5,124	4,769	4,397	4,028	3,667	3,350	3,062	2,808	2,582	2,364	2,135	1,657	10
2005	46,671	34,539	25,747	19,663	17,144	15,461	14,445	13,458	12,198	11,164	10,119	9,090	8,109	7,154	6,286	5,676	5,015	4,634	4,346	4,063	3,684	3,393	3,132	2,886	2,660	2,441	2,245	2,061	1,885	1,512	3
2006	10,156	8,436	6,683	5,355	4,623	4,239	3,850	3,447	3,144	2,868	2,567	2,293	2,035	1,801	1,616	1,414	1,307	1,239	1,139	1,046	958	877	805	741	704	657	603	547	503	367	0
2007	4,581	3,908	3,001	2,371	2,085	1,826	1,551	1,426	1,295	1,165	1,022	914	820	755	671	628	595	552	503	468	441	418	380	352	323	305	292	260	235	189	0
2008	12,189	9,144	7,285	5,999	4,918	3,722	3,117	2,705	2,363	2,058	1,811	1,595	1,435	1,225	1,136	1,061	970	894	801	723	661	601	551	501	453	401	365	332	302	253	3
2009	14,438	10,750	9,093	7,858	6,189	5,263	4,582	3,963	3,431	2,907	2,457	2,126	1,784	1,590	1,461	1,297	1,151	993	889	788	700	637	573	512	461	402	357	313	283	209	5
2010	46,998	41,958	38,510	32,175	26,767	21,766	18,346	15,484	12,982	10,728	9,153	7,552	6,783	6,161	5,531	4,854	4,273	3,768	3,330	2,915	2,581	2,307	2,058	1,821	1,611	1,412	1,243	1,102	988	816	1
2011	50,916	45,943	37,718	30,928	23,911	18,603	15,261	12,596	10,208	8,550	7,058	6,214	5,557	4,926	4,362	3,796	3,305	2,881	2,550	2,287	2,032	1,777	1,561	1,383	1,226	1,092	964	845	739	605	1
2012	20,362	16,659	13,548	10,405	7,783	5,960	4,839	3,845	3,202	2,647	2,319	2,073	1,845	1,630	1,417	1,246	1,085	953	833	729	644	586	512	456	403	368	328	297	259	194	1
2013	9,315	7,853	6,197	4,684	3,504	2,668	2,032	1,618	1,305	1,127	998	874	755	655	566	491	441	381	339	287	251	219	182	160	141	122	108	93	86	73	1
2014	19,316	13,195	9,143	6,600	4,949	3,555	2,647	2,014	1,730	1,520	1,351	1,189	1,059	926	818	728	641	578	513	451	403	354	307	276	244	220	193	170	146	123	1
2015	12,760	8,868	6,469	4,806	3,565	2,484	1,768	1,488	1,248	1,066	922	788	697	605	536	479	422	368	311	270	236	198	171	148	132	120	110	96	78	65	1
2016	4,651	3,428	2,699	2,117	1,492	954	758	635	531	441	358	314	269	237	202	176	155	136	120	95	85	69	62	53	46	41	37	33	31	21	0
2017	3,796	3,222	2,660	1,887	1,138	929	762	626	522	442	376	324	280	251	221	192	162	137	115	103	94	80	68	61	55	53	45	40	36	31	0
2018	3,802	3,099	2,156	1,269	1,020	859	697	557	482	409	352	302	260	237	206	178	158	141	124	115	102	90	77	69	62	56	48	42	40	30	0
2019	3,410	2,078	1,190	930	773	624	516	436	351	304	261	220	194	165	144	132	117	100	89	76	66	58	50	44	39	37	36	30	27	23	0
2020	345	191	146	106	90	64	53	41	33	30	23	18	16	14	12	11	10	7	4	3	2	2	2	2	1	1	1	0	0	0	0
2021	165	127	94	71	50	36	26	21	17	14	10	9	8	8	6	6	6	6	6	6	5	5	5	5	5	4	3	1	1	1	0

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Claim Rate
ARM

Table 2: Number of Claims in Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0	14	43	67	77	57	73	72	55	30	26	11	6	6	3	1	1	1	0	0	2	1	0	0	2	0	1	0	1	0
1991	1	24	173	250	298	322	384	329	219	160	78	40	24	21	10	7	2	3	3	9	2	9	5	2	3	7	6	2	1	0
1992	1	122	536	783	1,040	1,272	1,075	710	481	224	132	103	52	23	17	10	12	22	17	11	13	20	18	15	21	7	8	7	1	0
1993	4	199	778	1,353	2,016	1,686	1,202	765	374	223	178	79	38	24	27	17	20	25	17	20	23	20	22	22	16	9	7	3	1	1
1994	6	378	1,783	3,386	3,504	2,607	1,556	787	493	366	191	86	60	33	35	36	58	44	38	50	42	31	35	26	20	13	6	1	3	1
1995	8	352	1,877	2,876	2,545	1,425	807	541	475	257	120	83	37	41	39	52	40	31	47	37	38	47	35	26	16	7	0	2	3	4
1996	4	538	2,699	4,009	2,811	1,654	1,168	974	486	224	145	86	110	90	86	76	73	79	67	74	84	51	21	26	8	1	3	10	5	2
1997	9	851	3,435	4,011	2,955	2,180	1,723	835	425	253	179	162	145	171	117	125	120	104	111	113	70	43	28	16	4	8	6	11	6	9
1998	16	672	1,421	1,330	1,085	846	477	241	150	97	92	87	79	62	82	71	55	42	66	30	23	14	4	4	3	6	5	6	4	3
1999	2	96	513	777	935	536	278	152	105	84	97	97	76	86	86	53	51	39	37	23	10	3	2	3	1	3	4	9	3	5
2000	3	270	781	1,118	723	457	293	218	217	174	154	126	125	135	82	66	59	59	24	22	9	2	5	8	7	6	4	5	5	2
2001	0	57	309	306	203	149	125	103	127	95	82	60	69	42	32	32	16	8	7	2	1	1	5	4	5	4	3	2	2	1
2002	2	212	972	892	765	620	633	529	491	347	331	306	204	157	146	83	49	27	11	2	6	9	20	6	13	9	11	3	6	2
2003	4	267	663	606	561	582	461	422	296	279	263	156	99	93	68	30	19	12	4	2	15	12	10	7	7	1	2	8	2	3
2004	59	627	1,242	1,392	1,515	1,306	1,015	693	724	703	438	319	268	158	102	60	33	7	19	21	38	26	27	27	25	11	6	7	11	6
2005	35	459	980	1,305	1,244	1,098	748	704	719	510	417	279	174	119	66	42	9	12	32	25	36	24	18	22	15	16	12	12	8	6
2006	5	133	306	444	466	296	288	212	161	119	110	63	39	28	13	6	6	13	15	11	6	5	10	4	4	2	1	2	3	0
2007	1	59	196	276	190	167	149	76	59	60	48	26	22	4	1	3	2	6	9	4	2	2	5	2	1	1	4	3	3	1
2008	1	93	397	511	469	506	390	201	139	104	48	34	12	6	4	10	16	14	11	8	7	6	4	2	9	4	0	2	2	0
2009	12	152	339	409	555	432	256	222	138	81	48	39	12	13	12	8	7	10	6	10	8	4	2	2	3	3	0	2	0	1
2010	20	236	596	1,055	1,071	724	578	359	264	165	85	28	26	38	43	33	18	24	17	30	17	15	13	5	12	7	5	7	4	3
2011	10	192	540	594	522	372	280	194	113	64	9	30	62	36	30	24	30	18	20	16	16	10	13	8	9	6	5	7	1	1
2012	7	98	153	126	141	102	79	47	21	5	12	18	15	8	9	12	14	9	11	5	4	3	5	0	2	0	3	1	0	3
2013	3	16	32	47	34	37	23	11	2	8	5	8	7	6	2	5	2	3	3	1	1	4	2	3	1	0	0	0	1	1
2014	0	19	53	76	50	47	30	4	19	25	17	16	19	14	14	5	6	2	5	3	3	6	3	1	0	0	0	0	2	1
2015	0	11	38	30	26	19	5	7	23	21	10	14	9	12	5	4	6	7	5	1	3	6	2	1	0	3	0	0	0	0
2016	0	2	7	12	7	2	8	9	13	6	7	6	9	4	2	4	2	0	1	0	2	0	1	2	0	1	0	0	0	0
2017	0	2	5	7	2	11	13	23	13	8	7	7	1	3	3	2	3	2	1	2	1	0	0	0	0	0	0	0	0	0
2018	0	7	8	3	18	35	30	23	7	15	11	3	13	4	3	3	5	1	0	1	2	0	0	2	0	0	0	0	0	0
2019	0	3	4	17	26	19	19	10	14	7	6	4	3	6	5	2	1	0	2	2	1	1	0	0	1	0	0	0	0	0
2020	0	0	5	5	2	4	1	1	1	0	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	2	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3: Conditional Claim Rate = Table 2 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Claim During the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.00%	0.22%	0.71%	1.24%	1.65%	1.35%	2.02%	2.30%	2.17%	1.44%	1.46%	0.77%	0.53%	0.69%	0.43%	0.17%	0.20%	0.23%	0.00%	0.00%	0.56%	0.29%	0.00%	0.00%	0.66%	0.00%	0.38%	0.00%	0.47%	0.00%
1991	0.00%	0.08%	0.64%	1.03%	1.34%	1.68%	2.33%	2.49%	2.09%	1.78%	1.11%	0.75%	0.61%	0.68%	0.39%	0.34%	0.11%	0.19%	0.20%	0.65%	0.15%	0.70%	0.41%	0.17%	0.27%	0.68%	0.63%	0.23%	0.13%	0.00%
1992	0.00%	0.14%	0.66%	1.06%	1.65%	2.36%	2.56%	2.17%	1.73%	1.03%	0.81%	0.86%	0.55%	0.30%	0.26%	0.18%	0.25%	0.49%	0.40%	0.27%	0.33%	0.54%	0.52%	0.46%	0.70%	0.25%	0.32%	0.31%	0.05%	0.00%
1993	0.00%	0.18%	0.76%	1.54%	2.66%	2.85%	2.62%	1.96%	1.28%	1.04%	1.19%	0.70%	0.42%	0.32%	0.43%	0.30%	0.38%	0.51%	0.36%	0.44%	0.53%	0.49%	0.57%	0.62%	0.49%	0.30%	0.26%	0.12%	0.05%	0.06%
1994	0.00%	0.22%	1.15%	2.54%	3.41%	3.26%	2.29%	1.54%	1.31%	1.39%	0.97%	0.56%	0.48%	0.32%	0.38%	0.42%	0.71%	0.56%	0.50%	0.70%	0.62%	0.48%	0.58%	0.47%	0.40%	0.28%	0.14%	0.03%	0.09%	0.03%
1995	0.01%	0.31%	1.99%	4.66%	5.70%	3.84%	2.98%	2.75%	3.42%	2.52%	1.55%	1.38%	0.75%	0.94%	0.94%	1.32%	1.06%	0.85%	1.35%	1.12%	1.21%	1.60%	1.27%	1.03%	0.69%	0.33%	0.00%	0.11%	0.18%	0.27%
1996	0.00%	0.31%	2.35%	5.32%	4.64%	4.04%	4.02%	4.77%	3.28%	1.99%	1.64%	1.20%	1.77%	1.56%	1.58%	1.46%	1.46%	1.66%	1.49%	1.74%	2.11%	1.38%	0.61%	0.81%	0.27%	0.04%	0.12%	0.41%	0.22%	0.10%
1997	0.00%	0.43%	2.61%	3.89%	4.72%	5.00%	5.68%	3.79%	2.54%	1.97%	1.75%	1.83%	1.76%	2.21%	1.58%	1.75%	1.76%	1.62%	1.83%	2.00%	1.34%	0.89%	0.62%	0.38%	0.10%	0.22%	0.18%	0.34%	0.20%	0.34%
1998	0.02%	0.94%	2.44%	3.64%	4.29%	4.85%	3.84%	2.64%	2.18%	1.83%	2.07%	2.14%	2.06%	1.70%	2.37%	2.18%	1.79%	1.44%	2.43%	1.19%	0.98%	0.65%	0.20%	0.21%	0.17%	0.36%	0.33%	0.43%	0.31%	0.27%
1999	0.00%	0.16%	1.31%	2.95%	5.24%	4.15%	3.02%	2.29%	2.19%	2.15%	2.73%	2.95%	2.43%	2.91%	3.12%	2.05%	2.11%	1.76%	1.81%	1.22%	0.58%	0.19%	0.14%	0.22%	0.08%	0.25%	0.36%	0.90%	0.32%	0.60%
2000	0.00%	0.57%	2.32%	4.75%	4.15%	3.63%	3.22%	3.32%	4.10%	3.64%	3.49%	3.00%	3.16%	3.70%	2.40%	2.08%	2.03%	2.22%	0.99%	1.00%	0.45%	0.11%	0.30%	0.50%	0.47%	0.44%	0.32%	0.43%	0.46%	0.21%
2001	0.00%	0.27%	2.06%	2.80%	2.74%	2.97%	3.69%	3.80%	5.34%	4.35%	4.02%	3.13%	3.89%	2.57%	2.12%	2.31%	1.29%	0.71%	0.69%	0.21%	0.12%	0.13%	0.71%	0.61%	0.82%	0.72%	0.58%	0.42%	0.47%	0.28%
2002	0.00%	0.35%	2.16%	2.90%	3.73%	4.65%	6.21%	5.92%	6.08%	4.61%	4.72%	4.78%	3.46%	2.91%	2.98%	1.87%	1.24%	0.76%	0.34%	0.07%	0.23%	0.36%	0.87%	0.28%	0.67%	0.51%	0.68%	0.20%	0.44%	0.17%
2003	0.01%	0.65%	2.43%	3.44%	4.97%	6.94%	6.30%	6.45%	4.87%	4.94%	5.13%	3.29%	2.28%	2.39%	1.98%	0.98%	0.71%	0.49%	0.19%	0.10%	0.82%	0.71%	0.65%	0.50%	0.55%	0.09%	0.19%	0.84%	0.23%	0.41%
2004	0.07%	1.00%	2.96%	5.13%	7.41%	7.38%	6.34%	4.62%	5.20%	5.54%	3.75%	2.98%	2.77%	1.82%	1.32%	0.87%	0.53%	0.13%	0.37%	0.44%	0.86%	0.65%	0.74%	0.81%	0.82%	0.39%	0.23%	0.30%	0.52%	0.36%
2005	0.07%	1.33%	3.81%	6.64%	7.26%	7.10%	5.18%	5.23%	5.89%	4.57%	4.12%	3.07%	2.15%	1.66%	1.05%	0.74%	0.18%	0.26%	0.74%	0.62%	0.98%	0.71%	0.57%	0.76%	0.56%	0.66%	0.53%	0.58%	0.42%	0.40%
2006	0.05%	1.58%	4.58%	8.29%	10.08%	6.98%	7.48%	6.15%	5.12%	4.15%	4.29%	2.75%	1.92%	1.55%	0.80%	0.42%	0.46%	1.05%	1.32%	1.05%	0.63%	0.57%	1.24%	0.54%	0.57%	0.30%	0.17%	0.37%	0.60%	0.00%
2007	0.02%	1.51%	6.53%	11.64%	9.11%	9.15%	9.61%	5.33%	4.56%	5.15%	4.70%	2.84%	2.68%	0.53%	0.15%	0.48%	0.34%	1.09%	1.79%	0.85%	0.45%	0.48%	1.32%	0.57%	0.31%	0.33%	1.37%	1.15%	1.28%	0.53%
2008	0.01%	1.02%	5.45%	8.52%	9.54%	13.59%	12.51%	7.43%	5.88%	5.05%	2.65%	2.13%	0.84%	0.49%	0.35%	0.94%	1.65%	1.57%	1.37%	1.11%	1.06%	1.00%	0.73%	0.40%	1.99%	1.00%	0.00%	0.60%	0.66%	0.00%
2009	0.08%	1.41%	3.73%	5.20%	8.97%	8.21%	5.59%	5.60%	4.02%	2.79%	1.95%	1.83%	0.67%	0.82%	0.82%	0.62%	0.61%	1.01%	0.67%	1.27%	1.14%	0.63%	0.35%	0.39%	0.65%	0.75%	0.00%	0.64%	0.00%	0.48%
2010	0.04%	0.56%	1.55%	3.28%	4.00%	3.33%	3.15%	2.32%	2.03%	1.54%	0.93%	0.37%	0.38%	0.62%	0.78%	0.68%	0.42%	0.64%	0.51%	1.03%	0.66%	0.65%	0.63%	0.27%	0.74%	0.50%	0.40%	0.64%	0.40%	0.37%
2011	0.02%	0.42%	1.43%	1.92%	2.18%	2.00%	1.83%	1.54%	1.11%	0.75%	0.13%	0.48%	1.12%	0.73%	0.69%	0.63%	0.91%	0.62%	0.78%	0.70%	0.79%	0.56%	0.83%	0.58%	0.73%	0.55%	0.52%	0.83%	0.14%	0.17%
2012	0.03%	0.59%	1.13%	1.21%	1.81%	1.71%	1.63%	1.22%	0.66%	0.19%	0.52%	0.87%	0.81%	0.49%	0.64%	0.96%	1.29%	0.94%	1.32%	0.69%	0.62%	0.51%	0.98%	0.00%	0.50%	0.00%	0.91%	0.34%	0.00%	1.55%
2013	0.03%	0.20%	0.52%	1.00%	0.97%	1.39%	1.13%	0.68%	0.15%	0.71%	0.50%	0.92%	0.93%	0.92%	0.35%	1.02%	0.45%	0.79%	0.88%	0.35%	0.40%	1.83%	1.10%	1.88%	0.71%	0.00%	0.00%	0.00%	1.16%	1.37%
2014	0.00%	0.14%	0.58%	1.15%	1.01%	1.32%	1.13%	0.20%	1.10%	1.64%	1.26%	1.35%	1.79%	1.51%	1.71%	0.69%	0.94%	0.35%	0.97%	0.67%	0.74%	1.69%	0.98%	0.36%	0.00%	0.00%	0.00%	0.00%	1.37%	0.81%
2015	0.00%	0.12%	0.59%	0.62%	0.73%	0.76%	0.28%	0.47%	1.84%	1.97%	1.08%	1.78%	1.29%	1.98%	0.93%	0.84%	1.42%	1.90%	1.61%	0.37%	1.27%	3.03%	1.17%	0.68%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%
2016	0.00%	0.06%	0.26%	0.57%	0.47%	0.21%	1.06%	1.42%	2.45%	1.36%	1.96%	1.91%	3.35%	1.69%	0.99%	2.27%	1.29%	0.00%	0.83%	0.00%	2.35%	0.00%	1.61%	3.77%	0.00%	2.44%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.06%	0.19%	0.37%	0.18%	1.18%	1.71%	3.67%	2.49%	1.81%	1.86%	2.16%	0.36%	1.20%	1.36%	1.04%	1.85%	1.46%	0.87%	1.94%	1.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2018	0.00%	0.23%	0.37%	0.24%	1.76%	4.07%	4.30%	4.13%	1.45%	3.67%	3.13%	0.99%	5.00%	1.69%	1.46%	1.69%	3.16%	0.71%	0.00%	0.87%	1.96%	0.00%	0.00%	2.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2019	0.00%	0.14%	0.34%	1.83%	3.36%	3.04%	3.68%	2.29%	3.99%	2.30%	2.30%	1.82%	1.55%	3.64%	3.47%	1.52%	0.85%	0.00%	2.25%	2.63%	1.52%	1.72%	0.00%	0.00%	2.56%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	3.42%	4.72%	2.22%	6.25%	1.89%	2.44%	3.03%	0.00%	8.70%	5.56%	0.00%	0.00%	0.00%	0.00%	10.00%	14.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2021	0.00%	0.00%	0.00%	2.82%	2.00%	2.78%	3.85%	4.76%	0.00%	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Claim Rate
ARM

