

**Appendix B: Cash Flow Analysis****I. Introduction**

The calculation of the economic value of the MMI Fund involves the estimation of the present value of future cash flows generated by the existing portfolio and future books of business. This requires the projection of future prepayment and claim incidences as well as attaching proper cash flow items associated with each incidence. This appendix explains the details related to the attribution of cash flows by source.

The evaluation of the Fund's economic value is done similarly to corporate valuation. An investor would estimate the value of a firm as the present value of net assets plus the present value of new business expected to be undertaken. Assuming FHA continues to insure loans, the economic value of MMIF Fund would be determined by valuing both its current portfolio of loans and its future books of business.

In order to analyze future changes in the Fund's economic value, we developed a model that incorporates projections of the loan performance and information about its existing portfolio composition to project the Fund's various cash flow sources. This actuarial model used the projections from the econometric models discussed in Appendix A. The econometric models project conditional claim and prepayment probabilities for each individual loan depending on its origination year, age, interest rate, initial LTV ratio, refinancing incentive, probability of negative equity, loan term, burnout, and other characteristics. With the detailed loan-level characteristics, we were able to estimate more accurately the prepayment and claim probabilities and then attach respective cash flows to each loan.

**Exhibit B-1**

| <b>Cash Flow Components</b>          |                    |                     |
|--------------------------------------|--------------------|---------------------|
| <b>Cash Flow Components</b>          | <b>Cash Inflow</b> | <b>Cash Outflow</b> |
| Up-front Premiums                    | X                  |                     |
| Annual Premiums                      | X                  |                     |
| Claim Payments                       |                    | X                   |
| Refunded Up-front Premiums           |                    | X                   |
| Administrative Expenses <sup>a</sup> |                    | X                   |
| Distributive Shares <sup>b</sup>     |                    | X                   |

<sup>a</sup> The administrative expense was discontinued since the FY 2002 Actuarial Review according to the Federal credit reform requirement.

<sup>b</sup> The distributive share has been suspended since 1990. There is no indication that it would be resumed in the foreseeable future.

Based on the mortgage termination rates projected by the econometric model, the major components of cash flows are estimated into the future. Future interest income is reflected through the present value discounting process. The relevant cash flow components are listed in Exhibit B-1. These components were projected for each loan on a probabilistic basis and then aggregated according to the product type, origination year, and policy year for reporting purpose. Below, we discuss the sources of each of these cash flows.

## II. Background Information

The following background information helps clarify our discussion of the cash flow components:

- **Insurance-in-force (IIF):** the nominal value of the unamortized original mortgage loan amount of the surviving mortgages insured by FHA. This is distinct from the conventional notion of amortized insurance-in-force, which includes only the current outstanding balance on surviving loans.
- **Conditional Claim Rate (ccr):** the number of loans claimed during a time period divided by the number of surviving loans in force at the beginning of that period.
- **Conditional Prepayment Rate (cpr):** the number of loans being completely prepaid during a time period divided by the number of surviving loans in force at the beginning of that period.
- **Policy Year:** the first policy year starts the day the mortgage was originated. Subsequent policy years start on the anniversaries of the mortgage origination.
- **Fiscal Policy Year:** a fiscal policy year covers a single Federal fiscal year. The year in which the mortgage is originated is assigned as fiscal policy year one, even though it may not be a complete year. The MMI Fund's fiscal policy year is the same as the Federal fiscal year, which runs from October 1<sup>st</sup> of the previous calendar year to September 30<sup>th</sup> of the specific calendar year. For example, the time frame from October 1, 2004 to September 30, 2005 is considered as Fiscal Policy Year 2005.
- **Termination Year:** the year in which a mortgage terminates through a claim, a prepayment or other reasons.
- **Unpaid Balance (UPB) Factor:** the principal balance outstanding divided by the original mortgage amount. The UPB factor is calculated based on the term, the type of mortgage and the mortgage contract rate. For FRMs, the UPB factor for each quarter in the future can be directly computed with the initial contract rate and the amortization term. For ARMs, the UPB factor would decrease at different rates depending on the interest rate of the particular loan, updated according to the rate adjustment rule. In this model, the contract interest rate of the loan was updated by using the one-year Treasury rate as an approximation for changes in the underlying index, with the annual and lifetime caps incorporated. The historical average mortgage contract rates for all loans at their origination dates are summarized in Exhibit B-2. These rates reflect the average contract rate for all originations during each fiscal year.

