

## Appendix B – Demand Model

### Introduction

The actuarial review of the MMI Fund includes projections of the economic value of future fiscal year's endorsements. The economic value is based on the volume of endorsements written and the projected performance of these endorsements. We must therefore forecast the volume of FHA endorsements for fiscal years 2001-2007.

Our procedure for projecting future levels of demand for this year's Review is significantly different from that used in past Reviews. In the past, the demand model consisted of a series of regressions intended to predict the overall level of endorsements and the allocation of those endorsements to the various loan categories. It is now generally accepted that the past models yielded less than satisfactory results. Furthermore, the models were sufficiently complicated to have little explanatory power.

The approach for this year's analysis, described in more detail below, is intended to be simpler, easier to follow, and to rely on available information in a way that makes the projections more defensible and consistent, and that makes the driving factors behind the projections more identifiable. The critical feature of this year's method is to base the projections of future endorsements for the MMIF on DRI projections of sales on new and existing homes for the whole market. We can then estimate the MMIF's share of the market and the allocation to loan categories based on actual proportions in recent years.

### Forecast Methodology

We forecast the overall level of demand for MMIF mortgages based on the DRI projections of the number of sales and the average sale price on new and existing homes. The size of the MMIF market share (number of loans) and loan size relative to the DRI projections are summarized in Table B.1 below. We also show the expected number of Streamline Refinancings relative to the number of purchase originations each year.

**Table B.1**

	<b>New Homes</b>	<b>Existing Homes</b>	<b>Streamline Refinancings</b>	<b>Source</b>
MMIF Loan Size Relative to Market	75%	60%	N/A	Actual for 1998, 1999, and 2000
MMIF Market Share (Number of Loans)	9%	16.5%	N/A	Actual for 1998, 1999, and 2000
Refinance Rate Relative to Purchase Originations	N/A	N/A	15%	Mortgage Bankers' Association

<b>Actuarial Review of MMI Fund as of FY 2000</b>
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Note that these market share estimates, refinance percentages, and average house price assumptions are consistent with FHA's own internal five-year plan working estimates. The actual projections will differ slightly because the plan was based on DRI's September projections, while we had November projections available to us.

In summary, therefore, the total number of originations projected for a given endorsement year is:

$$\underbrace{(\#ofsales\_new \cdot MMIFshare\_new)}_{\#new\_MMIF} + \underbrace{(\#ofsale\_existing \cdot MMIFshare\_existing)}_{\#existing\_MMIF} \cdot (1 + refi\_rate)$$

Similarly, the dollar volume of originations is:

$$\left( \left[ \#new\_MMIF \cdot new\_price \cdot \frac{MMIFnew\_price}{new\_price} \right] + \left[ \#existing\_MMIF \cdot exist\_price \cdot \frac{MMIFexist\_price}{exist\_price} \right] \right) \cdot (1 + refi\_rate)$$

### Projected Demand

We project overall MMIF endorsement volume for all loan categories in future endorsement years to be as follows:

**Table B.2**

<b>Endorsement Year</b>	<b>Endorsement Count (000's)</b>	<b>Endorsement Volume (\$millions)</b>
2001	999	108,908
2002	1,060	121,230
2003	1,097	131,546
2004	1,126	141,225
2005	1,152	150,983
2006	1,159	159,013
2007	1,164	166,969

Note that all the calculations described above are performed on the basis of fiscal origination year data. We estimate the endorsement year volume by assuming a three-month lag, that is, by prorating the origination year estimates. Therefore,  $V_{EY} = 0.75 \cdot V_{OY} + 0.25 \cdot V_{OY-1}$ , where  $V_{OY}$  is the volume of endorsements for origination year  $OY$ , and  $V_{EY}$  is the volume of endorsements for endorsement year  $EY$ .

**Allocation Process**

The process outlined above results in a projection of total demand for MMIF mortgages for fiscal endorsement years 2001-2007. The final step in the demand model is to split the overall endorsement volume to the loan type and loan-to-value categories considered in the regression analysis underlying the conditional claim rate and conditional prepayment rate models. This allocation is selected on the basis of the distribution of FHA endorsements seen in the most recent two years<sup>1</sup>. The projected distribution is as follows for each fiscal endorsement year from 2001-2007:

**Table B.3**

<b>Loan Type</b>	<b>High LTV</b>	<b>Investor LTV</b>	<b>Low LTV</b>	<b>Mid LTV</b>	<b>Total</b>
<b>Fixed Rate, 30-Year</b>	61.44%	4.68%	1.12%	8.76%	<b>76.00%</b>
<b>Fixed Rate, 15-Year</b>	0.79%	0.08%	0.06%	0.07%	<b>1.00%</b>
<b>Adjustable Rate</b>	7.59%	0.59%	0.11%	1.20%	<b>9.50%</b>
<b>Streamline, Fixed Rate 30-Year</b>	8.25%	0.80%	0.51%	1.45%	<b>11.00%</b>
<b>Streamline, Fixed Rate 15-Year</b>	0.88%	0.07%	0.22%	0.08%	<b>1.25%</b>
<b>Streamline, Adjustable Rate</b>	0.96%	0.08%	0.05%	0.16%	<b>1.25%</b>
<b>All Loan Types</b>	<b>79.90%</b>	<b>6.30%</b>	<b>2.07%</b>	<b>11.73%</b>	<b>100.00%</b>

**Data Sources**

We used the DRI 10-year forecast to project the total number of loans endorsed from 2001-2007, in terms of new homes and existing homes.

We used the MMIF forecast to estimate the proportion of FHA endorsements that will streamline refinance as well as the fiscal year 2000 average house price for FHA loans on new, existing, and streamline refinanced homes. Finally, we used the Selected forecast of average countrywide house price appreciation<sup>2</sup>.

<sup>1</sup> While our selection is based on the most recent two years, our review consisted of examining the distribution by loan type and loan-to-value ratio for the most recent 6 years.

<sup>2</sup> Please see *Appendix F – Economic Forecast* of this report for a description of the Selected house price appreciation series.

**Table B.4**

<b>Information</b>	<b>Source</b>
Number of Sales of New and Existing Homes	DRI 10-Year Forecast in publication titled <i>The US Economy</i>
MMIF Share of Market	Actual Relationship for FY 1998, 1999, and 2000
Average Sale Prices of New and Existing Homes	DRI 10-Year Forecast in publication titled <i>The US Economy</i>
MMIF Average Loan Value Relative to Average Sale Price	Actual Relationship for FY 1998, 1999, and 2000
Number of Refinancings Relative to Number of Purchase Originations	Mortgage Bankers' Association
Allocation Relativities to Loan Categories	Actual Relationship for FY 1998, 1999, and 2000