Table 4: Cumulative Number of Claims as of Each Evaluation Year
Total Number of Claims for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0	14	57	124	201	258	331	403	458	488	514	525	531	537	540	541	542	543	543	543	545	546	546	546	548	548	549	549	550	550
1991	1	25	198	448	746	1,068	1,452	1,781	2,000	2,160	2,238	2,278	2,302	2,323	2,333	2,340	2,342	2,345	2,348	2,357	2,359	2,368	2,373	2,375	2,378	2,385	2,391	2,393	2,394	2,394
1992	1	123	659	1,442	2,482	3,754	4,829	5,539	6,020	6,244	6,376	6,479	6,531	6,554	6,571	6,581	6,593	6,615	6,632	6,643	6,656	6,676	6,694	6,709	6,730	6,737	6,745	6,752	6,753	6,753
1993	4	203	981	2,334	4,350	6,036	7,238	8,003	8,377	8,600	8,778	8,857	8,895	8,919	8,946	8,963	8,983	9,008	9,025	9,045	9,068	9,088	9,110	9,132	9,148	9,157	9,164	9,167	9,168	9,169
1994	6	384	2,167	5,553	9,057	11,664	13,220	14,007	14,500	14,866	15,057	15,143	15,203	15,236	15,271	15,307	15,365	15,409	15,447	15,497	15,539	15,570	15,605	15,631	15,651	15,664	15,670	15,671	15,674	15,675
1995	8	360	2,237	5,113	7,658	9,083	9,890	10,431	10,906	11,163	11,283	11,366	11,403	11,444	11,483	11,535	11,575	11,606	11,653	11,690	11,728	11,775	11,810	11,836	11,852	11,859	11,859	11,861	11,864	11,868
1996	4	542	3,241	7,250	10,061	11,715	12,883	13,857	14,343	14,567	14,712	14,798	14,908	14,998	15,084	15,160	15,233	15,312	15,379	15,453	15,537	15,588	15,609	15,635	15,643	15,644	15,647	15,657	15,662	15,664
1997	9	860	4,295	8,306	11,261	13,441	15,164	15,999	16,424	16,677	16,856	17,018	17,163	17,334	17,451	17,576	17,696	17,800	17,911	18,024	18,094	18,137	18,165	18,181	18,185	18,193	18,199	18,210	18,216	18,225
1998	16	688	2,109	3,439	4,524	5,370	5,847	6,088	6,238	6,335	6,427	6,514	6,593	6,655	6,737	6,808	6,863	6,905	6,971	7,001	7,024	7,038	7,042	7,046	7,049	7,055	7,060	7,066	7,070	7,073
1999	2	98	611	1,388	2,323	2,859	3,137	3,289	3,394	3,478	3,575	3,672	3,748	3,834	3,920	3,973	4,024	4,063	4,100	4,123	4,133	4,136	4,138	4,141	4,142	4,145	4,149	4,158	4,161	4,166
2000	3	273	1,054	2,172	2,895	3,352	3,645	3,863	4,080	4,254	4,408	4,534	4,659	4,794	4,876	4,942	5,001	5,060	5,084	5,106	5,115	5,117	5,122	5,130	5,137	5,143	5,147	5,152	5,157	5,159
2001	0	57	366	672	875	1,024	1,149	1,252	1,379	1,474	1,556	1,616	1,685	1,727	1,759	1,791	1,807	1,815	1,822	1,824	1,825	1,826	1,831	1,835	1,840	1,844	1,847	1,849	1,851	1,852
2002	2	214	1,186	2,078	2,843	3,463	4,096	4,625	5,116	5,463	5,794	6,100	6,304	6,461	6,607	6,690	6,739	6,766	6,777	6,779	6,785	6,794	6,814	6,820	6,833	6,842	6,853	6,856	6,862	6,864
2003	4	271	934	1,540	2,101	2,683	3,144	3,566	3,862	4,141	4,404	4,560	4,659	4,752	4,820	4,850	4,869	4,881	4,885	4,887	4,902	4,914	4,924	4,931	4,938	4,939	4,941	4,949	4,951	4,954
2004	59	686	1,928	3,320	4,835	6,141	7,156	7,849	8,573	9,276	9,714	10,033	10,301	10,459	10,561	10,621	10,654	10,661	10,680	10,701	10,739	10,765	10,792	10,819	10,844	10,855	10,861	10,868	10,879	10,885
2005	35	494	1,474	2,779	4,023	5,121	5,869	6,573	7,292	7,802	8,219	8,498	8,672	8,791	8,857	8,899	8,908	8,920	8,952	8,977	9,013	9,037	9,055	9,077	9,092	9,108	9,120	9,132	9,140	9,146
2006	5	138	444	888	1,354	1,650	1,938	2,150	2,311	2,430	2,540	2,603	2,642	2,670	2,683	2,689	2,695	2,708	2,723	2,734	2,740	2,745	2,755	2,759	2,763	2,765	2,766	2,768	2,771	2,771
2007	1	60	256	532	722	889	1,038	1,114	1,173	1,233	1,281	1,307	1,329	1,333	1,334	1,337	1,339	1,345	1,354	1,358	1,360	1,362	1,367	1,369	1,370	1,371	1,375	1,378	1,381	1,382
2008	1	94	491	1,002	1,471	1,977	2,367	2,568	2,707	2,811	2,859	2,893	2,905	2,911	2,915	2,925	2,941	2,955	2,966	2,974	2,981	2,987	2,991	2,993	3,002	3,006	3,006	3,008	3,010	3,010
2009	12	164	503	912	1,467	1,899	2,155	2,377	2,515	2,596	2,644	2,683	2,695	2,708	2,720	2,728	2,735	2,745	2,751	2,761	2,769	2,773	2,775	2,777	2,780	2,783	2,783	2,785	2,785	2,786
2010	20	256	852	1,907	2,978	3,702	4,280	4,639	4,903	5,068	5,153	5,181	5,207	5,245	5,288	5,321	5,339	5,363	5,380	5,410	5,427	5,442	5,455	5,460	5,472	5,479	5,484	5,491	5,495	5,498
2011	10	202	742	1,336	1,858	2,230	2,510	2,704	2,817	2,881	2,890	2,920	2,982	3,018	3,048	3,072	3,102	3,120	3,140	3,156	3,172	3,182	3,195	3,203	3,212	3,218	3,223	3,230	3,231	3,232
2012	7	105	258	384	525	627	706	753	774	779	791	809	824	832	841	853	867	876	887	892	896	899	904	904	906	906	909	910	910	913
2013	3	19	51	98	132	169	192	203	205	213	218	226	233	239	241	246	248	251	254	255	256	260	262	265	266	266	266	266	267	268
2014	0	19	72	148	198	245	275	279	298	323	340	356	375	389	403	408	414	416	421	424	427	433	436	437	437	437	437	437	439	440
2015	0	11	49	79	105	124	129	136	159	180	190	204	213	225	230	234	240	247	252	253	256	262	264	265	265	268	268	268	268	268
2016	0	2	9	21	28	30	38	47	60	66	73	79	88	92	94	98	100	100	101	101	103	103	104	106	106	107	107	107	107	107
2017	0	2	7	14	16	27	40	63	76	84	91	98	99	102	105	107	110	112	113	115	116	116	116	116	116	116	116	116	116	116
2018	0	7	15	18	36	71	101	124	131	146	157	160	173	177	180	183	188	189	189	190	192	192	192	194	194	194	194	194	194	194
2019	0	3	7	24	50	69	88	98	112	119	125	129	132	138	143	145	146	146	148	150	151	152	152	152	153	153	153	153	153	153
2020	0	0	5	10	12	16	17	18	19	19	21	22	22	22	22	22	23	24	24	24	24	24	24	24	24	24	24	24	24	24
2021	0	0	0	2	3	4	5	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Table 5: Cumulative Claim Rate = Table 4 / Table 1 (Evaluation Year 1)
Cumulative Claims as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.00%	0.21%	0.86%	1.88%	3.05%	3.91%	5.02%	6.11%	6.94%	7.40%	7.79%	7.96%	8.05%	8.14%	8.19%	8.20%	8.22%	8.23%	8.23%	8.23%	8.26%	8.28%	8.28%	8.28%	8.31%	8.31%	8.32%	8.32%	8.34%	8.34%
1991	0.00%	0.09%	0.68%	1.53%	2.55%	3.64%	4.95%	6.08%	6.82%	7.37%	7.64%	7.77%	7.85%	7.93%	7.96%	7.98%	7.99%	8.00%	8.01%	8.04%	8.05%	8.08%	8.10%	8.10%	8.11%	8.14%	8.16%	8.16%	8.17%	8.17%
1992	0.00%	0.14%	0.72%	1.58%	2.73%	4.12%	5.30%	6.08%	6.61%	6.86%	7.00%	7.12%	7.17%	7.20%	7.22%	7.23%	7.24%	7.27%	7.28%	7.30%	7.31%	7.33%	7.35%	7.37%	7.39%	7.40%	7.41%	7.42%	7.42%	7.42%
1993	0.00%	0.18%	0.85%	2.02%	3.77%	5.23%	6.27%	6.93%	7.26%	7.45%	7.61%	7.67%	7.71%	7.73%	7.75%	7.77%	7.78%	7.80%	7.82%	7.84%	7.86%	7.87%	7.89%	7.91%	7.93%	7.93%	7.94%	7.94%	7.94%	7.94%
1994	0.00%	0.21%	1.19%	3.04%	4.97%	6.39%	7.25%	7.68%	7.95%	8.15%	8.25%	8.30%	8.33%	8.35%	8.37%	8.39%	8.42%	8.45%	8.47%	8.50%	8.52%	8.54%	8.55%	8.57%	8.58%	8.59%	8.59%	8.59%	8.59%	8.59%
1995	0.01%	0.29%	1.79%	4.09%	6.13%	7.27%	7.91%	8.35%	8.73%	8.93%	9.03%	9.09%	9.12%	9.16%	9.19%	9.23%	9.26%	9.29%	9.32%	9.35%	9.38%	9.42%	9.45%	9.47%	9.48%	9.49%	9.49%	9.49%	9.49%	9.49%
1996	0.00%	0.29%	1.75%	3.92%	5.44%	6.34%	6.97%	7.49%	7.76%	7.88%	7.96%	8.00%	8.06%	8.11%	8.16%	8.20%	8.24%	8.28%	8.32%	8.36%	8.40%	8.43%	8.44%	8.46%	8.46%	8.46%	8.46%	8.47%	8.47%	8.47%
1997	0.00%	0.36%	1.78%	3.45%	4.68%	5.58%	6.30%	6.65%	6.82%	6.93%	7.00%	7.07%	7.13%	7.20%	7.25%	7.30%	7.35%	7.39%	7.44%	7.49%	7.52%	7.53%	7.55%	7.55%	7.55%	7.56%	7.56%	7.56%	7.57%	7.57%
1998	0.02%	0.71%	2.18%	3.55%	4.68%	5.55%	6.04%	6.29%	6.45%	6.55%	6.64%	6.73%	6.82%	6.88%	6.96%	7.04%	7.09%	7.14%	7.21%	7.24%	7.26%	7.28%	7.28%	7.28%	7.29%	7.29%	7.30%	7.30%	7.31%	7.31%
1999	0.00%	0.16%	0.98%	2.23%	3.73%	4.59%	5.03%	5.28%	5.44%	5.58%	5.73%	5.89%	6.01%	6.15%	6.29%	6.37%	6.45%	6.52%	6.58%	6.61%	6.63%	6.63%	6.64%	6.64%	6.64%	6.65%	6.66%	6.67%	6.67%	6.68%
2000	0.00%	0.41%	1.57%	3.23%	4.30%	4.98%	5.42%	5.74%	6.06%	6.32%	6.55%	6.74%	6.92%	7.12%	7.25%	7.34%	7.43%	7.52%	7.55%	7.59%	7.60%	7.60%	7.61%	7.62%	7.63%	7.64%	7.65%	7.66%	7.66%	7.67%
2001	0.00%	0.21%	1.34%	2.46%	3.20%	3.75%	4.21%	4.59%	5.05%	5.40%	5.70%	5.92%	6.17%	6.32%	6.44%	6.56%	6.62%	6.65%	6.67%	6.68%	6.68%	6.69%	6.71%	6.72%	6.74%	6.75%	6.76%	6.77%	6.78%	6.78%
2002	0.00%	0.25%	1.38%	2.41%	3.30%	4.02%	4.76%	5.37%	5.94%	6.34%	6.73%	7.08%	7.32%	7.50%	7.67%	7.77%	7.82%	7.86%	7.87%	7.87%	7.88%	7.89%	7.91%	7.92%	7.93%	7.94%	7.96%	7.96%	7.97%	7.97%
2003	0.01%	0.48%	1.66%	2.74%	3.74%	4.77%	5.59%	6.34%	6.87%	7.36%	7.83%	8.11%	8.28%	8.45%	8.57%	8.62%	8.66%	8.68%	8.69%	8.69%	8.72%	8.74%	8.76%	8.77%	8.78%	8.78%	8.79%	8.80%	8.80%	8.81%
2004	0.07%	0.76%	2.13%	3.66%	5.33%	6.77%	7.89%	8.65%	9.45%	10.23%	10.71%	11.06%	11.36%	11.53%	11.64%	11.71%	11.75%	11.75%	11.77%	11.80%	11.84%	11.87%	11.90%	11.93%	11.95%	11.97%	11.97%	11.98%	11.99%	12.00%
2005	0.07%	1.06%	3.16%	5.95%	8.62%	10.97%	12.58%	14.08%	15.62%	16.72%	17.61%	18.21%	18.58%	18.84%	18.98%	19.07%	19.09%	19.11%	19.18%	19.23%	19.31%	19.36%	19.40%	19.45%	19.48%	19.52%	19.54%	19.57%	19.58%	19.60%
2006	0.05%	1.36%	4.37%	8.74%	13.33%	16.25%	19.08%	21.17%	22.76%	23.93%	25.01%	25.63%	26.01%	26.29%	26.42%	26.48%	26.54%	26.66%	26.81%	26.92%	26.98%	27.03%	27.13%	27.17%	27.21%	27.23%	27.24%	27.25%	27.28%	27.28%
2007	0.02%	1.31%	5.59%	11.61%	15.76%	19.41%	22.66%	24.32%	25.61%	26.92%	27.96%	28.53%	29.01%	29.10%	29.12%	29.19%	29.23%	29.36%	29.56%	29.64%	29.69%	29.73%	29.84%	29.88%	29.91%	29.93%	30.02%	30.08%	30.15%	30.17%
2008	0.01%	0.77%	4.03%	8.22%	12.07%	16.22%	19.42%	21.07%	22.21%	23.06%	23.46%	23.73%	23.83%	23.88%	23.92%	24.00%	24.13%	24.24%	24.33%	24.40%	24.46%	24.51%	24.54%	24.55%	24.63%	24.66%	24.66%	24.68%	24.69%	24.69%
2009	0.08%	1.14%	3.48%	6.32%	10.16%	13.15%	14.93%	16.46%	17.42%	17.98%	18.31%	18.58%	18.67%	18.76%	18.84%	18.89%	18.94%	19.01%	19.05%	19.12%	19.18%	19.21%	19.22%	19.23%	19.25%	19.28%	19.28%	19.29%	19.29%	19.30%
2010	0.04%	0.54%	1.81%	4.06%	6.34%	7.88%	9.11%	9.87%	10.43%	10.78%	10.96%	11.02%	11.08%	11.16%	11.25%	11.32%	11.36%	11.41%	11.45%	11.51%	11.55%	11.58%	11.61%	11.62%	11.64%	11.66%	11.67%	11.68%	11.69%	11.70%
2011	0.02%	0.40%	1.46%	2.62%	3.65%	4.38%	4.93%	5.31%	5.53%	5.66%	5.68%	5.73%	5.86%	5.93%	5.99%	6.03%	6.09%	6.13%	6.17%	6.20%	6.23%	6.25%	6.28%	6.29%	6.31%	6.32%	6.33%	6.34%	6.35%	6.35%
2012	0.03%	0.52%	1.27%	1.89%	2.58%	3.08%	3.47%	3.70%	3.80%	3.83%	3.88%	3.97%	4.05%	4.09%	4.13%	4.19%	4.26%	4.30%	4.36%	4.38%	4.40%	4.42%	4.44%	4.44%	4.45%	4.45%	4.46%	4.47%	4.47%	4.48%
2013	0.03%	0.20%	0.55%	1.05%	1.42%	1.81%	2.06%	2.18%	2.20%	2.29%	2.34%	2.43%	2.50%	2.57%	2.59%	2.64%	2.66%	2.69%	2.73%	2.74%	2.75%	2.79%	2.81%	2.84%	2.86%	2.86%	2.86%	2.86%	2.87%	2.88%
2014	0.00%	0.10%	0.37%	0.77%	1.03%	1.27%	1.42%	1.44%	1.54%	1.67%	1.76%	1.84%	1.94%	2.01%	2.09%	2.11%	2.14%	2.15%	2.18%	2.20%	2.21%	2.24%	2.26%	2.26%	2.26%	2.26%	2.26%	2.26%	2.27%	2.28%
2015	0.00%	0.09%	0.38%	0.62%	0.82%	0.97%	1.01%	1.07%	1.25%	1.41%	1.49%	1.60%	1.67%	1.76%	1.80%	1.83%	1.88%	1.94%	1.97%	1.98%	2.01%	2.05%	2.07%	2.08%	2.08%	2.10%	2.10%	2.10%	2.10%	2.10%
2016	0.00%	0.04%	0.19%	0.45%	0.60%	0.65%	0.82%	1.01%	1.29%	1.42%	1.57%	1.70%	1.89%	1.98%	2.02%	2.11%	2.15%	2.15%	2.17%	2.17%	2.21%	2.21%	2.24%	2.28%	2.28%	2.30%	2.30%	2.30%	2.30%	2.30%
2017	0.00%	0.05%	0.18%	0.37%	0.42%	0.71%	1.05%	1.66%	2.00%	2.21%	2.40%	2.58%	2.61%	2.69%	2.77%	2.82%	2.90%	2.95%	2.98%	3.03%	3.06%	3.06%	3.06%	3.06%	3.06%	3.06%	3.06%	3.06%	3.06%	3.06%
2018	0.00%	0.18%	0.39%	0.47%	0.95%	1.87%	2.66%	3.26%	3.45%	3.84%	4.13%	4.21%	4.55%	4.66%	4.73%	4.81%	4.94%	4.97%	4.97%	5.00%	5.05%	5.05%	5.05%	5.10%	5.10%	5.10%	5.10%	5.10%	5.10%	5.10%
2019	0.00%	0.09%	0.21%	0.70%	1.47%	2.02%	2.58%	2.87%	3.28%	3.49%	3.67%	3.78%	3.87%	4.05%	4.19%	4.25%	4.28%	4.28%	4.34%	4.40%	4.43%	4.46%	4.46%	4.46%	4.49%	4.49%	4.49%	4.49%	4.49%	4.49%
2020	0.00%	0.00%	1.45%	2.90%	3.48%	4.64%	4.93%	5.22%	5.51%	5.51%	6.09%	6.38%	6.38%	6.38%	6.38%	6.38%	6.67%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.96%
2021	0.00%	0.00%	0.00%	1.21%	1.82%	2.42%	3.03%	3.64%	3.64%	3.64%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%	4.24%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Non-Claim Termination Rate
ARM