## Exhibit B-2

| Average Original Contract Rate of Mortgages<br>(Percentage by Mortgage Types) |       |       |       |       |       |       |         |
|---|-------|-------|-------|-------|-------|-------|---------|
| Fiscal Year   | FRM30 | FRM15 | ARM   | SR30  | SR15  | SRARM | Average |
| 1976  | 8.62  | 8.74  |       |       |       |       | 8.62    |
| 1977  | 8.22  | 8.25  |       | 8.50  |       |       | 8.22    |
| 1978  | 8.70  | 8.64  |       | 9.50  |       |       | 8.70    |
| 1979  | 9.55  | 9.60  |       | 9.50  |       |       | 9.55    |
| 1980  | 11.13 | 11.58 |       | 10.60 |       |       | 11.13   |
| 1981  | 13.25 | 13.84 |       | 14.38 |       |       | 13.25   |
| 1982  | 15.15 | 15.41 |       | 15.75 |       |       | 15.16   |
| 1983  | 12.14 | 11.02 |       | 11.92 | 11.00 |       | 12.05   |
| 1984  | 12.72 | 11.83 | 12.80 | 12.35 |       |       | 12.66   |
| 1985  | 12.23 | 11.71 | 11.25 | 12.31 | 11.77 |       | 12.18   |
| 1986  | 10.16 | 9.95  | 9.10  | 9.77  | 9.45  | 8.20  | 10.12   |
| 1987  | 9.31  | 9.06  | 7.75  | 9.38  | 8.96  | 7.54  | 9.27    |
| 1988  | 10.08 | 9.80  | 8.87  | 10.84 | 10.06 | 8.99  | 10.05   |
| 1989  | 10.06 | 9.98  | 9.08  | 11.16 | 10.22 | 9.18  | 10.07   |
| 1990  | 9.69  | 9.56  | 8.54  | 10.70 | 9.95  | 8.86  | 9.71    |
| 1991  | 9.46  | 9.20  | 7.56  | 10.09 | 9.31  | 7.74  | 9.40    |
| 1992  | 8.54  | 8.36  | 6.47  | 8.91  | 8.37  | 6.51  | 8.26    |
| 1993  | 7.76  | 7.42  | 5.87  | 8.16  | 7.58  | 6.27  | 7.64    |
| 1994  | 7.57  | 7.14  | 6.06  | 7.75  | 7.42  | 6.08  | 7.36    |
| 1995  | 8.39  | 8.24  | 7.18  | 8.67  | 8.69  | 7.32  | 8.10    |
| 1996  | 7.84  | 7.57  | 6.49  | 7.98  | 7.65  | 6.75  | 7.53    |
| 1997  | 7.97  | 7.77  | 6.53  | 8.23  | 7.97  | 6.77  | 7.51    |
| 1998  | 7.37  | 7.22  | 6.12  | 7.55  | 7.16  | 6.45  | 7.25    |
| 1999  | 7.24  | 7.00  | 6.00  | 7.16  | 6.88  | 6.05  | 7.16    |
| 2000  | 8.29  | 8.08  | 6.95  | 8.32  | 8.04  | 6.30  | 8.16    |
| 2001  | 7.56  | 7.16  | 6.19  | 7.41  | 6.85  | 6.12  | 7.49    |
| 2002  | 7.00  | 6.57  | 5.28  | 6.95  | 6.41  | 5.31  | 6.84    |
| 2003  | 6.08  | 5.54  | 4.39  | 6.01  | 5.48  | 4.45  | 5.92    |
| 2004  | 6.12  | 5.59  | 4.46  | 5.99  | 5.52  | 4.39  | 5.87    |
| 2005  | 5.96  | 5.59  | 4.71  | 5.88  | 5.61  | 4.67  | 5.78    |