Table 6: Number of Non-Claim Terminations in Each Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	7	121	347	598	644	394	532	416	541	430	270	344	298	247	163	103	106	57	30	26	16	14	13	14	11	22	14	18	28	34
1991	35	476	1,738	2,374	1,757	2,703	2,278	2,937	2,513	1,333	1,890	1,687	1,365	837	503	503	294	156	120	61	52	47	55	51	57	67	75	91	75	111
1992	221	3,010	6,375	6,074	10,022	7,769	10,763	8,541	4,417	5,924	5,187	4,331	2,492	1,605	1,291	973	614	293	237	180	168	192	189	215	226	215	260	285	238	425
1993	758	4,892	6,587	13,201	9,959	14,837	11,993	6,065	9,574	7,590	6,186	3,588	2,191	1,587	1,192	654	373	252	186	174	189	207	224	257	252	270	321	258	369	165
1994	1,176	5,956	18,604	17,562	27,167	20,368	10,319	16,123	12,997	10,914	6,548	4,044	2,904	2,085	1,145	559	383	298	260	301	326	366	401	423	460	430	340	488	301	231
1995	1,622	10,630	16,313	29,611	14,526	6,109	9,243	6,857	5,300	3,439	2,323	1,623	1,047	525	215	145	108	94	134	121	136	150	149	207	189	167	205	127	105	113
1996	1,013	11,108	54,792	35,375	11,915	18,089	10,711	7,647	5,108	3,309	2,280	1,621	819	348	248	150	140	153	195	184	189	238	225	220	206	271	161	117	165	169
1997	2,155	38,025	64,876	24,185	37,692	16,804	11,526	7,453	4,892	3,606	2,439	1,210	494	311	198	162	214	272	254	295	356	328	326	307	317	265	189	183	214	247
1998	3,870	20,475	12,081	20,312	10,170	7,010	4,551	3,049	2,104	1,487	748	300	161	122	93	131	131	120	136	164	151	169	145	143	114	92	119	114	110	102
1999	613	2,829	19,267	11,945	7,514	4,410	3,421	2,427	1,726	795	268	165	90	81	112	121	117	153	143	138	136	141	137	93	81	84	77	85	58	78
2000	579	18,880	13,051	9,077	5,382	4,397	3,193	2,301	1,062	344	214	85	118	167	159	167	210	193	217	194	174	205	119	87	95	114	100	88	74	76
2001	984	5,164	5,824	3,745	3,305	2,246	1,500	577	203	98	64	59	78	94	97	90	129	110	95	78	104	75	50	44	40	47	41	37	45	31
2002	2,558	23,137	14,155	13,413	9,528	6,533	2,523	722	365	209	187	302	295	351	345	379	426	377	307	385	202	155	164	185	164	165	129	128	120	138
2003	4,113	11,086	12,776	9,107	5,769	2,314	611	347	174	147	259	236	298	352	392	345	352	230	279	177	139	122	140	137	118	112	99	95	72	81
2004	5,188	22,141	19,507	13,402	5,201	1,425	681	323	331	532	570	670	767	834	839	756	602	713	418	333	333	343	334	290	262	243	220	206	208	212
2005	3,335	8,303	7,812	4,779	1,275	585	268	283	541	524	628	750	807	836	801	566	652	369	256	258	337	267	243	224	211	198	183	172	165	167
2006	329	1,253	1,447	884	266	88	101	191	142	157	191	211	219	206	172	196	101	55	85	82	82	76	62	60	33	45	53	54	41	45
2007	96	517	711	354	96	92	126	49	72	70	95	82	72	61	83	40	31	37	40	31	25	21	33	26	28	17	9	29	20	23
2008	131	2,820	1,462	775	612	690	215	211	203	201	199	182	148	204	85	65	75	62	82	70	55	54	46	48	39	47	36	31	28	32
2009	1,476	2,048	1,318	826	1,114	494	425	397	394	443	402	292	330	181	117	156	139	148	98	91	80	59	62	59	48	56	45	42	30	36
2010	1,228	3,556	2,852	5,280	4,337	4,277	2,842	2,503	2,238	2,089	1,490	1,573	743	584	587	644	563	481	421	385	317	259	236	232	198	191	164	134	110	94
2011	606	4,165	7,685	6,196	6,495	4,936	3,062	2,471	2,275	1,594	1,483	814	595	595	534	542	461	406	311	247	239	245	203	170	148	128	123	112	105	82
2012	543	3,055	2,958	3,017	2,481	1,721	1,042	947	622	550	316	228	213	207	204	159	147	123	109	99	81	55	69	56	51	35	37	30	38	29
2013	257	1,186	1,624	1,466	1,146	799	613	403	311	170	124	116	112	94	87	70	48	57	39	51	35	28	35	19	18	18	14	15	6	9
2014	684	5,418	3,999	2,467	1,601	1,347	878	629	265	185	152	146	111	119	94	85	81	61	60	59	45	43	44	30	32	24	27	23	22	15
2015	1,056	2,825	2,361	1,633	1,215	1,062	711	273	217	161	134	120	82	80	64	53	51	47	52	40	31	32	25	22	16	9	10	14	18	5
2016	354	867	722	570	618	536	188	114	91	84	76	38	36	28	33	22	19	19	15	25	8	16	6	7	7	4	4	4	2	7
2017	51	521	557	766	747	198	154	113	91	72	59	45	43	26	27	27	27	23	21	10	8	14	12	7	6	2	8	5	4	4
2018	96	600	935	884	231	126	132	117	68	58	46	47	29	19	28	25	15	16	17	8	11	12	13	6	7	6	8	6	2	4
2019	231	1,098	884	243	131	130	89	70	71	40	37	37	23	23	16	10	14	17	9	11	9	7	8	6	4	2	1	6	3	4
2020	30	124	40	35	14	22	10	11	7	3	5	4	2	2	2	1	0	2	3	1	1	0	0	0	1	0	0	1	0	0
2021	2	36	33	21	20	13	9	4	4	3	3	1	1	0	2	0	0	0	0	0	1	0	0	0	0	1	1	2	0	0

Table 7: Non-Claim Termination Rate = Table 6 / Table 1
Percentage of Active Loans at the Beginnng of the Evaluation Year that end in Termination by Other Than Claim During the Evaluation Year

	Evaluation Year																													
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.11%	1.87%	5.72%	11.08%	13.77%	9.32%	14.69%	13.27%	21.32%	20.69%	15.15%	24.11%	26.54%	28.39%	23.15%	17.20%	21.54%	13.13%	7.43%	6.88%	4.44%	4.06%	3.92%	4.40%	3.61%	7.94%	5.36%	7.44%	13.27%	19.65%
1991	0.12%	1.65%	6.47%	9.79%	7.92%	14.11%	13.81%	22.19%	23.93%	14.80%	26.85%	31.75%	34.79%	27.30%	19.70%	24.63%	16.84%	9.83%	8.20%	4.38%	3.88%	3.66%	4.49%	4.36%	5.13%	6.48%	7.88%	10.61%	9.60%	16.89%
1992	0.24%	3.43%	7.89%	8.22%	15.94%	14.43%	25.64%	26.09%	15.87%	27.31%	31.69%	36.29%	26.54%	20.67%	20.00%	17.78%	12.68%	6.47%	5.54%	4.41%	4.30%	5.20%	5.42%	6.61%	7.52%	7.72%	10.33%	12.81%	12.00%	27.71%
1993	0.66%	4.47%	6.45%	15.06%	13.16%	25.09%	26.10%	15.50%	32.82%	35.53%	41.25%	31.67%	24.08%	21.19%	19.01%	11.69%	7.17%	5.12%	3.94%	3.84%	4.38%	5.06%	5.83%	7.22%	7.65%	8.97%	11.97%	10.66%	18.01%	9.39%
1994	0.64%	3.41%	12.04%	13.15%	26.40%	25.49%	15.17%	31.53%	34.53%	41.40%	33.37%	26.10%	23.17%	20.02%	12.41%	6.48%	4.68%	3.80%	3.45%	4.19%	4.78%	5.70%	6.70%	7.64%	9.10%	9.33%	7.97%	12.92%	8.69%	7.73%
1995	1.30%	9.46%	17.32%	47.99%	32.54%	16.47%	34.17%	34.89%	38.19%	33.78%	30.02%	26.90%	21.16%	11.98%	5.21%	3.69%	2.86%	2.57%	3.86%	3.65%	4.33%	5.09%	5.39%	8.19%	8.13%	7.77%	10.54%	6.99%	6.17%	7.61%
1996	0.55%	6.45%	47.75%	46.93%	19.65%	44.22%	36.90%	37.48%	34.49%	29.34%	25.76%	22.69%	13.18%	6.02%	4.56%	2.88%	2.80%	3.21%	4.32%	4.33%	4.75%	6.45%	6.53%	6.88%	6.91%	10.00%	6.32%	4.84%	7.35%	8.54%
1997	0.90%	19.04%	49.38%	23.44%	60.26%	38.57%	38.02%	33.84%	29.28%	28.06%	23.83%	13.66%	6.01%	4.02%	2.67%	2.27%	3.15%	4.23%	4.19%	5.22%	6.81%	6.76%	7.25%	7.35%	8.22%	7.40%	5.58%	5.73%	7.21%	9.42%
1998	4.00%	28.55%	20.76%	55.56%	40.19%	40.17%	36.64%	33.39%	30.59%	28.09%	16.80%	7.38%	4.21%	3.35%	2.68%	4.02%	4.26%	4.12%	5.02%	6.52%	6.44%	7.82%	7.21%	7.67%	6.53%	5.58%	7.80%	8.12%	8.55%	9.32%
1999	0.98%	4.81%	49.38%	45.42%	42.10%	34.18%	37.17%	36.63%	36.00%	20.31%	7.55%	5.02%	2.88%	2.74%	4.06%	4.69%	4.85%	6.89%	7.01%	7.34%	7.84%	8.87%	9.44%	6.86%	6.36%	7.09%	6.99%	8.46%	6.18%	9.30%
2000	0.86%	39.69%	38.69%	38.56%	30.87%	34.96%	35.11%	35.00%	20.06%	7.20%	4.85%	2.02%	2.98%	4.57%	4.66%	5.26%	7.22%	7.27%	8.99%	8.82%	8.63%	11.33%	7.06%	5.47%	6.38%	8.34%	7.92%	7.54%	6.81%	7.93%
2001	3.60%	24.47%	38.91%	34.31%	44.61%	44.80%	44.27%	21.31%	8.54%	4.49%	3.14%	3.07%	4.40%	5.74%	6.43%	6.49%	10.39%	9.80%	9.30%	8.29%	12.44%	9.87%	7.09%	6.70%	6.55%	8.42%	7.98%	7.79%	10.64%	8.61%
2002	2.97%	38.42%	31.39%	43.56%	46.48%	48.95%	24.76%	8.08%	4.52%	2.78%	2.67%	4.72%	5.00%	6.51%	7.04%	8.54%	10.75%	10.59%	9.47%	13.49%	7.63%	6.24%	7.13%	8.78%	8.49%	9.39%	7.98%	8.62%	8.84%	11.60%
2003	7.31%	27.19%	46.75%	51.71%	51.13%	27.59%	8.35%	5.30%	2.86%	2.60%	5.05%	4.98%	6.87%	9.04%	11.42%	11.29%	13.11%	9.42%	12.92%	8.94%	7.62%	7.21%	9.09%	9.81%	9.28%	9.66%	9.37%	9.96%	8.22%	10.96%
2004	5.72%	35.32%	46.51%	49.36%	25.45%	8.05%	4.25%	2.15%	2.38%	4.19%	4.88%	6.26%	7.93%	9.61%	10.85%	10.93%	9.58%	12.82%	8.16%	6.98%	7.57%	8.52%	9.11%	8.66%	8.56%	8.65%	8.52%	8.71%	9.74%	12.79%
2005	7.15%	24.04%	30.34%	24.30%	7.44%	3.78%	1.86%	2.10%	4.44%	4.69%	6.21%	8.25%	9.95%	11.69%	12.74%	9.97%	13.00%	7.96%	5.89%	6.35%	9.15%	7.87%	7.76%	7.76%	7.93%	8.11%	8.15%	8.35%	8.75%	11.04%
2006	3.24%	14.85%	21.65%	16.51%	5.75%	2.08%	2.62%	5.54%	4.52%	5.47%	7.44%	9.20%	10.76%	11.44%	10.64%	13.86%	7.73%	4.44%	7.46%	7.84%	8.56%	8.67%	7.70%	8.10%	4.69%	6.85%	8.79%	9.87%	8.15%	12.26%
2007	2.10%	13.23%	23.69%	14.93%	4.60%	5.04%	8.12%	3.44%	5.56%	6.01%	9.30%	8.97%	8.78%	8.08%	12.37%	6.37%	5.21%	6.70%	7.95%	6.62%	5.67%	5.02%	8.68%	7.39%	8.67%	5.57%	3.08%	11.15%	8.51%	12.17%
2008	1.07%	30.84%	20.07%	12.92%	12.44%	18.54%	6.90%	7.80%	8.59%	9.77%	10.99%	11.41%	10.31%	16.65%	7.48%	6.13%	7.73%	6.94%	10.24%	9.68%	8.32%	8.99%	8.35%	9.58%	8.61%	11.72%	9.86%	9.34%	9.27%	12.65%
2009	10.22%	19.05%	14.49%	10.51%	18.00%	9.39%	9.28%	10.02%	11.48%	15.24%	16.36%	13.73%	18.50%	11.38%	8.01%	12.03%	12.08%	14.90%	11.02%	11.55%	11.43%	9.26%	10.82%	11.52%	10.41%	13.93%	12.61%	13.42%	10.60%	17.22%
2010	2.61%	8.48%	7.41%	16.41%	16.20%	19.65%	15.49%	16.17%	17.24%	19.47%	16.28%	20.83%	10.95%	9.48%	10.61%	13.27%	13.18%	12.77%	12.64%	13.21%	12.28%	11.23%	11.47%	12.74%	12.29%	13.53%	13.19%	12.16%	11.13%	11.52%
2011	1.19%	9.07%	20.37%	20.03%	27.16%	26.53%	20.06%	19.62%	22.29%	18.64%	21.01%	13.10%	10.71%	12.08%	12.24%	14.28%	13.95%	14.09%	12.20%	10.80%	11.76%	13.79%	13.00%	12.29%	12.07%	11.72%	12.76%	13.25%	14.21%	13.55%
2012	2.67%	18.34%	21.83%	29.00%	31.88%	28.88%	21.53%	24.63%	19.43%	20.78%	13.63%	11.00%	11.54%	12.70%	14.40%	12.76%	13.55%	12.91%	13.09%	13.58%	12.58%	9.39%	13.48%	12.28%	12.66%	9.51%	11.28%	10.10%	14.67%	14.95%
2013	2.76%	15.10%	26.21%	31.30%	32.71%	29.95%	30.17%	24.91%	23.83%	15.08%	12.42%	13.27%	14.83%	14.35%	15.37%	14.26%	10.88%	14.96%	11.50%	17.77%	13.94%	12.79%	19.23%	11.88%	12.77%	14.75%	12.96%	16.13%	6.98%	12.33%
2014	3.54%	41.06%	43.74%	37.38%	32.35%	37.89%	33.17%	31.23%	15.32%	12.17%	11.25%	12.28%	10.48%	12.85%	11.49%	11.68%	12.64%	10.55%	11.70%	13.08%	11.17%	12.15%	14.33%	10.87%	13.11%	10.91%	13.99%	13.53%	15.07%	12.20%
2015	8.28%	31.86%	36.50%	33.98%	34.08%	42.75%	40.21%	18.35%	17.39%	15.10%	14.53%	15.23%	11.76%	13.22%	11.94%	11.06%	12.09%	12.77%	16.72%	14.81%	13.14%	16.16%	14.62%	14.86%	12.12%	7.50%	9.09%	14.58%	23.08%	7.69%
2016	7.61%	25.29%	26.75%	26.92%	41.42%	56.18%	24.80%	17.95%	17.14%	19.05%	21.23%	12.10%	13.38%	11.81%	16.34%	12.50%	12.26%	13.97%	12.50%	26.32%	9.41%	23.19%	9.68%	13.21%	15.22%	9.76%	10.81%	12.12%	6.45%	33.33%
2017	1.34%	16.17%	20.94%	40.59%	65.64%	21.31%	20.21%	18.05%	17.43%	16.29%	15.69%	13.89%	15.36%	10.36%	12.22%	14.06%	16.67%	16.79%	18.26%	9.71%	8.51%	17.50%	17.65%	11.48%	10.91%	3.77%	17.78%	12.50%	11.11%	12.90%
2018	2.52%	19.36%	43.37%	69.66%	22.65%	14.67%	18.94%	21.01%	14.11%	14.18%	13.07%	15.56%	11.15%	8.02%	13.59%	14.04%	9.49%	11.35%	13.71%	6.96%	10.78%	13.33%	16.88%	8.70%	11.29%	10.71%	16.67%	14.29%	5.00%	13.33%
2019	6.77%	52.84%	74.29%	26.13%	16.95%	20.83%	17.25%	16.06%	20.23%	13.16%	14.18%	16.82%	11.86%	13.94%	11.11%	7.58%	11.97%	17.00%	10.11%	14.47%	13.64%	12.07%	16.00%	13.64%	10.26%	5.41%	2.78%	20.00%	11.11%	17.39%
2020	8.70%	64.92%	27.40%	33.02%	15.56%	34.38%	18.87%	26.83%	21.21%	10.00%	21.74%	22.22%	12.50%	14.29%	16.67%	9.09%	0.00%	28.57%	75.00%	33.33%	50.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2021	1.21%	28.35%	35.11%	29.58%	40.00%	36.11%	34.62%	19.05%	23.53%	21.43%	30.00%	11.11%	12.50%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	20.00%	0.00%	0.00%	0.00%	0.00%	25.00%	33.33%	200.00%	0.00%	0.00%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Non-Claim Termination Rate
ARM