### III. Cash Flow Components

#### A. Premiums

##### *1. Premium Structure*

The primary source of revenue collected by the Fund is the insurance premium. If the Fund's mortgage insurance is priced to be premium-sufficient, the insurance premiums collected and interest earned on them will cover all costs associated with insuring the specific mortgage loan. According to the FHA mortgage insurance policy, the insurance premium was structured in three ways:

- Through September 1, 1983 the mortgage premium was collected on a monthly basis at an annualized rate of 0.50 percent of the outstanding principal balance for the period. To align this change with fiscal quarters, we assumed for this analysis that the annual premium policy was in effect through September 30, 1983.
- Between September 1, 1983 and June 30, 1991 a mortgage premium based on a percentage of the original mortgage amount was collected at the time of origination. This amount was 3.80 percent for 30-year mortgages and 2.40 percent for 15-year mortgages.
- Effective July 1, 1991, the NAHA specified a new premium structure. This structure specifies that an upfront premium of 3.80 percent for all product types except for 15-year non-streamline refinance loans (which was set at 2.00%) be collected and an annual renewal premium of 0.50 percent would be assessed on the outstanding balance per period. The annual premium would cease at different mortgage ages depending on the initial LTV of the loan.
- On October 1, 1992, the upfront premium was reduced from 3.80 percent to 3.00 percent. The annual premium of 15-year mortgages was lowered to 0.25 percent or completely waived, depending on whether the initial LTV ratio is greater than 90 percent.
- As of April 17, 1994, FHA lowered the upfront premium rate on 30-year mortgages from 3.00 percent to 2.25 percent. To align this change with fiscal quarters, we started applying this policy change on April 1, 1994.
- Starting from October 1, 1996, FHA lowered the upfront premium rate on 30-year mortgages for first-time homebuyers who receive homeowner counseling from 2.25 percent to 2.00 percent. This rate was further reduced to 1.75 percent for mortgages executed on or after September 22, 1997. This favorable treatment for borrowers with homeowner counseling was terminated shortly thereafter.

- Effective January 1, 2001, FHA lowered the upfront premium rate of all mortgages to 1.50 percent. The annual premium was reduced to 0.50 percent and the annual premium would stop as soon as the current LTV ratio of the loan became below 78 percent according to the home price as of the loan origination date. The 30-year mortgages are further subject to a minimum of five years that the annual premium must be paid.

The changes of upfront premium rules are summarized in Exhibit B-3.

**Exhibit B-3**

| Upfront Premium Rates for New FHA Originations |  |  |
|--|--|--|
| Fiscal Year                                    | 30yr Loans, Fixed or Adjustable Rate (%) | 15yr Loans, Fixed or Adjustable Rate (%) |
| 9/1/83~6/30/91                                 | 3.80                                     | 2.40                                     |
| 7/1/91~9/30/92                                 | 3.80                                     | 2.00/3.80 <sup>b</sup>                   |
| 10/1/92~4/16/94                                | 3.00                                     | 2.00                                     |
| 4/17/94~9/30/96                                | 2.25                                     | 2.00                                     |
| 10/1/96~9/21/97                                | 2.25/2.00 <sup>a</sup>                   | 2.00                                     |
| 9/22/97~12/31/00                               | 2.25/2.00/1.75 <sup>a</sup>              | 2.00                                     |
| 1/1/01 & subsequent                            | 1.50                                     | 1.50                                     |

<sup>a</sup> For first-time homebuyers who received homeowner counseling.

<sup>b</sup> For 15year streamline refinance loans.

The changes in annual premium rules are summarized in Exhibit B-4.

**Exhibit B-4**

| NAHA Annual Premium Rate for 15- and 30-Year Mortgages |   |                 |                                     |                             |
|--|---|-----------------|-------------------------------------|-----------------------------|
| Fiscal Year  | 30yr Loans, Fixed or Adjustable                   |                 | 15yr Loans, Fixed or Adjustable     |                             |
| Prior to 9/1/1983                                      | 0.5% for life of loan                             |                 | 0.5% for life of loan               |                             |
| 9/1/83~6/30/91   | None  |                 | None                                |                             |
| 7/1/91~9/30/92   | varies by LTV category <sup>a</sup>               |                 | varies by LTV category <sup>a</sup> |                             |
| 10/1/92~12/31/00                                       | varies by LTV category <sup>b</sup>               |                 | varies by LTV category <sup>c</sup> |                             |
| 1/1/01 & subsequent                                    | 0.5% until LTV reaches 78%,<br>minimum of 5 years |                 | varies by LTV category <sup>d</sup> |                             |
| LTV Range:   | a   | b               | C                                   | d                           |
| below 90%  | 0.5% for 5 yrs                                    | 0.5% for 7 yrs  | 0%                                  | 0%                          |
| Between 90%~95%  | 0.5% for 8 yrs                                    | 0.5% for 12 yrs | 0.25% for 4 yrs                     | 0.25% until LTV reaches 78% |
| above 95%  | 0.5% for 10 yrs                                   | 0.5% for 30 yrs | 0.25% for 8 yrs                     | 0.25% until LTV reaches 78% |

Insurance premium rules of streamline refinance loans are summarized in Exhibit B-5.

**Exhibit B-5**

| <b>Premium Rates for Streamline Refinance Loans</b> |                          |  |                          |                                     |
|---|--------------------------|--|--------------------------|-------------------------------------|
| <b>Period of Origination</b>                        | <b>30-Year Mortgages</b> |  | <b>15-Year Mortgages</b> |                                     |
|   | <b>Upfront Premium</b>   | <b>Annual Premium</b>                          | <b>Up-front Premium</b>  | <b>Annual Premium</b>               |
| Prior to 9/1/1983                                   | None                     | None   | None                     | None                                |
| 9/1/83~6/30/91                                      | 3.80%                    | None   | 2.40%                    | None                                |
| 7/1/91~9/30/92                                      | 3.80%                    | 0.5% for first 7 years                         | 3.80%                    | 0.5% for first 7 years              |
| 10/1/92~4/16/94                                     | 3.80%                    | 0.5% for first 7 years                         | 2.00%                    | None                                |
| 4/17/94~12/31/00                                    | 2.25%                    | 0.5% for first 7 years                         | 2.00%                    | None                                |
| 1/1/01 & subsequent                                 | 1.50%                    | 0.5% until LTV reaches 78%, minimum of 5 years | 1.50%                    | varies by LTV category <sup>d</sup> |
| <b>LTV Range:</b>                                   | <b>a</b>                 | <b>b</b>                                       | <b>c</b>                 | <b>d</b>                            |
| below 90%   | 0.5% for 5 yrs           | 0.5% for 7 yrs                                 | 0%                       | 0%                                  |
| between 90% & 95%                                   | 0.5% for 8 yrs           | 0.5% for 12 yrs                                | 0.25% for 4 yrs          | 0.25% until LTV reaches 78%         |
| above 95%   | 0.5% for 10 yrs          | 0.5% for 30 yrs                                | 0.25% for 8 yrs          | 0.25% until LTV reaches 78%         |

**2. Upfront Premium**

The upfront premium is calculated as follows:

$$\text{Upfront Premium Payment} = \text{Origination Amount before upfront premium} * \text{Mortgage Insurance Premium Rate (\%)}$$

In practice, the FHA offers a premium finance program to those qualified for mortgage insurance. Borrowers do not have to pay the upfront premium at the beginning of contract. Instead, the borrower can pay the upfront premium at the same schedule as their mortgage payment. According to FHA, the vast majority of the borrowers do finance the upfront premium.

### 3. Annual Premium

The annual premium is calculated as follows:

$$\text{Annual Premium} = \text{Amortized UPB (excluding any upfront premiums)} * \text{Annual Insurance Premium Rate (\%)} / 4$$

The annual premium is actually collected on a monthly basis. The above formula assumes that the premium is collected at the beginning of each quarter in our analysis. In addition, the termination rate will have impacts on annual premium flows similar to the characteristics of an interest-only strip security. That is, all potential future annual premium income would no longer exist when the particular mortgage loan was prepaid or claimed.