Table 8: Cumulative Number of Non-ClaimTerminations as of Each Evaluation Year
Total Number of Non-Claim Terminations for each Fiscal Year as of the End of the Evaluation Year

	Evaluation Year																														
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1990	7	128	475	1,073	1,717	2,111	2,643	3,059	3,600	4,030	4,300	4,644	4,942	5,189	5,352	5,455	5,561	5,618	5,648	5,674	5,690	5,704	5,717	5,731	5,742	5,764	5,778	5,796	5,824	5,858	5,858
1991	35	511	2,249	4,623	6,380	9,083	11,361	14,298	16,811	18,144	20,034	21,721	23,086	23,923	24,426	24,929	25,223	25,379	25,499	25,560	25,612	25,659	25,714	25,765	25,822	25,889	25,964	26,055	26,130	26,241	26,241
1992	221	3,231	9,606	15,680	25,702	33,471	44,234	52,775	57,192	63,116	68,303	72,634	75,126	76,731	78,022	78,995	79,609	79,902	80,139	80,319	80,487	80,679	80,868	81,083	81,309	81,524	81,784	82,069	82,307	82,732	82,732
1993	758	5,650	12,237	25,438	35,397	50,234	62,227	68,292	77,866	85,456	91,642	95,230	97,421	99,008	100,200	100,854	101,227	101,479	101,665	101,839	102,028	102,235	102,459	102,716	102,968	103,238	103,559	103,817	104,186	104,351	104,353
1994	1,176	7,132	25,736	43,298	70,465	90,833	101,152	117,275	130,272	141,186	147,734	151,778	154,682	156,767	157,912	158,471	158,854	159,152	159,412	159,713	160,039	160,405	160,806	161,229	161,689	162,119	162,459	162,947	163,248	163,479	163,480
1995	1,622	12,252	28,565	58,176	72,702	78,811	88,054	94,911	100,211	103,650	105,973	107,596	108,643	109,168	109,383	109,528	109,636	109,730	109,864	109,985	110,121	110,271	110,420	110,627	110,816	110,983	111,188	111,315	111,420	111,533	111,534
1996	1,013	12,121	66,913	102,288	114,203	132,292	143,003	150,650	155,758	159,067	161,347	162,968	163,787	164,135	164,383	164,533	164,673	164,826	165,021	165,205	165,394	165,632	165,857	166,077	166,283	166,554	166,715	166,832	166,997	167,166	167,168
1997	2,155	40,180	105,056	129,241	166,933	183,737	195,263	202,716	207,608	211,214	213,653	214,863	215,357	215,668	215,866	216,028	216,242	216,514	216,768	217,063	217,419	217,747	218,073	218,380	218,697	218,962	219,151	219,334	219,548	219,795	219,799
1998	3,870	24,345	36,426	56,738	66,908	73,918	78,469	81,518	83,622	85,109	85,857	86,157	86,318	86,440	86,533	86,664	86,795	86,915	87,051	87,215	87,366	87,535	87,680	87,823	87,937	88,029	88,148	88,262	88,372	88,474	88,474
1999	613	3,442	22,709	34,654	42,168	46,578	49,999	52,426	54,152	54,947	55,215	55,380	55,470	55,551	55,663	55,784	55,901	56,054	56,197	56,335	56,471	56,612	56,749	56,842	56,923	57,007	57,084	57,169	57,227	57,305	57,305
2000	579	19,459	32,510	41,587	46,969	51,366	54,559	56,860	57,922	58,266	58,480	58,565	58,683	58,850	59,009	59,176	59,386	59,579	59,796	59,990	60,164	60,369	60,488	60,575	60,670	60,784	60,884	60,972	61,046	61,122	61,126
2001	984	6,148	11,972	15,717	19,022	21,268	22,768	23,345	23,548	23,646	23,710	23,769	23,847	23,941	24,038	24,128	24,257	24,367	24,462	24,540	24,644	24,719	24,769	24,813	24,853	24,900	24,941	24,978	25,023	25,054	25,054
2002	2,558	25,695	39,850	53,263	62,791	69,324	71,847	72,569	72,934	73,143	73,330	73,632	73,927	74,278	74,623	75,002	75,428	75,805	76,112	76,497	76,699	76,854	77,018	77,203	77,367	77,532	77,661	77,789	77,909	78,047	78,049
2003	4,113	15,199	27,975	37,082	42,851	45,165	45,776	46,123	46,297	46,444	46,703	46,939	47,237	47,589	47,981	48,326	48,678	48,908	49,187	49,364	49,503	49,625	49,765	49,902	50,020	50,132	50,231	50,326	50,398	50,479	50,480
2004	5,188	27,329	46,836	60,238	65,439	66,864	67,545	67,868	68,199	68,731	69,301	69,971	70,738	71,572	72,411	73,167	73,769	74,482	74,900	75,233	75,566	75,909	76,243	76,533	76,795	77,038	77,258	77,464	77,672	77,884	77,885
2005	3,335	11,638	19,450	24,229	25,504	26,089	26,357	26,640	27,181	27,705	28,333	29,083	29,890	30,726	31,527	32,093	32,745	33,114	33,370	33,628	33,965	34,232	34,475	34,699	34,910	35,108	35,291	35,463	35,628	35,795	35,796
2006	329	1,582	3,029	3,913	4,179	4,267	4,368	4,559	4,701	4,858	5,049	5,260	5,479	5,685	5,857	6,053	6,154	6,209	6,294	6,376	6,458	6,534	6,596	6,656	6,689	6,734	6,787	6,841	6,882	6,927	6,927
2007	96	613	1,324	1,678	1,774	1,866	1,992	2,041	2,113	2,183	2,278	2,360	2,432	2,493	2,576	2,616	2,647	2,684	2,724	2,755	2,780	2,801	2,834	2,860	2,888	2,905	2,914	2,943	2,963	2,986	2,986
2008	131	2,951	4,413	5,188	5,800	6,490	6,705	6,916	7,119	7,320	7,519	7,701	7,849	8,053	8,138	8,203	8,278	8,340	8,422	8,492	8,547	8,601	8,647	8,695	8,734	8,781	8,817	8,848	8,876	8,908	8,910
2009	1,476	3,524	4,842	5,668	6,782	7,276	7,701	8,098	8,492	8,935	9,337	9,629	9,959	10,140	10,257	10,413	10,552	10,700	10,798	10,889	10,969	11,028	11,090	11,149	11,197	11,253	11,298	11,340	11,370	11,406	11,406
2010	1,228	4,784	7,636	12,916	17,253	21,530	24,372	26,875	29,113	31,202	32,692	34,265	35,008	35,592	36,179	36,823	37,386	37,867	38,288	38,673	38,990	39,249	39,485	39,717	39,915	40,106	40,270	40,404	40,514	40,608	40,608
2011	606	4,771	12,456	18,652	25,147	30,083	33,145	35,616	37,891	39,485	40,968	41,782	42,377	42,972	43,506	44,048	44,509	44,915	45,226	45,473	45,712	45,957	46,160	46,330	46,478	46,606	46,729	46,841	46,946	47,028	47,028
2012	543	3,598	6,556	9,573	12,054	13,775	14,817	15,764	16,386	16,936	17,252	17,480	17,693	17,900	18,104	18,263	18,410	18,533	18,642	18,741	18,822	18,877	18,946	19,002	19,053	19,088	19,125	19,155	19,193	19,222	19,223
2013	257	1,443	3,067	4,533	5,679	6,478	7,091	7,494	7,805	7,975	8,099	8,215	8,327	8,421	8,508	8,578	8,626	8,683	8,722	8,773	8,808	8,836	8,871	8,890	8,908	8,926	8,940	8,955	8,961	8,970	8,970
2014	684	6,102	10,101	12,568	14,169	15,516	16,394	17,023	17,288	17,473	17,625	17,771	17,882	18,001	18,095	18,180	18,261	18,322	18,382	18,441	18,486	18,529	18,573	18,603	18,635	18,659	18,686	18,709	18,731	18,746	18,746
2015	1,056	3,881	6,242	7,875	9,090	10,152	10,863	11,136	11,353	11,514	11,648	11,768	11,850	11,930	11,994	12,047	12,098	12,145	12,197	12,237	12,268	12,300	12,325	12,347	12,363	12,372	12,382	12,396	12,414	12,419	12,419
2016	354	1,221	1,943	2,513	3,131	3,667	3,855	3,969	4,060	4,144	4,220	4,258	4,294	4,322	4,355	4,377	4,396	4,415	4,430	4,455	4,463	4,479	4,485	4,492	4,499	4,503	4,507	4,511	4,513	4,520	4,520
2017	51	572	1,129	1,895	2,642	2,840	2,994	3,107	3,198	3,270	3,329	3,374	3,417	3,443	3,470	3,497	3,524	3,547	3,568	3,578	3,586	3,600	3,612	3,619	3,625	3,627	3,635	3,640	3,644	3,648	3,648
2018	96	696	1,631	2,515	2,746	2,872	3,004	3,121	3,189	3,247	3,293	3,340	3,369	3,388	3,416	3,441	3,456	3,472	3,489	3,497	3,508	3,520	3,533	3,539	3,546	3,552	3,560	3,566	3,568	3,572	3,572
2019	231	1,329	2,213	2,456	2,587	2,717	2,806	2,876	2,947	2,987	3,024	3,061	3,084	3,107	3,123	3,133	3,147	3,164	3,173	3,184	3,193	3,200	3,208	3,214	3,218	3,220	3,221	3,227	3,230	3,234	3,234
2020	30	154	194	229	243	265	275	286	293	296	301	305	307	309	311	312	312	314	317	318	319	319	319	319	320	320	320	321	321	321	321
2021	2	38	71	92	112	125	134	138	142	145	148	149	150	150	152	152	152	152	152	152	153	153	153	153	153	154	155	157	157	157	157

Table 9: Cumulative Non-Claim Termination Rate = Table 8 / Table 1 (Evaluation Year 1)
Cumulative Non-Claim Terminations as of Evaluation Year Divided by Active Loans as of Evaluation Year 1

	Evaluation Year																														
Fiscal Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1990	0.11%	1.94%	7.20%	16.27%	26.03%	32.00%	40.07%	46.38%	54.58%	61.10%	65.19%	70.41%	74.92%	78.67%	81.14%	82.70%	84.31%	85.17%	85.63%	86.02%	86.26%	86.48%	86.67%	86.89%	87.05%	87.39%	87.60%	87.87%	88.30%	88.81%	88.81%
1991	0.12%	1.74%	7.67%	15.77%	21.77%	30.99%	38.76%	48.78%	57.35%	61.90%	68.35%	74.10%	78.76%	81.62%	83.33%	85.05%	86.05%	86.58%	86.99%	87.20%	87.38%	87.54%	87.73%	87.90%	88.09%	88.32%	88.58%	88.89%	89.14%	89.52%	89.52%
1992	0.24%	3.55%	10.55%	17.22%	28.23%	36.76%	48.58%	57.96%	62.82%	69.32%	75.02%	79.78%	82.51%	84.28%	85.69%	86.76%	87.44%	87.76%	88.02%	88.22%	88.40%	88.61%	88.82%	89.06%	89.30%	89.54%	89.83%	90.14%	90.40%	90.87%	90.87%
1993	0.66%	4.90%	10.60%	22.04%	30.67%	43.52%	53.92%	59.17%	67.47%	74.04%	79.40%	82.51%	84.41%	85.78%	86.82%	87.38%	87.71%	87.92%	88.09%	88.24%	88.40%	88.58%	88.77%	89.00%	89.21%	89.45%	89.73%	89.95%	90.27%	90.41%	90.41%
1994	0.64%	3.91%	14.11%	23.74%	38.63%	49.79%	55.45%	64.29%	71.41%	77.40%	80.99%	83.20%	84.80%	85.94%	86.57%	86.87%	87.08%	87.25%	87.39%	87.55%	87.73%	87.93%	88.15%	88.39%	88.64%	88.87%	89.06%	89.33%	89.49%	89.62%	89.62%
1995	1.30%	9.80%	22.85%	46.54%	58.16%	63.05%	70.45%	75.93%	80.17%	82.92%	84.78%	86.08%	86.92%	87.34%	87.51%	87.63%	87.71%	87.79%	87.89%	87.99%	88.10%	88.22%	88.34%	88.51%	88.66%	88.79%	88.95%	89.06%	89.14%	89.23%	89.23%
1996	0.55%	6.56%	36.19%	55.32%	61.76%	71.54%	77.34%	81.47%	84.23%	86.02%	87.26%	88.13%	88.58%	88.76%	88.90%	88.98%	89.06%	89.14%	89.24%	89.34%	89.45%	89.57%	89.70%	89.82%	89.93%	90.07%	90.16%	90.22%	90.31%	90.40%	90.41%
1997	0.90%	16.69%	43.64%	53.68%	69.34%	76.32%	81.11%	84.20%	86.24%	87.73%	88.75%	89.25%	89.46%	89.58%	89.67%	89.73%	89.82%	89.94%	90.04%	90.16%	90.31%	90.45%	90.58%	90.71%	90.84%	90.95%	91.03%	91.11%	91.20%	91.30%	91.30%
1998	4.00%	25.17%	37.65%	58.65%	69.16%	76.41%	81.12%	84.27%	86.44%	87.98%	88.75%	89.06%	89.23%	89.36%	89.45%	89.59%	89.72%	89.85%	89.99%	90.16%	90.31%	90.49%	90.64%	90.79%	90.90%	91.00%	91.12%	91.24%	91.35%	91.46%	91.46%
1999	0.98%	5.52%	36.43%	55.59%	67.64%	74.72%	80.20%	84.10%	86.87%	88.14%	88.57%	88.84%	88.98%	89.11%	89.29%	89.48%	89.67%	89.92%	90.15%	90.37%	90.59%	90.81%	91.03%	91.18%	91.31%	91.45%	91.57%	91.71%	91.80%	91.92%	91.92%
2000	0.86%	28.92%	48.31%	61.80%	69.79%	76.33%	81.07%	84.49%	86.07%	86.58%	86.90%	87.02%	87.20%	87.45%	87.68%	87.93%	88.24%	88.53%	88.85%	89.14%	89.40%	89.71%	89.88%	90.01%	90.15%	90.32%	90.47%	90.60%	90.71%	90.82%	90.83%
2001	3.60%	22.52%	43.85%	57.56%	69.66%	77.89%	83.38%	85.50%	86.24%	86.60%	86.83%	87.05%	87.34%	87.68%	88.04%	88.36%	88.84%	89.24%	89.59%	89.87%	90.25%	90.53%	90.71%	90.87%	91.02%	91.19%	91.34%	91.48%	91.64%	91.76%	91.76%
2002	2.97%	29.83%	46.27%	61.84%	72.90%	80.49%	83.41%	84.25%	84.68%	84.92%	85.14%	85.49%	85.83%	86.24%	86.64%	87.08%	87.57%	88.01%	88.37%	88.81%	89.05%	89.23%	89.42%	89.63%	89.82%	90.02%	90.17%	90.31%	90.45%	90.61%	90.62%
2003	7.31%	27.03%	49.75%	65.94%	76.20%	80.31%	81.40%	82.02%	82.33%	82.59%	83.05%	83.47%	84.00%	84.63%	85.32%	85.94%	86.56%	86.97%	87.47%	87.78%	88.03%	88.25%	88.49%	88.74%	88.95%	89.15%	89.32%	89.49%	89.62%	89.76%	89.77%
2004	5.72%	30.13%	51.63%	66.41%	72.14%	73.71%	74.46%	74.82%	75.19%	75.77%	76.40%	77.14%	77.98%	78.90%	79.83%	80.66%	81.33%	82.11%	82.57%	82.94%	83.31%	83.69%	84.05%	84.37%	84.66%	84.93%	85.17%	85.40%	85.63%	85.86%	85.86%
2005	7.15%	24.94%	41.67%	51.91%	54.65%	55.90%	56.47%	57.08%	58.24%	59.36%	60.71%	62.31%	64.04%	65.84%	67.55%	68.76%	70.16%	70.95%	71.50%	72.05%	72.78%	73.35%	73.87%	74.35%	74.80%	75.22%	75.62%	75.99%	76.34%	76.70%	76.70%
2006	3.24%	15.58%	29.82%	38.53%	41.15%	42.01%	43.01%	44.89%	46.29%	47.83%	49.71%	51.79%	53.95%	55.98%	57.67%	59.60%	60.59%	61.14%	61.97%	62.78%	63.59%	64.34%	64.95%	65.54%	65.86%	66.31%	66.83%	67.36%	67.76%	68.21%	68.21%
2007	2.10%	13.38%	28.90%	36.63%	38.73%	40.73%	43.48%	44.55%	46.13%	47.65%	49.73%	51.52%	53.09%	54.42%	56.23%	57.11%	57.78%	58.59%	59.46%	60.14%	60.69%	61.14%	61.86%	62.43%	63.04%	63.41%	63.61%	64.24%	64.68%	65.18%	65.18%
2008	1.07%	24.21%	36.20%	42.56%	47.58%	53.24%	55.01%	56.74%	58.41%	60.05%	61.69%	63.18%	64.39%	66.07%	66.77%	67.30%	67.91%	68.42%	69.10%	69.67%	70.12%	70.56%	70.94%	71.33%	71.65%	72.04%	72.34%	72.59%	72.82%	73.08%	73.10%
2009	10.22%	24.41%	33.54%	39.26%	46.97%	50.39%	53.34%	56.09%	58.82%	61.89%	64.67%	66.69%	68.98%	70.23%	71.04%	72.12%	73.08%	74.11%	74.79%	75.42%	75.97%	76.38%	76.81%	77.22%	77.55%	77.94%	78.25%	78.54%	78.75%	79.00%	79.00%
2010	2.61%	10.18%	16.25%	27.48%	36.71%	45.81%	51.86%	57.18%	61.95%	66.39%	69.56%	72.91%	74.49%	75.73%	76.98%	78.35%	79.55%	80.57%	81.47%	82.29%	82.96%	83.51%	84.01%	84.51%	84.93%	85.34%	85.68%	85.97%	86.20%	86.40%	86.40%
2011	1.19%	9.37%	24.46%	36.63%	49.39%	59.08%	65.10%	69.95%	74.42%	77.55%	80.46%	82.06%	83.23%	84.40%	85.45%	86.51%	87.42%	88.21%	88.82%	89.31%	89.78%	90.26%	90.66%	90.99%	91.28%	91.54%	91.78%	92.00%	92.20%	92.36%	92.36%
2012	2.67%	17.67%	32.20%	47.01%	59.20%	67.65%	72.77%	77.42%	80.47%	83.17%	84.73%	85.85%	86.89%	87.91%	88.91%	89.69%	90.41%	91.02%	91.55%	92.04%	92.44%	92.71%	93.05%	93.32%	93.57%	93.74%	93.92%	94.07%	94.26%	94.40%	94.41%
2013	2.76%	15.49%	32.93%	48.66%	60.97%	69.54%	76.12%	80.45%	83.79%	85.61%	86.95%	88.19%	89.39%	90.40%	91.34%	92.09%	92.60%	93.22%	93.63%	94.18%	94.56%	94.86%	95.23%	95.44%	95.63%	95.82%	95.97%	96.14%	96.20%	96.30%	96.30%
2014	3.54%	31.59%	52.29%	65.07%	73.35%	80.33%	84.87%	88.13%	89.50%	90.46%	91.25%	92.00%	92.58%	93.19%	93.68%	94.12%	94.54%	94.85%	95.16%	95.47%	95.70%	95.93%	96.15%	96.31%	96.47%	96.60%	96.74%	96.86%	96.97%	97.05%	97.05%
2015	8.28%	30.42%	48.92%	61.72%	71.24%	79.56%	85.13%	87.27%	88.97%	90.24%	91.29%	92.23%	92.87%	93.50%	94.00%	94.41%	94.81%	95.18%	95.59%	95.90%	96.14%	96.39%	96.59%	96.76%	96.89%	96.96%	97.04%	97.15%	97.29%	97.33%	97.33%
2016	7.61%	26.25%	41.78%	54.03%	67.32%	78.84%	82.89%	85.34%	87.29%	89.10%	90.73%	91.55%	92.32%	92.93%	93.64%	94.11%	94.52%	94.93%	95.25%	95.79%	95.96%	96.30%	96.43%	96.58%	96.73%	96.82%	96.90%	96.99%	97.03%	97.18%	97.18%
2017	1.34%	15.07%	29.74%	49.92%	69.60%	74.82%	78.87%	81.85%	84.25%	86.14%	87.70%	88.88%	90.02%	90.70%	91.41%	92.12%	92.83%	93.44%	93.99%	94.26%	94.47%	94.84%	95.15%	95.34%	95.50%	95.55%	95.76%	95.89%	96.00%	96.10%	96.10%
2018	2.52%	18.31%	42.90%	66.15%	72.23%	75.54%	79.01%	82.09%	83.88%	85.40%	86.61%	87.85%	88.61%	89.11%	89.85%	90.50%	90.90%	91.32%	91.77%	91.98%	92.27%	92.58%	92.92%	93.08%	93.27%	93.42%	93.63%	93.79%	93.85%	93.95%	93.95%
2019	6.77%	38.97%	64.90%	72.02%	75.87%	79.68%	82.29%	84.34%	86.42%	87.60%	88.68%	89.77%	90.44%	91.11%	91.58%	91.88%	92.29%	92.79%	93.05%	93.37%	93.64%	93.84%	94.08%	94.25%	94.37%	94.43%	94.46%	94.63%	94.72%	94.84%	94.84%
2020	8.70%	44.64%	56.23%	66.38%	70.43%	76.81%	79.71%	82.90%	84.93%	85.80%	87.25%	88.41%	88.99%	89.57%	90.14%	90.43%	90.43%	91.01%	91.88%	92.17%	92.46%	92.46%	92.46%	92.46%	92.75%	92.75%	92.75%	93.04%	93.04%	93.04%	93.04%
2021	1.21%	23.03%	43.03%	55.76%	67.88%	75.76%	81.21%	83.64%	86.06%	87.88%	89.70%	90.30%	90.91%	90.91%	92.12%	92.12%	92.12%	92.12%	92.12%	92.12%	92.73%	92.73%	92.73%	92.73%	92.73%	93.33%	93.94%	95.15%	95.15%	95.15%	95.15%

Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Conditional Loss Rate
ARM

Table 10: Gross Claim Cost in Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0	1,109,037	3,385,149	5,879,190	7,319,339	5,519,002	6,331,310	6,781,556	5,516,832	2,760,250	2,639,433	1,080,863	429,741	377,374	267,980	70,442	85,247	111,878	0	0	111,141	42,886	0	0	51,917	0	20,393	0	14,476	0
1991	71,157	2,143,037	14,962,806	23,250,835	28,041,777	29,576,062	36,636,796	32,677,974	21,321,455	14,196,057	7,156,032	3,102,329	1,803,724	1,811,631	707,597	590,021	115,307	185,326	217,041	481,571	119,075	557,455	290,576	78,763	121,313	313,729	213,420	45,021	17,600	0
1992	79,894	10,202,714	48,214,657	72,250,400	97,026,446	122,691,477	102,860,581	67,561,678	44,855,419	19,782,013	11,424,613	8,353,467	3,900,722	1,689,993	1,356,529	772,462	690,091	1,454,903	998,645	757,272	841,541	1,154,355	833,971	840,521	1,134,615	333,873	315,199	220,180	346	0
1993	265,917	17,717,152	73,462,363	128,834,885	199,291,798	171,506,645	121,067,397	74,717,763	35,245,372	19,866,910	15,453,617	6,898,144	2,727,927	1,653,531	1,706,697	1,239,671	1,282,496	1,558,833	1,199,205	1,152,534	1,533,643	1,308,041	1,193,312	1,677,344	604,386	663,646	269,055	218,362	24,258	30,634
1994	535,940	34,188,751	170,094,412	335,538,492	354,453,938	262,560,012	158,762,627	78,539,979	45,319,367	32,202,709	15,570,056	6,430,339	4,867,403	2,770,103	2,767,445	2,427,492	3,790,043	3,307,906	2,239,497	3,606,126	2,371,242	1,960,669	2,203,120	1,610,584	932,711	461,176	171,589	7,502	31,314	2,976
1995	673,354	33,371,266	184,426,836	287,815,862	257,408,830	146,405,887	79,270,615	51,184,660	42,512,089	22,817,167	10,111,102	7,292,161	2,623,738	3,159,756	2,638,506	4,028,405	2,792,580	2,153,896	3,291,046	2,427,522	2,428,927	3,281,546	2,039,909	937,001	539,509	138,187	0	20,771	144,315	63,341
1996	302,438	53,293,766	278,765,735	420,109,158	291,754,900	170,359,111	115,223,493	92,512,862	42,438,134	20,095,225	12,102,853	6,855,709	8,858,310	6,894,098	6,939,036	6,595,407	5,247,243	6,144,064	4,171,928	5,376,473	5,673,168	2,943,485	1,126,577	1,365,515	201,046	62,917	100,049	304,299	124,490	18,522
1997	661,798	89,700,844	383,149,116	432,901,851	308,664,589	225,402,439	171,204,462	78,791,295	39,544,318	22,122,120	15,342,070	13,640,443	11,793,258	13,667,086	10,065,530	9,322,841	8,561,849	7,737,606	8,097,311	7,407,118	4,121,617	1,916,285	783,986	697,715	238,708	166,625	271,235	289,573	81,467	141,656
1998	1,301,992	78,227,070	170,388,656	147,093,495	112,784,157	90,431,700	47,271,414	23,923,425	13,994,376	8,739,571	7,822,076	7,042,694	7,053,955	5,370,474	6,763,907	5,896,367	3,634,797	3,593,634	4,915,719	1,626,351	1,036,036	260,513	178,669	80,736	34,928	277,052	108,817	240,163	80,271	83,566
1999	240,968	11,509,575	61,147,375	89,652,502	108,165,795	61,320,529	30,166,886	15,761,799	10,618,655	8,131,622	10,379,834	10,128,584	7,547,129	8,293,751	8,386,984	4,923,940	4,254,918	3,297,770	2,765,260	1,259,377	697,796	399,416	86,799	162,615	6,376	104,853	200,142	456,337	191,569	80,559
2000	77,444	32,119,454	90,436,664	128,557,361	83,928,327	50,359,735	32,560,053	23,451,869	22,677,243	18,219,008	16,146,464	12,737,501	12,141,795	13,711,274	8,382,955	5,840,115	5,402,060	4,257,116	1,250,493	823,335	528,307	238,317	160,239	478,681	338,073	265,631	171,635	275,847	143,419	184,258
2001	0	5,755,293	36,898,228	38,127,314	23,039,534	17,186,803	14,116,607	12,279,854	14,245,419	11,312,418	10,236,889	6,771,695	7,152,222	5,120,728	3,083,654	2,468,763	1,017,353	504,384	372,255	142,581	22,274	61,040	411,479	188,191	295,431	156,892	188,142	174,476	124,154	59,819
2002	33,295	21,661,072	124,048,819	113,191,978	94,507,788	76,536,238	80,332,488	66,611,667	58,586,198	42,083,924	40,197,571	34,314,451	21,722,589	16,444,842	13,886,996	5,739,029	3,177,219	1,738,109	666,384	143,712	208,776	546,514	1,142,719	650,031	540,571	328,924	655,531	161,108	311,157	51,404
2003	360,979	30,349,822	84,387,009	76,326,919	71,665,887	76,985,128	60,871,045	55,802,302	37,776,593	35,322,641	31,210,597	17,438,361	11,391,482	10,671,182	5,513,348	3,007,109	1,476,033	718,196	154,833	61,026	946,236	952,382	397,504	316,966	273,732	25,709	71,634	445,095	59,924	71,631
2004	5,585,737	78,063,581	156,117,979	182,986,687	210,150,690	178,302,797	135,890,235	93,716,248	95,095,802	91,568,202	54,546,037	36,356,218	30,815,294	14,672,835	9,296,264	4,759,310	2,197,154	264,082	861,731	1,628,341	2,541,676	1,462,572	1,610,630	1,864,937	1,741,505	520,829	397,535	429,784	465,820	188,092
2005	3,517,586	53,390,904	131,117,395	188,036,322	182,052,034	160,186,498	105,854,461	101,072,765	97,461,691	67,837,305	52,293,698	33,021,509	17,099,917	9,319,790	4,708,388	3,514,760	535,229	373,962	2,077,163	1,780,055	2,494,018	1,758,294	1,274,499	1,554,413	911,343	1,281,232	491,985	528,581	223,687	129,305
2006	350,879	18,410,902	44,915,086	68,694,803	73,573,781	45,955,527	43,124,755	31,520,038	23,562,561	17,122,576	14,697,611	6,200,149	4,103,190	1,672,200	1,232,921	527,975	339,150	858,780	602,214	973,829	413,164	432,406	697,480	302,863	143,108	206,395	109,669	96,326	47,949	0
2007	54,588	9,209,501	32,822,563	48,023,574	34,682,907	28,818,413	24,549,847	12,740,754	8,645,320	8,535,251	5,661,617	3,397,900	1,922,214	414,086	24,902	70,354	134,194	307,171	615,736	92,919	122,397	482,871	400,867	333,676	231,478	40,295	260,020	121,643	236,833	13,545
2008	25,302	15,722,722	73,409,582	98,086,285	83,201,098	90,552,179	76,027,712	38,160,682	23,078,057	15,956,962	6,032,758	3,208,556	931,381	1,061,381	481,520	908,291	1,414,770	1,416,393	517,971	829,830	816,987	406,307	493,045	65,336	959,655	253,904	0	73,195	194,319	0
2009	1,349,610	27,057,436	60,890,725	72,095,292	103,070,492	82,822,054	47,531,823	37,885,842	20,940,872	12,067,030	5,247,823	4,663,140	973,495	732,491	1,040,377	925,922	534,659	1,169,680	239,897	1,526,746	663,683	371,691	167,942	148,518	317,579	156,243	0	234,091	0	46,532
2010	1,815,964	31,855,339	90,734,931	173,219,153	189,088,493	124,437,264	100,010,904	48,815,039	34,070,345	18,781,371	10,645,635	2,499,411	1,673,349	4,389,197	3,108,178	3,955,123	1,261,293	2,017,701	1,416,891	2,158,431	1,871,796	1,152,638	1,264,177	303,498	829,540	464,494	355,503	335,564	74,260	245,337
2011	854,442	23,200,605	75,135,270	95,475,901	86,584,046	52,518,773	33,215,007	21,167,322	11,287,368	5,235,664	1,365,042	30,400,757	6,859,746	2,840,662	2,505,875	1,761,187	3,784,373	1,031,199	1,562,829	1,114,895	1,545,104	840,544	1,682,889	873,087	932,766	471,940	211,080	373,219	244,378	4,348
2012	745,107	10,891,817	21,995,035	18,014,395	19,072,108	13,833,285	9,742,461	6,589,341	2,697,199	463,610	883,885	1,787,160	876,261	729,368	1,059,731	1,191,033	736,012	995,026	722,898	481,487	557,019	202,479	467,105	0	86,680	0	52,192	14,308	0	24,729
2013	278,170	2,005,604	4,160,566	5,079,966	3,269,261	3,201,296	3,149,409	1,218,801	110,372	786,630	569,621	966,901	247,227	480,730	92,712	339,365	265,800	101,100	320,655	101,287	85,210	299,194	132,836	307,462	38,843	0	0	0	11,759	134,658
2014	0	2,099,424	4,611,453	10,698,397	4,266,610	4,277,970	3,465,104	140,867	1,398,006	12,253,819	1,716,828	1,527,866	2,045,483	1,367,425	1,207,638	502,567	802,394	162,781	261,925	342,712	213,351	393,688	119,834	19,082	0	0	0	0	112,037	1,716
2015	0	833,453	3,913,313	3,095,524	2,328,511	1,724,023	423,350	460,854	13,879,859	1,751,874	777,020	1,309,817	680,768	1,155,532	360,566	125,505	504,389	451,715	318,873	16,313	676,832	398,177	75,008	21,754	0	76,016	0	0	0	0
2016	0	164,778	484,367	1,761,820	396,250	327,173	465,471	1,937,380	1,420,019	467,356	542,936	473,114	664,549	483,937	564,130	237,208	49,805	0	241,616	0	355,099	0	199,064	466,801	0	120,137	0	0	0	0
2017	0	39,666	565,580	320,399	77,593	994,192	995,889	4,102,035	1,392,256	1,424,421	554,072	694,094	66,476	427,486	344,413	55,348	322,009	83,740	124,121	225,725	211,282	0	0	0	0	0	0	0	0	0
2018	0	502,979	591,937	244,566	1,577,300	3,945,645	2,987,100	3,254,586	1,272,182	2,359,439	1,229,944	456,977	2,069,599	378,635	387,767	464,462	255,402	30,502	0	120,019	226,564	0	0	290,670	0	0	0	0	0	0
2019	0	216,344	309,786	1,298,704	3,448,473	2,324,165	24,294,593	1,537,631	3,002,417	1,314,109	1,257,401	942,583	178,076	1,051,787	366,141	50,758	228,935	0	140,383	295,516	56,653	39,985	0	0	31,281	0	0	0	0	0
2020	0	0	355,090	911,443	254,976	448,905	39,270	211,149	195,353	0	275,670	67,567	0	0	0	0	61,101	11,062	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	125,981	46,603	20,925	108,230	39,700	0	0	142,164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 11: Claim Cost Net of Recovery in Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0	506,957	1,768,005	3,281,109	4,109,946	3,174,489	3,447,764	3,514,904	2,671,900	1,140,930	1,018,741	272,242	111,472	161,359	24,622	60,935	30,894	8,764	0	0	71,686	14,084	0	0	0	0	0	0	9,468	0
1991	0	1,106,186	8,385,005	12,207,472	14,742,322	15,552,743	17,955,701	15,487,470	9,116,110	5,257,781	2,346,547	1,138,718	383,743	495,938	246,320	270,282	67,346	157,428	146,775	379,609	99,206	316,495	129,527	0	9,104	149,525	54,567	0	0	0
1992	0	5,718,326	27,187,482	40,401,822	53,746,988	58,652,304	44,097,820	27,297,440	16,220,045	5,840,303	2,337,547	1,983,831	913,360	278,637	247,515	270,689	372,017	792,571	724,745	481,301	399,329	519,980	320,114	205,300	554,773	27,811	(44,419)	120,082	0	0
1993	58,273	9,520,962	41,776,469	69,842,377	97,071,857	71,864,265	44,974,335	25,947,020	9,167,359	4,651,140	3,279,958	1,638,122	975,145	729,864	984,362	749,303	632,826	1,116,320	755,986	537,071	689,659	552,542	401,073	706,967	181,641	346,201	44,098	128,493	0	30,634
1994	244,425	19,924,729	94,882,727	163,207,250	136,581,740	93,881,964	49,302,367	20,227,811	9,819,441	8,358,043	3,777,096	2,060,072	1,514,251	1,146,412	1,821,554	1,240,521	2,371,821	1,984,940	1,305,062	1,954,512	668,478	878,102	869,673	785,788	191,269	89,643	(3,124)	0	31,314	2,976
1995	228,984	19,858,637	87,482,387	111,658,640	91,630,048	49,988,452	23,124,057	12,537,020	12,606,227	6,623,678	3,213,018	2,237,371	1,590,664	1,735,628	1,634,606	2,533,068	1,713,630	1,284,151	1,922,790	1,180,811	1,370,667	1,704,804	912,223	446,092	280,729	36,433	0	20,771	57,203	47,898
1996	125,608	23,199,524	108,355,134	147,455,384	95,867,294	47,587,626	29,433,549	26,326,945	13,953,722	6,186,559	4,611,335	3,336,263	5,013,862	4,213,489	4,123,709	4,004,321	3,276,266	2,913,402	2,592,539	2,785,573	3,378,065	1,218,648	454,613	375,696	60,538	0	49,770	208,816	76,532	18,522
1997	224,473	38,605,627	148,568,058	144,623,172	90,289,993	59,358,310	50,189,349	23,505,858	12,451,370	7,520,793	6,854,282	7,891,215	6,993,484	8,866,107	6,711,432	5,484,568	5,412,032	3,982,033	4,382,628	4,521,685	2,112,172	1,020,361	121,559	427,793	117,005	125,070	190,106	136,103	81,467	110,025
1998	670,450	33,095,431	61,457,362	43,290,306	29,571,109	25,942,249	14,330,691	6,252,569	5,302,255	3,782,059	4,343,963	4,111,869	4,138,119	3,389,581	4,176,540	3,534,678	1,875,028	1,708,310	3,126,117	678,352	485,367	0	76,523	0	34,928	100,633	82,707	127,623	62,103	60,057
1999	59,193	4,370,130	21,094,936	25,329,588	30,845,761	17,996,839	9,664,071	4,873,535	4,823,712	4,192,565	5,098,974	5,769,049	4,789,230	5,287,483	5,135,641	2,162,481	2,188,902	1,532,192	1,472,044	495,759	384,115	206,192	58,889	87,892	6,376	95,626	156,750	283,305	42,990	61,830
2000	0	11,426,260	26,791,122	41,621,550	27,240,874	17,718,283	10,999,394	10,257,454	12,313,351	10,000,596	9,498,210	8,604,095	7,954,225	7,132,093	4,037,228	3,033,432	3,337,514	2,341,447	314,491	366,241	195,076	47,470	128,418	293,524	221,854	139,504	134,985	160,112	126,814	71,962
2001	0	1,563,380	12,699,120	12,712,835	7,570,461	6,090,033	6,209,380	7,402,771	8,254,157	6,762,651	6,475,539	4,322,783	4,021,108	2,008,335	1,592,195	1,241,033	379,884	48,668	171,621	48,523	0	18,549	200,699	150,265	54,149	83,022	109,674	72,128	62,434	25,008