Although FHA is effectively insuring the financed upfront premiums, the annual premium is not assessed on the amount of the financed upfront premium.

### B. Losses Associated with Claims

The MMI Fund's largest expense component comes in the form of losses due to claims. FHA pays the claim to the lender when a lender files a claim. In most cases, FHA takes possession of the foreclosed property and sells the property to recover its loss. This particular type of claim is called a conveyance.

Based on this practice, claim cash flows can actually be decomposed to two components:

- the cash outflow of the claim payment at the claim date and
- the cash inflow of any net proceeds received in selling the conveyed property at the property disposition date.

For tractability, we simplify this two-steps cash flow into one lump-sum amount. The single claim loss payment estimated in our model is

$$\text{Claim Payment}_t = \text{Amortized Surviving UPB}_t * \text{Conditional Claim Rate}_t * \text{Loss Rate}$$

The *Amortized Surviving UPB<sub>t</sub>* is the amount of the unpaid balance of the loan after amortization multiplied by the probability that the loan will survive until the beginning of time *t*. The conditional claim rate is estimated from the multinomial mortgage termination model presented in Appendix A.

The loss rate is usually referred to as the loss given default (LGD) in the banking industry, which measures the amount of principal not recovered divided by the unpaid balance at the time of

default. Based on the historical data of claimed mortgages provided by FHA, the average claim loss rate declined from the 40 percent in 2000 to about 35 percent during the 2001 through 2003 exposure years. However, this rate rose in the 2004 to about 37.5%. Although significant efforts have been invested by FHA to improve the loss rate, with the rising loss severity rate observed toward the end of this time series data, we feel it is necessary to revise the loss severity rate applied in last year's Review.

**Exhibit B-6**

| Average Loss Severity Rates of Claimed Loans by Claim Year |                       |        |        |        |        |        |         |
|--|-----------------------|--------|--------|--------|--------|--------|---------|
| Termination<br>Year  | Mortgage Product Type |        |        |        |        |        | Average |
|  | F30                   | F15    | ARM    | SR-F30 | SR-F15 | SR-ARM |         |
| 2000   | 41.38%                | 57.16% | 37.65% | 35.13% | 51.74% | 35.33% | 40.05%  |
| 2001   | 36.44%                | 51.26% | 33.06% | 28.17% | 43.15% | 28.52% | 35.22%  |
| 2002   | 34.30%                | 43.02% | 31.03% | 26.90% | 48.67% | 22.20% | 33.42%  |
| 2003   | 35.29%                | 44.75% | 31.47% | 29.57% | 37.44% | 27.40% | 34.54%  |
| 2004   | 38.20%                | 46.62% | 35.06% | 32.48% | 43.72% | 33.02% | 37.45%  |
| Average  | 36.96%                | 48.76% | 34.11% | 30.88% | 46.17% | 30.59% | 36.12%  |

Exhibit B-6 shows the historical loss severity rate experience by claim year and by mortgage product types. For property dispositions that occurred during FY 2002, FY 2003 and FY 2004, FHA's loss rates averaged 33.4, 34.5, and 37.5 percent of unpaid principal balance, respectively. FHA, however, often expresses its loss rate in terms of a percentage of its acquisition cost, which is the sum of the unpaid principal balance and other allowable costs (such as interest during the foreclosure period and foreclosure expenses) for which FHA reimburses the lender upon the filing of a claim when the property is conveyed to FHA. Following FHA's definition, the loss rates for property dispositions occurring during FY 2002, FY 2003 and FY 2004 would be 28.39, 29.42, and 32.0 percent, respectively when expressed as a percent of acquisition cost.