2002	0	8,081,902	44,664,077	37,740,049	34,945,140	34,856,939	44,948,727	37,148,076	37,287,413	28,136,558	25,171,940	20,800,169	10,967,325	9,444,640	8,185,426	3,493,039	1,737,061	498,831	295,329	143,712	175,304	375,512	802,241	384,413	309,893	221,053	243,264	136,363	206,529	22,375
2003	24,299	12,606,945	31,435,728	28,243,174	32,190,794	39,859,146	35,301,889	33,280,033	24,609,720	22,541,766	19,192,673	9,070,150	6,213,351	5,044,348	3,680,330	1,772,846	784,884	267,294	50,015	61,026	711,581	531,804	242,770	213,664	249,636	25,709	54,912	191,879	37,605	30,386
2004	2,171,576	32,694,885	61,890,757	86,714,914	113,940,376	104,735,969	84,524,428	60,761,342	63,341,508	55,331,145	28,918,537	18,954,320	17,245,342	9,094,093	5,631,390	2,276,215	1,247,484	0	569,916	1,375,214	1,739,186	1,119,540	959,024	1,113,798	1,111,910	260,278	151,039	302,510	262,998	104,749
2005	1,900,666	22,265,730	63,866,693	105,587,528	108,136,622	103,952,206	71,381,285	68,251,590	59,743,497	37,039,131	29,908,409	19,003,890	10,239,654	6,228,576	3,012,369	1,584,037	133,103	339,397	1,659,820	1,228,404	1,579,825	1,316,440	840,746	1,112,874	606,485	640,454	348,331	438,886	166,558	86,171
2006	140,747	8,924,150	27,119,144	43,361,604	49,756,842	31,480,099	28,806,634	20,314,167	13,215,549	9,805,218	8,862,812	3,595,225	2,240,857	509,026	671,137	273,865	208,992	555,050	442,065	632,614	250,879	398,432	531,653	255,757	143,108	139,480	9,274	58,732	21,793	0
2007	0	5,217,606	20,041,085	31,701,998	22,976,711	19,184,753	15,847,502	6,707,377	4,867,008	5,748,282	3,580,482	2,090,030	705,178	188,023	0	70,354	80,700	218,113	429,222	92,919	99,443	279,571	218,259	151,233	141,271	40,295	164,298	62,944	158,201	13,545
2008	0	9,537,247	46,900,824	66,016,599	55,007,175	56,859,709	40,413,427	22,357,154	13,496,349	7,394,245	2,804,025	1,659,534	160,855	244,850	120,619	524,815	1,078,177	1,174,649	517,971	390,514	659,693	368,484	406,637	65,336	268,957	253,904	0	73,195	113,554	0
2009	941,454	16,815,306	41,305,319	46,422,729	50,335,421	40,640,876	24,352,616	22,689,679	11,184,301	7,408,090	2,934,556	1,626,136	0	732,491	791,973	559,359	263,291	730,727	239,897	1,014,618	491,581	284,122	64,234	76,044	317,579	115,485	0	218,462	0	46,532
2010	934,452	22,838,589	59,880,009	100,468,672	85,255,873	63,037,647	54,665,850	31,892,244	20,142,676	11,015,435	4,806,597	1,150,127	1,305,485	3,264,375	2,336,832	1,996,893	722,765	1,328,470	1,115,132	1,493,097	947,567	716,084	544,636	265,133	701,878	194,149	185,277	236,312	74,260	125,794
2011	91,078	16,284,943	45,344,900	41,680,883	39,532,280	29,596,425	18,824,537	12,191,243	5,809,665	2,068,684	532,021	26,554,134	4,097,146	2,114,502	1,610,650	1,457,177	2,316,546	973,760	825,646	774,130	1,061,422	482,979	1,118,705	641,580	665,425	275,630	111,488	236,235	244,378	4,348
2012	0	7,355,751	9,692,053	9,136,394	9,490,101	5,946,728	4,130,485	3,087,318	965,350	18,223	624,467	826,569	687,663	404,804	563,975	585,403	736,012	445,673	423,028	383,387	321,247	146,298	282,486	0	54,507	0	52,192	14,308	0	24,729
2013	0	681,545	1,487,737	2,813,594	1,439,253	1,324,853	1,004,042	143,946	0	520,942	302,691	817,479	247,227	399,579	92,712	339,365	192,056	101,100	212,878	81,045	85,210	272,372	132,836	183,288	38,843	0	0	0	11,759	74,046
2014	0	538,737	2,025,660	4,362,112	1,863,580	1,354,691	1,530,090	29,311	1,209,533	10,096,638	1,145,020	718,680	1,247,495	929,377	899,553	295,384	563,822	54,615	171,661	161,996	65,829	200,764	119,834	19,082	0	0	0	0	61,532	1,716
2015	0	94,604	1,959,068	953,932	925,348	502,139	120,841	274,656	10,722,439	1,115,836	643,985	887,226	634,442	660,575	197,350	125,505	341,105	380,648	223,341	16,313	412,476	292,928	75,008	21,754	0	76,016	0	0	0	0
2016	0	0	32,320	875,494	52,961	240,515	465,471	1,071,708	1,031,373	348,559	478,957	174,292	603,584	406,662	105,995	237,208	49,805	0	158,886	0	185,680	0	103,964	413,278	0	120,137	0	0	0	0
2017	0	0	297,040	0	0	611,567	787,153	1,624,895	797,280	1,011,642	323,581	558,191	66,476	282,235	344,413	48,200	288,576	83,740	86,592	140,032	93,915	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	1,288,184	2,553,654	1,639,183	2,005,999	718,177	987,047	536,581	416,515	1,431,837	237,079	387,767	225,965	241,727	30,502	0	46,168	146,956	0	0	220,847	0	0	0	0	0	0
2019	0	0	212,821	1,114,984	2,031,422	1,615,857	18,608,198	540,255	1,849,567	605,259	561,082	347,246	178,076	516,661	262,739	50,758	228,935	0	82,786	212,120	56,653	39,985	0	0	31,281	0	0	0	0	0
2020	0	0	355,090	208,261	254,976	326,508	39,270	76,599	94,362	0	76,705	67,567	0	0	0	0	61,101	11,062	0	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	125,981	46,603	20,925	108,230	39,700	0	0	142,164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 12: Conditional Loss Severity = Table 11/Table 10
Loss Severity for Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	0.00%	45.71%	52.23%	55.81%	56.15%	57.52%	54.46%	51.83%	48.43%	41.33%	38.60%	25.19%	25.94%	42.76%	9.19%	86.50%	36.24%	7.83%	0.00%	0.00%	64.50%	32.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	65.41%	0.00%
1991	0.00%	51.62%	56.04%	52.50%	52.57%	52.59%	49.01%	47.39%	42.76%	37.04%	32.79%	36.71%	21.28%	27.38%	34.81%	45.81%	58.41%	84.95%	67.63%	78.83%	83.31%	56.77%	44.58%	0.00%	7.50%	47.66%	25.57%	0.00%	0.00%	0.00%
1992	0.00%	56.05%	56.39%	55.92%	55.39%	47.80%	42.87%	40.40%	36.16%	29.52%	20.46%	23.75%	23.42%	16.49%	18.25%	35.04%	53.91%	54.48%	72.57%	63.56%	47.45%	45.05%	38.38%	24.43%	48.90%	8.33%	-14.09%	54.54%	0.00%	0.00%
1993	21.91%	53.74%	56.87%	54.21%	48.71%	41.90%	37.15%	34.73%	26.01%	23.41%	21.22%	23.75%	35.75%	44.14%	57.68%	60.44%	49.34%	71.61%	63.04%	46.60%	44.97%	42.24%	33.61%	42.15%	30.05%	52.17%	16.39%	58.84%	0.00%	100.00%
1994	45.61%	58.28%	55.78%	48.64%	38.53%	35.76%	31.05%	25.75%	21.67%	25.95%	24.26%	32.04%	31.11%	41.39%	65.82%	51.10%	62.58%	60.01%	58.27%	54.20%	28.19%	44.79%	39.47%	48.79%	20.51%	19.44%	-1.82%	0.00%	100.00%	100.00%
1995	34.01%	59.51%	47.43%	38.80%	35.60%	34.14%	29.17%	24.49%	29.65%	29.03%	31.78%	30.68%	60.63%	54.93%	61.95%	62.88%	61.36%	59.62%	58.42%	48.64%	56.43%	51.95%	44.72%	47.61%	52.03%	26.37%	0.00%	100.00%	39.64%	75.62%
1996	41.53%	43.53%	38.87%	35.10%	32.86%	27.93%	25.54%	28.46%	32.88%	30.79%	38.10%	48.66%	56.60%	61.12%	59.43%	60.71%	62.44%	47.42%	62.14%	51.81%	59.54%	41.40%	40.35%	27.51%	30.11%	0.00%	49.75%	68.62%	61.48%	100.00%
1997	33.92%	43.04%	38.78%	33.41%	29.25%	26.33%	29.32%	29.83%	31.49%	34.00%	44.68%	57.85%	59.30%	64.87%	66.68%	58.83%	63.21%	51.46%	54.12%	61.05%	51.25%	53.25%	15.51%	61.31%	49.02%	75.06%	70.09%	47.00%	100.00%	77.67%
1998	51.49%	42.31%	36.07%	29.43%	26.22%	28.69%	30.32%	26.14%	37.89%	43.28%	55.53%	58.38%	58.66%	63.12%	61.75%	59.95%	51.59%	47.54%	63.59%	41.71%	46.85%	0.00%	42.83%	0.00%	100.00%	36.32%	76.01%	53.14%	77.37%	71.87%
1999	24.56%	37.97%	34.50%	28.25%	28.52%	29.35%	32.04%	30.92%	45.43%	51.56%	49.12%	56.96%	63.46%	63.75%	61.23%	43.92%	51.44%	46.46%	53.23%	39.37%	55.05%	51.62%	67.85%	54.05%	100.00%	91.20%	78.32%	62.08%	22.44%	76.75%
2000	0.00%	35.57%	29.62%	32.38%	32.46%	35.18%	33.78%	43.74%	54.30%	54.89%	58.83%	67.55%	65.51%	52.02%	48.16%	51.94%	61.78%	55.00%	25.15%	44.48%	36.92%	19.92%	80.14%	61.32%	65.62%	52.52%	78.65%	58.04%	88.42%	39.05%
2001	0.00%	27.16%	34.42%	33.34%	32.86%	35.43%	43.99%	60.28%	57.94%	59.78%	63.26%	63.84%	56.22%	39.22%	51.63%	50.27%	37.34%	9.65%	46.10%	34.03%	0.00%	30.39%	48.78%	79.85%	18.33%	52.92%	58.29%	41.34%	50.29%	41.81%
2002	0.00%	37.31%	36.01%	33.34%	36.98%	45.54%	55.95%	55.77%	63.65%	66.86%	62.62%	60.62%	50.49%	57.43%	58.94%	60.86%	54.67%	28.70%	44.32%	100.00%	83.97%	68.71%	70.20%	59.14%	57.33%	67.20%	37.11%	84.64%	66.37%	43.53%
2003	6.73%	41.54%	37.25%	37.00%	44.92%	51.78%	57.99%	59.64%	65.15%	63.82%	61.49%	52.01%	54.54%	47.27%	66.75%	58.96%	53.18%	37.22%	32.30%	100.00%	75.20%	55.84%	61.07%	67.41%	91.20%	100.00%	76.66%	43.11%	62.75%	42.42%
2004	38.88%	41.88%	39.64%	47.39%	54.22%	58.74%	62.20%	64.84%	66.61%	60.43%	53.02%	52.14%	55.96%	61.98%	60.58%	47.83%	56.78%	0.00%	66.14%	84.45%	68.43%	76.55%	59.54%	59.72%	63.85%	49.97%	37.99%	70.39%	56.46%	55.69%
2005	54.03%	41.70%	48.71%	56.15%	59.40%	64.89%	67.43%	67.53%	61.30%	54.60%	57.19%	57.55%	59.88%	66.83%	63.98%	45.07%	24.87%	90.76%	79.91%	69.01%	63.34%	74.87%	65.97%	71.59%	66.55%	49.99%	70.80%	83.03%	74.46%	66.64%
2006	40.11%	48.47%	60.38%	63.12%	67.63%	68.50%	66.80%	64.45%	56.09%	57.26%	60.30%	57.99%	54.61%	30.44%	54.43%	51.87%	61.62%	64.63%	73.41%	64.96%	60.72%	92.14%	76.22%	84.45%	100.00%	67.58%	8.46%	60.97%	45.45%	0.00%
2007	0.00%	56.65%	61.06%	66.01%	66.25%	66.57%	64.55%	52.65%	56.30%	67.35%	63.24%	61.51%	36.69%	45.41%	0.00%	100.00%	60.14%	71.01%	69.71%	100.00%	81.25%	57.90%	54.45%	45.32%	61.03%	100.00%	63.19%	51.75%	66.80%	100.00%
2008	0.00%	60.66%	63.89%	67.30%	66.11%	62.79%	53.16%	58.59%	58.48%	46.34%	46.48%	51.72%	17.27%	23.07%	25.05%	57.78%	76.21%	82.93%	100.00%	47.06%	80.75%	90.69%	82.47%	100.00%	28.03%	100.00%	0.00%	100.00%	58.44%	0.00%
2009	69.76%	62.15%	67.84%	64.39%	48.84%	49.07%	51.23%	59.89%	53.41%	61.39%	55.92%	34.87%	0.00%	100.00%	76.12%	60.41%	49.24%	62.47%	100.00%	66.46%	74.07%	76.44%	38.25%	51.20%	100.00%	73.91%	0.00%	93.32%	0.00%	100.00%
2010	51.46%	71.69%	65.99%	58.00%	45.09%	50.66%	54.66%	65.33%	59.12%	58.65%	45.15%	46.02%	78.02%	74.37%	75.18%	50.49%	57.30%	65.84%	78.70%	69.18%	50.62%	62.13%	43.08%	87.36%	84.61%	41.80%	52.12%	70.42%	100.00%	51.27%
2011	10.66%	70.19%	60.35%	43.66%	45.66%	56.35%	56.67%	57.59%	51.47%	39.51%	38.97%	87.35%	59.73%	74.44%	64.27%	82.74%	61.21%	94.43%	52.83%	69.44%	68.70%	57.46%	66.48%	73.48%	71.34%	58.40%	52.82%	63.30%	100.00%	100.00%
2012	0.00%	67.53%	44.06%	50.72%	49.76%	42.99%	42.40%	46.85%	35.79%	3.93%	70.65%	46.25%	78.48%	55.50%	53.22%	49.15%	100.00%	44.79%	58.52%	79.63%	57.67%	72.25%	60.48%	0.00%	62.88%	0.00%	100.00%	100.00%	0.00%	100.00%
2013	0.00%	33.98%	35.76%	55.39%	44.02%	41.38%	31.88%	11.81%	0.00%	66.22%	53.14%	84.55%	100.00%	83.12%	100.00%	100.00%	72.26%	100.00%	66.39%	80.02%	100.00%	91.04%	100.00%	59.61%	100.00%	0.00%	0.00%	0.00%	100.00%	54.99%
2014	0.00%	25.66%	43.93%	40.77%	43.68%	31.67%	44.16%	20.81%	86.52%	82.40%	66.69%	47.04%	60.99%	67.97%	74.49%	58.78%	70.27%	33.55%	65.54%	47.27%	30.85%	51.00%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	54.92%	100.00%
2015	0.00%	11.35%	50.06%	30.82%	39.74%	29.13%	28.54%	59.60%	77.25%	63.69%	82.88%	67.74%	93.19%	57.17%	54.73%	100.00%	67.63%	84.27%	70.04%	100.00%	60.94%	73.57%	100.00%	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
2016	0.00%	0.00%	6.67%	49.69%	13.37%	73.51%	100.00%	55.32%	72.63%	74.58%	88.22%	36.84%	90.83%	84.03%	18.79%	100.00%	100.00%	0.00%	65.76%	0.00%	52.29%	0.00%	52.23%	88.53%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	52.52%	0.00%	0.00%	61.51%	79.04%	39.61%	57.27%	71.02%	58.40%	80.42%	100.00%	66.02%	100.00%	87.09%	89.62%	100.00%	69.76%	62.04%	44.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2018	0.00%	0.00%	0.00%	0.00%	81.67%	64.72%	54.88%	61.64%	56.45%	41.83%	43.63%	91.15%	69.18%	62.61%	100.00%	48.65%	94.65%	100.00%	0.00%	38.47%	64.86%	0.00%	0.00%	75.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2019	0.00%	0.00%	68.70%	85.85%	58.91%	69.52%	76.59%	35.14%	61.60%	46.06%	44.62%	36.84%	100.00%	49.12%	71.76%	100.00%	100.00%	0.00%	58.97%	71.78%	100.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	100.00%	22.85%	100.00%	72.73%	100.00%	36.28%	48.30%	0.00%	27.82%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2021	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Appendix G
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Mutual Mortgage Insurance Fund
Forward Mortgage Summaries
Cumulative Loss Rate
ARM

Table 13: Cumulative Gross Claim Cost
Total Gross Losses for each Fiscal Year as of the End of the Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	0	1,109,037	4,494,186	10,373,376	17,692,715	23,211,717	29,543,027	36,324,583	41,841,415	44,601,665	47,241,098	48,321,961	48,751,702	49,129,076	49,397,056
1991	71,157	2,214,194	17,177,000	40,427,835	68,469,612	98,045,674	134,682,470	167,360,444	188,681,899	202,877,956	210,033,988	213,136,317	214,940,041	216,751,672	217,459,269
1992	79,894	10,282,608	58,497,265	130,747,665	227,774,111	350,465,588	453,326,169	520,887,847	565,743,266	585,525,279	596,949,892	605,303,359	609,204,081	610,894,074	612,250,603
1993	265,917	17,983,069	91,445,432	220,280,317	419,572,115	591,078,760	712,146,157	786,863,920	822,109,292	841,976,202	857,429,819	864,327,963	867,055,890	868,709,421	870,416,118
1994	535,940	34,724,691	204,819,103	540,357,595	894,811,533	1,157,371,545	1,316,134,172	1,394,674,151	1,439,993,518	1,472,196,227	1,487,766,283	1,494,196,622	1,499,064,025	1,501,834,128	1,504,601,573
1995	673,354	34,044,620	218,471,456	506,287,318	763,696,148	910,102,035	989,372,650	1,040,557,310	1,083,069,399	1,105,886,566	1,115,997,668	1,123,289,829	1,125,913,567	1,129,073,323	1,131,711,829
1996	302,438	53,596,204	332,361,939	752,471,097	1,044,225,997	1,214,585,108	1,329,808,601	1,422,321,463	1,464,759,597	1,484,854,822	1,496,957,675	1,503,813,384	1,512,671,694	1,519,565,792	1,526,504,828
1997	661,798	90,362,642	473,511,758	906,413,609	1,215,078,198	1,440,480,637	1,611,685,099	1,690,476,394	1,730,020,712	1,752,142,832	1,767,484,902	1,781,125,345	1,792,918,603	1,806,585,689	1,816,651,219
1998	1,301,992	79,529,062	249,917,718	397,011,213	509,795,370	600,227,070	647,498,484	671,421,909	685,416,285	694,155,856	701,977,932	709,020,626	716,074,581	721,445,055	728,208,962
1999	240,968	11,750,543	72,897,918	162,550,420	270,716,215	332,036,744	362,203,630	377,965,429	388,584,084	396,715,706	407,095,540	417,224,124	424,771,253	433,065,004	441,451,988
2000	77,444	32,196,898	122,633,562	251,190,923	335,119,250	385,478,985	418,039,038	441,490,907	464,168,150	482,387,158	498,533,622	511,271,123	523,412,918	537,124,192	545,507,147
2001	0	5,755,293	42,653,521	80,780,835	103,820,369	121,007,172	135,123,779	147,403,633	161,649,052	172,961,470	183,198,359	189,970,054	197,122,276	202,243,004	205,326,658
2002	33,295	21,694,367	145,743,186	258,935,164	353,442,952	429,979,190	510,311,678	576,923,345	635,509,543	677,593,467	717,791,038	752,105,489	773,828,078	790,272,920	804,159,916
2003	360,979	30,710,801	115,097,810	191,424,729	263,090,616	340,075,744	400,946,789	456,749,091	494,525,684	529,848,325	561,058,922	578,497,283	589,888,765	600,559,947	606,073,295
2004	5,585,737	83,649,318	239,767,297	422,753,984	632,904,674	811,207,471	947,097,706	1,040,813,954	1,135,909,756	1,227,477,958	1,282,023,995	1,318,380,213	1,349,195,507	1,363,868,342	1,373,164,606
2005	3,517,586	56,908,490	188,025,885	376,062,207	558,114,241	718,300,739	824,155,200	925,227,965	1,022,689,656	1,090,526,961	1,142,820,659	1,175,842,168	1,192,942,085	1,202,261,875	1,206,970,263
2006	350,879	18,761,781	63,676,867	132,371,670	205,945,451	251,900,978	295,025,733	326,545,771	350,108,332	367,230,908	381,928,519	388,128,668	392,231,858	393,904,058	395,136,979
2007	54,588	9,264,089	42,086,652	90,110,226	124,793,133	153,611,546	178,161,393	190,902,147	199,547,467	208,082,718	213,744,335	217,142,235	219,064,449	219,478,535	219,503,437
2008	25,302	15,748,024	89,157,606	187,243,891	270,444,989	360,997,168	437,024,880	475,185,562	498,263,619	514,220,581	520,253,339	523,461,895	524,393,276	525,454,657	525,936,177
2009	1,349,610	28,407,046	89,297,771	161,393,063	264,463,555	347,285,609	394,817,432	432,703,274	453,644,146	465,711,176	470,958,999	475,622,139	476,595,634	477,328,125	478,368,501
2010	1,815,964	33,671,303	124,406,234	297,625,387	486,713,880	611,151,144	711,162,048	759,977,087	794,047,432	812,828,803	823,474,438	825,973,849	827,647,198	832,036,395	835,144,573
2011	854,442	24,055,047	99,190,317	194,666,218	281,250,264	333,769,037	366,984,044	388,151,366	399,438,734	404,674,398	406,039,440	436,440,197	443,299,943	446,140,605	448,646,480
2012	745,107	11,636,924	33,631,959	51,646,354	70,718,462	84,551,747	94,294,208	100,883,549	103,580,748	104,044,358	104,928,243	106,715,403	107,591,664	108,321,032	109,380,764
2013	278,170	2,283,774	6,444,340	11,524,306	14,793,567	17,994,863	21,144,272	22,363,073	22,473,445	23,260,075	23,829,696	24,796,597	25,043,824	25,524,554	25,617,266
2014	0	2,099,424	6,710,877	17,409,274	21,675,884	25,953,854	29,418,958	29,559,825	30,957,831	43,211,650	44,928,478	46,456,344	48,501,827	49,869,252	51,076,890
2015	0	833,453	4,746,766	7,842,290	10,170,801	11,894,824	12,318,174	12,779,028	26,658,887	28,410,761	29,187,782	30,497,599	31,178,367	32,333,899	32,694,465
2016	0	164,778	649,145	2,410,965	2,807,215	3,134,388	3,599,859	5,537,239	6,957,257	7,424,614	7,967,549	8,440,663	9,105,212	9,589,149	10,153,279
2017	0	39,666	605,246	925,645	1,003,238	1,997,430	2,993,319	7,095,354	8,487,610	9,912,032	10,466,103	11,160,198	11,226,674	11,654,160	11,998,573
2018	0	502,979	1,094,916	1,339,482	2,916,782	6,862,427	9,849,527	13,104,113	14,376,295	16,735,734	17,965,678	18,422,654	20,492,253	20,870,889	21,258,656
2019	0	216,344	526,130	1,824,834	5,273,307	7,597,473	31,892,066	33,429,697	36,432,114	37,746,223	39,003,624	39,946,207	40,124,283	41,176,070	41,542,212
2020	0	0	355,090	1,266,533	1,521,509	1,970,414	2,009,684	2,220,834	2,416,187	2,416,187	2,691,857	2,759,423	2,759,423	2,759,423	2,759,423
2021	0	0	0	125,981	172,584	193,509	301,739	341,439	341,439	341,439	483,603	483,603	483,603	483,603	483,603

Fiscal Year	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	49,467,498	49,552,745	49,664,623	49,664,623	49,664,623	49,775,764	49,818,650	49,818,650	49,818,650	49,870,567	49,870,567	49,890,960	49,890,960	49,905,436	49,905,436
1991	218,049,290	218,164,597	218,349,923	218,566,964	219,048,535	219,167,610	219,725,065	220,015,641	220,094,404	220,215,717	220,529,446	220,742,866	220,787,887	220,805,487	220,805,487
1992	613,023,065	613,713,156	615,168,059	616,166,704	616,923,976	617,765,517	618,919,872	619,753,843	620,594,364	621,728,979	622,062,852	622,378,051	622,598,231	622,598,577	622,598,577
1993	871,655,789	872,938,285	874,497,118	875,696,323	876,848,857	878,382,500	879,690,541	880,883,853	882,561,197	883,165,583	883,829,229	884,098,284	884,316,646	884,340,904	884,371,538
1994	1,507,029,065	1,510,819,108	1,514,127,014	1,516,366,511	1,519,972,637	1,522,343,879	1,524,304,548	1,526,507,668	1,528,118,252	1,529,050,963	1,529,512,139	1,529,683,728	1,529,691,230	1,529,722,544	1,529,725,520
1995	1,135,740,234	1,138,532,814	1,140,686,710	1,143,977,756	1,146,405,278	1,148,834,205	1,152,115,751	1,154,155,660	1,155,092,661	1,155,632,170	1,155,770,357	1,155,770,357	1,155,791,128	1,155,935,443	1,155,998,784
1996	1,533,100,235	1,538,347,478	1,544,491,542	1,548,663,470	1,554,039,943	1,559,713,111	1,562,656,596	1,563,783,173	1,565,148,688	1,565,349,734	1,565,412,651	1,565,512,700	1,565,816,999	1,565,941,490	1,565,960,012
1997	1,825,974,060	1,834,535,909	1,842,273,515	1,850,370,826	1,857,777,944	1,861,899,561	1,863,815,846	1,864,599,832	1,865,297,547	1,865,536,255	1,865,702,880	1,865,974,115	1,866,263,688	1,866,345,155	1,866,486,811
1998	734,105,329	737,740,126	741,333,760	746,249,479	747,875,830	748,911,866	749,172,379	749,351,048	749,431,784	749,466,712	749,743,764	749,852,581	750,092,744	750,173,016	750,256,582
1999	446,375,928	450,630,846	453,928,616	456,693,876	457,953,253	458,651,049	459,050,465	459,137,264	459,299,879	459,306,255	459,411,108	459,611,250	460,067,587	460,259,156	460,339,715
2000	551,347,262	556,749,322	561,006,438	562,256,931	563,080,266	563,608,573	563,846,890	564,007,129	564,485,810	564,823,883	565,089,514	565,261,149	565,536,996	565,680,415	565,864,673
2001	207,795,421	208,812,774	209,317,158	209,689,413	209,831,994	209,854,268	209,915,308	210,326,787	210,514,977	210,810,409	210,967,300	211,155,442	211,329,918	211,454,072	211,513,891
2002	809,898,945	813,076,164	814,814,273	815,480,657	815,624,369	815,833,145	816,379,659	817,522,379	818,172,410	818,712,981	819,041,905	819,697,435	819,858,543	820,169,700	820,221,105
2003	609,080,404	610,556,437	611,274,633	611,429,466	611,490,492	612,436,728	613,389,109	613,786,614	614,103,580	614,377,312	614,403,021	614,474,655	614,919,750	614,979,674	615,051,305
2004	1,377,923,916	1,380,121,070	1,380,385,152	1,381,246,883	1,382,875,224	1,385,416,900	1,386,879,472	1,388,490,102	1,390,355,040	1,392,096,544	1,392,617,373	1,393,014,908	1,393,444,692	1,393,910,512	1,394,098,604
2005	1,210,485,023	1,211,020,252	1,211,394,214	1,213,471,377	1,215,251,432	1,217,745,449	1,219,503,743	1,220,778,242	1,222,332,655	1,223,243,998	1,224,525,230	1,225,017,216	1,225,545,797	1,225,769,484	1,225,898,789
2006	395,664,954	396,004,104	396,862,884	397,465,098	398,438,928	398,852,092	399,284,498	399,981,978	400,284,841	400,427,948	400,634,343	400,744,012	400,840,338	400,888,288	400,888,288
2007	219,573,791	219,707,985	220,015,156	220,630,892	220,723,812	220,846,209	221,329,080	221,729,947	222,063,622	222,295,100	222,335,395	222,595,415	222,717,058	222,953,891	222,967,436
2008	526,844,468	528,259,238	529,675,632	530,193,603	531,023,433	531,840,421	532,246,728	532,739,772	532,805,109	533,764,763	534,018,668	534,018,668	534,091,863	534,286,182	534,286,182
2009	479,294,423	479,829,082	480,998,762	481,238,659	482,765,406	483,429,089	483,800,780	483,968,722	484,117,240	484,434,820	484,591,063	484,591,063	484,825,154	484,825,154	484,871,686
2010	839,099,697	840,360,990	842,378,690	843,795,582	845,954,013	847,825,809	848,978,447	850,242,625	850,546,123	851,375,663	851,840,157	852,195,659	852,531,223	852,605,483	852,850,820
2011	450,407,667	454,192,041	455,223,240	456,786,068	457,900,963	459,446,068	460,286,611	461,969,500	462,842,587	463,775,353	464,247,293	464,458,373	464,831,592	465,075,971	465,080,318
2012	110,571,797	111,307,809	112,302,835	113,025,733	113,507,220	114,064,240	114,266,719	114,733,825	114,733,825	114,820,504	114,820,504	114,872,696	114,887,004	114,887,004	114,911,733
2013	25,956,630	26,222,430	26,323,530	26,644,184	26,745,471	26,830,681	27,129,876	27,262,712	27,570,174	27,609,017	27,609,017	27,609,017	27,609,017	27,620,776	27,755,435
2014	51,579,457	52,381,851	52,544,631	52,806,557	53,149,268	53,362,620	53,756,308	53,876,142	53,895,224	53,895,224	53,895,224	53,895,224	53,895,224	54,007,260	54,008,976
2015	32,819,970	33,324,360	33,776,075	34,094,948	34,111,261	34,788,093	35,186,270	35,261,278	35,283,032	35,283,032	35,359,048	35,359,048	35,359,048	35,359,048	35,359,048
2016	10,390,487	10,440,292	10,440,292	10,681,908	10,681,908	11,037,007	11,037,007	11,236,071	11,702,871	11,702,871	11,823,008	11,823,008	11,823,008	11,823,008	11,823,008
2017	12,053,921	12,375,931	12,459,671	12,583,791	12,809,517	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798	13,020,798
2018	21,723,118	21,978,520	22,009,022	22,009,022	22,129,040	22,355,604	22,355,604	22,355,604	22,646,274	22,646,274	22,646,274	22,646,274	22,646,274	22,646,274	22,646,274
2019	41,592,970	41,821,905	41,821,905	41,962,288	42,257,804	42,314,457	42,354,442	42,354,442	42,354,442	42,385,723	42,385,723	42,385,723	42,385,723	42,385,723	42,385,723
2020	2,759,423	2,820,524	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586	2,831,586
2021	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603

Table 14: Cumulative Claim Cost Net of Recovery
Total Losses Net of Recovery for each Fiscal Year as of the End of the Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	0	506,957	2,274,962	5,556,071	9,666,017	12,840,506	16,288,270	19,803,174	22,475,073	23,616,003	24,634,744	24,906,986	25,018,458	25,179,817	25,204,439
1991	0	1,106,186	9,491,192	21,698,663	36,440,985	51,993,727	69,949,428	85,436,898	94,553,008	99,810,789	102,157,336	103,296,054	103,679,798	104,175,735	104,422,055
1992	0	5,718,326	32,905,808	73,307,630	127,054,618	185,706,923	229,804,743	257,102,183	273,322,228	279,162,531	281,500,078	283,483,908	284,397,268	284,675,905	284,923,420
1993	58,273	9,579,235	51,355,704	121,198,082	218,269,939	290,134,204	335,108,539	361,055,559	370,222,918	374,874,058	378,154,016	379,792,139	380,767,283	381,497,148	382,481,510
1994	244,425	20,169,155	115,051,881	278,259,132	414,840,872	508,722,837	558,025,204	578,253,015	588,072,456	596,430,499	600,207,594	602,267,666	603,781,917	604,928,329	606,749,882
1995	228,984	20,087,621	107,570,009	219,228,648	310,858,696	360,847,148	383,971,205	396,508,225	409,114,452	415,738,130	418,951,148	421,188,519	422,779,184	424,514,812	426,149,417
1996	125,608	23,325,132	131,680,266	279,135,650	375,002,944	422,590,570	452,024,119	478,351,064	492,304,786	498,491,345	503,102,680	506,438,942	511,452,805	515,666,294	519,790,003
1997	224,473	38,830,100	187,398,158	332,021,330	422,311,323	481,669,632	531,858,981	555,364,839	567,816,209	575,337,002	582,191,285	590,082,500	597,075,984	605,942,091	612,653,523
1998	670,450	33,765,880	95,223,242	138,513,548	168,084,657	194,026,905	208,357,596	214,610,166	219,912,421	223,694,479	228,038,443	232,150,312	236,288,431	239,678,012	243,854,553
1999	59,193	4,429,322	25,524,258	50,853,846	81,699,607	99,696,447	109,360,517	114,234,053	119,057,765	123,250,329	128,349,303	134,118,352	138,907,582	144,195,065	149,330,707
2000	0	11,426,260	38,217,382	79,838,932	107,079,807	124,798,090	135,797,484	146,054,938	158,368,289	168,368,885	177,867,096	186,471,191	194,425,415	201,557,508	205,594,736
2001	0	1,563,380	14,262,500	26,975,335	34,545,796	40,635,829	46,845,209	54,247,981	62,502,138	69,264,789	75,740,328	80,063,111	84,084,219	86,092,554	87,684,749
2002	0	8,081,902	52,745,979	90,486,028	125,431,168	160,288,107	205,236,834	242,384,911	279,672,324	307,808,882	332,980,822	353,780,991	364,748,315	374,192,955	382,378,382
2003	24,299	12,631,244	44,066,972	72,310,146	104,500,940	144,360,086	179,661,976	212,942,009	237,551,729	260,093,495	279,286,168	288,356,318	294,569,669	299,614,016	303,294,346
2004	2,171,576	34,866,461	96,757,217	183,472,131	297,412,507	402,148,476	486,672,904	547,434,245	610,775,754	666,106,898	695,025,435	713,979,755	731,225,096	740,319,190	745,950,580
2005	1,900,666	24,166,396	88,033,089	193,620,617	301,757,239	405,709,445	477,090,731	545,342,321	605,085,818	642,124,949	672,033,358	691,037,248	701,276,902	707,505,479	710,517,848
2006	140,747	9,064,897	36,184,041	79,545,645	129,302,487	160,782,586	189,589,220	209,903,387	223,118,935	232,924,153	241,786,965	245,382,190	247,623,047	248,132,074	248,803,211
2007	0	5,217,606	25,258,691	56,960,689	79,937,400	99,122,153	114,969,655	121,677,033	126,544,041	132,292,323	135,872,805	137,962,835	138,668,014	138,856,037	138,856,037
2008	0	9,537,247	56,438,070	122,454,669	177,461,845	234,321,554	274,734,981	297,092,135	310,588,484	317,982,729	320,786,754	322,446,288	322,607,143	322,851,993	322,972,612
2009	941,454	17,756,760	59,062,079	105,484,807	155,820,228	196,461,104	220,813,720	243,503,399	254,687,700	262,095,790	265,030,346	266,656,482	266,656,482	267,388,973	268,180,946
2010	934,452	23,773,041	83,653,050	184,121,722	269,377,595	332,415,241	387,081,092	418,973,336	439,116,012	450,131,447	454,938,044	456,088,171	457,393,656	460,658,031	462,994,863
2011	91,078	16,376,021	61,720,921	103,401,804	142,934,084	172,530,510	191,355,047	203,546,290	209,355,955	211,424,638	211,956,660	238,510,793	242,607,939	244,722,441	246,333,092
2012	0	7,355,751	17,047,804	26,184,198	35,674,298	41,621,026	45,751,511	48,838,830	49,804,180	49,822,402	50,446,870	51,273,439	51,961,102	52,365,906	52,929,881
2013	0	681,545	2,169,281	4,982,875	6,422,128	7,746,981	8,751,023	8,894,969	8,894,969	9,415,911	9,718,601	10,536,081	10,783,307	11,182,887	11,275,599
2014	0	538,737	2,564,397	6,926,509	8,790,089	10,144,780	11,674,870	11,704,181	12,913,714	23,010,352	24,155,372	24,874,052	26,121,548	27,050,925	27,950,478
2015	0	94,604	2,053,672	3,007,605	3,932,953	4,435,092	4,555,933	4,830,589	15,553,028	16,668,864	17,312,848	18,200,074	18,834,515	19,495,090	19,692,440
2016	0	0	32,320	907,814	960,775	1,201,290	1,666,761	2,738,469	3,769,842	4,118,402	4,597,359	4,771,650	5,375,235	5,781,897	5,887,892
2017	0	0	297,040	297,040	297,040	908,606	1,695,760	3,320,655	4,117,935	5,129,577	5,453,158	6,011,349	6,077,826	6,360,060	6,704,473
2018	0	0	0	0	1,288,184	3,841,839	5,481,022	7,487,021	8,205,198	9,192,245	9,728,826	10,145,341	11,577,178	11,814,257	12,202,024
2019	0	0	212,821	1,327,805	3,359,227	4,975,083	23,583,282	24,123,537	25,973,104	26,578,363	27,139,445	27,486,691	27,664,767	28,181,428	28,444,167
2020	0	0	355,090	563,351	818,327	1,144,835	1,184,104	1,260,703	1,355,066	1,355,066	1,431,771	1,499,337	1,499,337	1,499,337	1,499,337
2021	0	0	0	125,981	172,584	193,509	301,739	341,439	341,439	341,439	483,603	483,603	483,603	483,603	483,603

Fiscal Year	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	25,265,374	25,296,268	25,305,032	25,305,032	25,305,032	25,376,718	25,390,801	25,390,801	25,390,801	25,390,801	25,390,801	25,390,801	25,390,801	25,400,270	25,400,270
1991	104,692,337	104,759,683	104,917,112	105,063,886	105,443,496	105,542,701	105,859,196	105,988,723	105,988,723	105,997,827	106,147,352	106,201,919	106,201,919	106,201,919	106,201,919
1992	285,194,109	285,566,127	286,358,698	287,083,442	287,564,743	287,964,072	288,484,052	288,804,166	289,009,465	289,564,239	289,592,050	289,547,631	289,667,713	289,667,713	289,667,713
1993	383,230,813	383,863,639	384,979,959	385,735,944	386,273,015	386,962,674	387,515,216	387,916,290	388,623,257	388,804,898	389,151,098	389,195,196	389,323,690	389,323,690	389,354,324
1994	607,990,404	610,362,224	612,347,164	613,652,226	615,606,738	616,275,215	617,153,317	618,022,990	618,808,777	619,000,046	619,089,689	619,086,566	619,086,566	619,117,880	619,120,856
1995	428,682,485	430,396,115	431,680,266	433,603,056	434,783,867	436,154,535	437,859,338	438,771,561	439,217,653	439,498,382	439,534,815	439,534,815	439,555,586	439,612,789	439,660,686
1996	523,794,324	527,070,590	529,983,991	532,576,530	535,362,103	538,740,168	539,958,816	540,413,429	540,789,125	540,849,662	540,849,662	540,899,432	541,108,249	541,184,781	541,203,303
1997	618,138,091	623,550,122	627,532,155	631,914,783	636,436,468	638,548,641	639,569,002	639,690,562	640,118,355	640,235,360	640,360,430	640,550,536	640,686,639	640,768,106	640,878,132
1998	247,389,230	249,264,258	250,972,568	254,098,685	254,777,037	255,262,403	255,262,403	255,338,926	255,338,926	255,373,854	255,474,487	255,557,193	255,684,817	255,746,920	255,806,977
1999	151,493,188	153,682,090	155,214,282	156,686,326	157,182,085	157,566,200	157,772,392	157,831,281	157,919,173	157,925,549	158,021,174	158,177,925	158,461,230	158,504,220	158,566,050
2000	208,628,168	211,965,682	214,307,129	214,621,620	214,987,861	215,182,937	215,230,407	215,358,825	215,652,349	215,874,203	216,013,707	216,148,692	216,308,804	216,435,618	216,507,579
2001	88,925,782	89,305,666	89,354,334	89,525,956	89,574,478	89,574,478	89,593,027	89,793,726	89,943,991	89,998,141	90,081,163	90,190,837	90,262,965	90,325,399	90,350,407
2002	385,871,421	387,608,482	388,107,313	388,402,643	388,546,355	388,721,659	389,097,172	389,899,413	390,283,826	390,593,720	390,814,773	391,058,037	391,194,399	391,400,929	391,423,304
2003	305,067,192	305,852,076	306,119,369	306,169,385	306,230,411	306,941,992	307,473,796	307,716,566	307,930,230	308,179,866	308,205,575	308,260,487	308,452,366	308,489,971	308,520,357
2004	748,226,794	749,474,279	749,474,279	750,044,195	751,419,408	753,158,594	754,278,134	755,237,158	756,350,957	757,462,867	757,723,145	757,874,184	758,176,694	758,439,692	758,544,441
2005	712,101,885	712,234,989	712,574,385	714,234,205	715,462,609	717,042,434	718,358,874	719,199,621	720,312,495	720,918,980	721,559,435	721,907,765	722,346,652	722,513,210	722,599,381
2006	249,077,076	249,286,068	249,841,118	250,283,183	250,915,798	251,166,677	251,565,109	252,096,762	252,352,519	252,495,627	252,635,107	252,644,381	252,703,112	252,724,906	252,724,906
2007	138,926,391	139,007,091	139,225,204	139,654,426	139,747,346	139,846,789	140,126,360	140,344,619	140,495,852	140,637,122	140,677,417	140,841,716	140,904,660	141,062,861	141,076,406
2008	323,497,428	324,575,605	325,750,254	326,268,225	326,658,739	327,318,432	327,686,916	328,093,553	328,158,890	328,427,847	328,681,752	328,681,752	328,754,947	328,868,500	328,868,500
2009	268,740,305	269,003,596	269,734,323	269,974,220	270,988,838	271,480,420	271,764,542	271,828,776	271,904,820	272,222,399	272,337,884	272,337,884	272,556,346	272,556,346	272,602,879
2010	464,991,756	465,714,521	467,042,991	468,158,123	469,651,220	470,598,787	471,314,871	471,859,506	472,124,639	472,826,516	473,020,666	473,205,942	473,442,255	473,516,514	473,642,308
2011	247,790,268	250,106,814	251,080,574	251,906,220	252,680,350	253,741,772	254,224,751	255,343,456	255,985,036	256,650,462	256,926,091	257,037,579	257,273,814	257,518,193	257,522,540
2012	53,515,284	54,251,296	54,696,970	55,119,998	55,503,385	55,824,632	55,970,931	56,253,417	56,253,417	56,307,923	56,307,923	56,360,115	56,374,423	56,374,423	56,399,152
2013	11,614,963	11,807,019	11,908,119	12,120,997	12,202,043	12,287,253	12,559,625	12,692,461	12,875,749	12,914,592	12,914,592	12,914,592	12,914,592	12,926,352	13,000,398
2014	28,245,862	28,809,684	28,864,300	29,035,961	29,197,956	29,263,785	29,464,549	29,584,383	29,603,465	29,603,465	29,603,465	29,603,465	29,603,465	29,664,997	29,666,713
2015	19,817,945	20,159,051	20,539,698	20,763,039	20,779,352	21,191,828	21,484,756	21,559,764	21,581,518	21,581,518	21,657,534	21,657,534	21,657,534	21,657,534	21,657,534
2016	6,125,100	6,174,905	6,174,905	6,333,791	6,333,791	6,519,471	6,519,471	6,623,435	7,036,712	7,036,712	7,156,849	7,156,849	7,156,849	7,156,849	7,156,849
2017	6,752,673	7,041,250	7,124,990	7,211,582	7,351,614	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528	7,445,528
2018	12,427,989	12,669,716	12,700,218	12,700,218	12,746,385	12,893,341	12,893,341	12,893,341	13,114,189	13,114,189	13,114,189	13,114,189	13,114,189	13,114,189	13,114,189
2019	28,494,925	28,723,860	28,723,860	28,806,647	29,018,767	29,075,420	29,115,405	29,115,405	29,115,405	29,146,685	29,146,685	29,146,685	29,146,685	29,146,685	29,146,685
2020	1,499,337	1,560,438	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500	1,571,500
2021	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603	483,603

Table 15: Cumulative Loss Severity = Table 14/Table 13
Loss Severity for Each Evaluation Year

Fiscal Year	Evaluation Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	0.00%	45.71%	50.62%	53.56%	54.63%	55.32%	55.13%	54.52%	53.71%	52.95%	52.15%	51.54%	51.32%	51.25%	51.02%
1991	0.00%	49.96%	55.26%	53.67%	53.22%	53.03%	51.94%	51.05%	50.11%	49.20%	48.64%	48.46%	48.24%	48.06%	48.02%
1992	0.00%	55.61%	56.25%	56.07%	55.78%	52.99%	50.69%	49.36%	48.31%	47.68%	47.16%	46.83%	46.68%	46.60%	46.54%
1993	21.91%	53.27%	56.16%	55.02%	52.02%	49.09%	47.06%	45.89%	45.03%	44.52%	44.10%	43.94%	43.91%	43.92%	43.94%
1994	45.61%	58.08%	56.17%	51.50%	46.36%	43.96%	42.40%	41.46%	40.84%	40.51%	40.34%	40.31%	40.28%	40.28%	40.33%
1995	34.01%	59.00%	49.24%	43.30%	40.70%	39.65%	38.81%	38.11%	37.77%	37.59%	37.54%	37.50%	37.55%	37.60%	37.66%
1996	41.53%	43.52%	39.62%	37.10%	35.91%	34.79%	33.99%	33.63%	33.61%	33.57%	33.61%	33.68%	33.81%	33.94%	34.05%
1997	33.92%	42.97%	39.58%	36.63%	34.76%	33.44%	33.00%	32.85%	32.82%	32.84%	32.94%	33.13%	33.30%	33.54%	33.72%
1998	51.49%	42.46%	38.10%	34.89%	32.97%	32.33%	32.18%	31.96%	32.08%	32.23%	32.49%	32.74%	33.00%	33.22%	33.49%
1999	24.56%	37.69%	35.01%	31.28%	30.18%	30.03%	30.19%	30.22%	30.64%	31.07%	31.53%	32.15%	32.70%	33.30%	33.83%
2000	0.00%	35.49%	31.16%	31.78%	31.95%	32.37%	32.48%	33.08%	34.12%	34.90%	35.68%	36.47%	37.15%	37.53%	37.69%
2001	0.00%	27.16%	33.44%	33.39%	33.27%	33.58%	34.67%	36.80%	38.67%	40.05%	41.34%	42.15%	42.66%	42.57%	42.70%
2002	0.00%	37.25%	36.19%	34.95%	35.49%	37.28%	40.22%	42.01%	44.01%	45.43%	46.39%	47.04%	47.14%	47.35%	47.55%
2003	6.73%	41.13%	38.29%	37.77%	39.72%	42.45%	44.81%	46.62%	48.04%	49.09%	49.78%	49.85%	49.94%	49.89%	50.04%
2004	38.88%	41.68%	40.35%	43.40%	46.99%	49.57%	51.39%	52.60%	53.77%	54.27%	54.21%	54.16%	54.20%	54.28%	54.32%
2005	54.03%	42.47%	46.82%	51.49%	54.07%	56.48%	57.89%	58.94%	59.17%	58.88%	58.80%	58.77%	58.79%	58.85%	58.87%
2006	40.11%	48.32%	56.82%	60.09%	62.78%	63.83%	64.26%	64.28%	63.73%	63.43%	63.31%	63.22%	63.13%	62.99%	62.97%
2007	0.00%	56.32%	60.02%	63.21%	64.06%	64.53%	64.53%	63.74%	63.42%	63.58%	63.57%	63.54%	63.30%	63.27%	63.26%
2008	0.00%	60.56%	63.30%	65.40%	65.62%	64.91%	62.86%	62.52%	62.33%	61.84%	61.66%	61.60%	61.52%	61.44%	61.41%
2009	69.76%	62.51%	66.14%	65.36%	58.92%	56.57%	55.93%	56.27%	56.14%	56.28%	56.27%	56.06%	55.95%	56.02%	56.06%
2010	51.46%	70.60%	67.24%	61.86%	55.35%	54.39%	54.43%	55.13%	55.30%	55.38%	55.25%	55.22%	55.26%	55.37%	55.44%
2011	10.66%	68.08%	62.22%	53.12%	50.82%	51.69%	52.14%	52.44%	52.41%	52.25%	52.20%	54.65%	54.73%	54.85%	54.91%
2012	0.00%	63.21%	50.69%	50.70%	50.45%	49.23%	48.52%	48.41%	48.08%	47.89%	48.08%	48.05%	48.29%	48.34%	48.39%
2013	0.00%	29.84%	33.66%	43.24%	43.41%	43.05%	41.39%	39.78%	39.58%	40.48%	40.78%	42.49%	43.06%	43.81%	44.02%
2014	0.00%	25.66%	38.21%	39.79%	40.55%	39.09%	39.68%	39.59%	41.71%	53.25%	53.76%	53.54%	53.86%	54.24%	54.72%
2015	0.00%	11.35%	43.26%	38.35%	38.67%	37.29%	36.99%	37.80%	58.34%	58.67%	59.32%	59.68%	60.41%	60.29%	60.23%
2016	0.00%	0.00%	4.98%	37.65%	34.23%	38.33%	46.30%	49.46%	54.19%	55.47%	57.70%	56.53%	59.03%	60.30%	57.99%
2017	0.00%	0.00%	49.08%	32.09%	29.61%	45.49%	56.65%	46.80%	48.52%	51.75%	52.10%	53.86%	54.14%	54.57%	55.88%
2018	0.00%	0.00%	0.00%	0.00%	44.16%	55.98%	55.65%	57.13%	57.07%	54.93%	54.15%	55.07%	56.50%	56.61%	57.40%
2019	0.00%	0.00%	40.45%	72.76%	63.70%	65.48%	73.95%	72.16%	71.29%	70.41%	69.58%	68.81%	68.95%	68.44%	68.47%
2020	0.00%	0.00%	100.00%	44.48%	53.78%	58.10%	58.92%	56.77%	56.08%	56.08%	53.19%	54.34%	54.34%	54.34%	54.34%
2021	0.00%	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Fiscal Year	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1990	51.07%	51.05%	50.95%	50.95%	50.95%	50.98%	50.97%	50.97%	50.97%	50.91%	50.91%	50.89%	50.89%	50.90%	50.90%
1991	48.01%	48.02%	48.05%	48.07%	48.14%	48.16%	48.18%	48.17%	48.16%	48.13%	48.13%	48.11%	48.10%	48.10%	48.10%
1992	46.52%	46.53%	46.55%	46.59%	46.61%	46.61%	46.61%	46.60%	46.57%	46.57%	46.55%	46.52%	46.53%	46.53%	46.53%
1993	43.97%	43.97%	44.02%	44.05%	44.05%	44.05%	44.05%	44.04%	44.03%	44.02%	44.03%	44.02%	44.03%	44.02%	44.03%
1994	40.34%	40.40%	40.44%	40.47%	40.50%	40.48%	40.49%	40.49%	40.49%	40.48%	40.48%	40.47%	40.47%	40.47%	40.47%
1995	37.74%	37.80%	37.84%	37.90%	37.93%	37.96%	38.00%	38.02%	38.02%	38.03%	38.03%	38.03%	38.03%	38.03%	38.03%
1996	34.17%	34.26%	34.31%	34.39%	34.45%	34.54%	34.55%	34.56%	34.55%	34.55%	34.55%	34.55%	34.56%	34.56%	34.56%
1997	33.85%	33.99%	34.06%	34.15%	34.26%	34.30%	34.32%	34.31%	34.32%	34.32%	34.32%	34.33%	34.33%	34.33%	34.34%
1998	33.70%	33.79%	33.85%	34.05%	34.07%	34.08%	34.07%	34.07%	34.07%	34.07%	34.07%	34.08%	34.09%	34.09%	34.10%
1999	33.94%	34.10%	34.19%	34.31%	34.32%	34.35%	34.37%	34.38%	34.38%	34.38%	34.40%	34.42%	34.44%	34.44%	34.45%
2000	37.84%	38.07%	38.20%	38.17%	38.18%	38.18%	38.17%	38.18%	38.20%	38.22%	38.23%	38.24%	38.25%	38.26%	38.26%
2001	42.79%	42.77%	42.69%	42.69%	42.69%	42.68%	42.68%	42.69%	42.73%	42.69%	42.70%	42.71%	42.71%	42.72%	42.72%
2002	47.64%	47.67%	47.63%	47.63%	47.64%	47.65%	47.66%	47.69%	47.70%	47.71%	47.72%	47.71%	47.71%	47.72%	47.72%
2003	50.09%	50.09%	50.08%	50.07%	50.08%	50.12%	50.13%	50.13%	50.14%	50.16%	50.16%	50.17%	50.16%	50.16%	50.16%
2004	54.30%	54.30%	54.29%	54.30%	54.34%	54.36%	54.39%	54.39%	54.40%	54.41%	54.41%	54.41%	54.41%	54.41%	54.41%
2005	58.83%	58.81%	58.82%	58.86%	58.87%	58.88%	58.91%	58.91%	58.93%	58.94%	58.93%	58.93%	58.94%	58.94%	58.94%
2006	62.95%	62.95%	62.95%	62.97%	62.97%	62.97%	63.00%	63.03%	63.04%	63.06%	63.06%	63.04%	63.04%	63.04%	63.04%
2007	63.27%	63.27%	63.28%	63.30%	63.31%	63.32%	63.31%	63.30%	63.27%	63.27%	63.27%	63.27%	63.27%	63.27%	63.27%
2008	61.40%	61.44%	61.50%	61.54%	61.51%	61.54%	61.57%	61.59%	61.59%	61.53%	61.55%	61.55%	61.55%	61.55%	61.55%
2009	56.07%	56.06%	56.08%	56.10%	56.13%	56.16%	56.17%	56.17%	56.17%	56.19%	56.20%	56.20%	56.22%	56.22%	56.22%
2010	55.42%	55.42%	55.44%	55.48%	55.52%	55.51%	55.52%	55.50%	55.51%	55.54%	55.53%	55.53%	55.53%	55.54%	55.54%
2011	55.01%	55.07%	55.16%	55.15%	55.18%	55.23%	55.23%	55.27%	55.31%	55.34%	55.34%	55.34%	55.35%	55.37%	55.37%
2012	48.40%	48.74%	48.70%	48.77%	48.90%	48.94%	48.98%	49.03%	49.03%	49.04%	49.04%	49.06%	49.07%	49.07%	49.08%
2013	44.75%	45.03%	45.24%	45.49%	45.62%	45.80%	46.29%	46.56%	46.70%	46.78%	46.78%	46.78%	46.78%	46.80%	46.84%
2014	54.76%	55.00%	54.93%	54.99%	54.94%	54.84%	54.81%	54.91%	54.93%	54.93%	54.93%	54.93%	54.93%	54.93%	54.93%
2015	60.38%	60.49%	60.81%	60.90%	60.92%	60.92%	61.06%	61.14%	61.17%	61.17%	61.25%	61.25%	61.25%	61.25%	61.25%
2016	58.95%	59.14%	59.14%	59.29%	59.29%	59.07%	59.07%	58.95%	60.13%	60.13%	60.53%	60.53%	60.53%	60.53%	60.53%
2017	56.02%	56.89%	57.18%	57.31%	57.39%	57.18%	57.18%	57.18%	57.18%	57.18%	57.18%	57.18%	57.18%	57.18%	57.18%
2018	57.21%	57.65%	57.70%	57.70%	57.60%	57.67%	57.67%	57.67%	57.91%	57.91%	57.91%	57.91%	57.91%	57.91%	57.91%
2019	68.51%	68.68%	68.68%	68.65%	68.67%	68.71%	68.74%	68.74%	68.74%	68.77%	68.77%	68.77%	68.77%	68.77%	68.77%
2020	54.34%	55.32%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%	55.50%
2021	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%