For the FY 2005 Actuarial Review, the cash flow model expressed the loss severity rate in terms of the unpaid principal balance. The average loss rates for each product type during the past five termination years are used as the expected loss severity rates for all future terminations. These individual loss rates are listed below:

- 36.96 percent for FMR30
- 48.76 percent for FRM15
- 34.11 percent for ARM
- 30.88 percent for FRM30-SR
- 46.17 percent for FRM15-SR
- 30.59 percent for ARM-SR

To provide insights into the impact of sensitivity analysis on the economic value and capital ratios, this year's report also includes an alternative scenario under which we assumed that the loss rate of each product was five percentage points higher than the above historical average rates.

### C. Refunded Premiums

FHA first introduced the upfront premium refund program in 1983, which specified that FHA would refund a portion of the upfront premium when a household prepays its mortgage. The upfront premium is considered to be "earned" over the life of the loan. Upon prepayment, an approximation of the unearned upfront premium is returned to the borrower. Therefore, the amount of the refund depends on the time since origination that the mortgage is prepaid. The refund payments are calculated as follows:

$$\begin{aligned} \text{Refund Payments} = \\ \text{Original UPB} * \text{Upfront Premium Rate} * \text{Conditional Prepayment Rate} * \text{Refund Rate} \end{aligned}$$

In the past, borrowers could receive the upfront premium refund when they prepaid their mortgage before the maturity of the mortgage contract. The 2000 policy change in FHA states that borrowers can obtain refunds only if they prepay 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 newly insured loans except for those occurring within 3 years following the endorsement data if the borrower refinanced with a new FHA loan.

As of the current rules as well as past policies related to the upfront premium refund schedule are presented in Exhibit B-7.

## Exhibit B-7

| Years since Origination | Percentage of Upfront Premium Refunded |                        |                              |                               |                                     |
|-------------------------|--|------------------------|------------------------------|-------------------------------|-------------------------------------|
|                         | 9/1/83~12/31/93                        |                        | 1/1/94~12/31/00 <sup>a</sup> | 1/1/01 and later <sup>b</sup> | 12/8/2004 and later <sup>c</sup>    |
|                         | Thirty Year Mortgages                  | Fifteen Year Mortgages | All Mortgages                | All Mortgages                 | If Refinanced into Another FHA Loan |
| 1                       | 0.99                                   | 0.99                   | 0.95                         | 0.85                          | 0.58                                |
| 2                       | 0.94                                   | 0.93                   | 0.85                         | 0.65                          | 0.34                                |
| 3                       | 0.82                                   | 0.81                   | 0.70                         | 0.45                          | 0.10                                |
| 4                       | 0.67                                   | 0.66                   | 0.49                         | 0.25                          | 0.00                                |
| 5                       | 0.54                                   | 0.51                   | 0.30                         | 0.10                          |                                     |
| 6                       | 0.43                                   | 0.39                   | 0.15                         | 0.00                          |                                     |
| 7                       | 0.35                                   | 0.29                   | 0.04                         |                               |                                     |
| 8                       | 0.29                                   | 0.21                   | 0.00                         |                               |                                     |
| 9                       | 0.24                                   | 0.15                   |                              |                               |                                     |
| 10                      | 0.21                                   | 0.11                   |                              |                               |                                     |
| 11                      | 0.18                                   | 0.08                   |                              |                               |                                     |
| 12                      | 0.16                                   | 0.06                   |                              |                               |                                     |
| 13                      | 0.15                                   | 0.04                   |                              |                               |                                     |
| 14                      | 0.13                                   | 0.03                   |                              |                               |                                     |
| 15                      | 0.12                                   | 0.02                   |                              |                               |                                     |
| 16                      | 0.11                                   | 0.00                   |                              |                               |                                     |
| 17                      | 0.10                                   |                        |                              |                               |                                     |
| 18                      | 0.09                                   |                        |                              |                               |                                     |
| 19                      | 0.09                                   |                        |                              |                               |                                     |
| 20                      | 0.08                                   |                        |                              |                               |                                     |
| 21                      | 0.07                                   |                        |                              |                               |                                     |
| 22                      | 0.07                                   |                        |                              |                               |                                     |
| 23                      | 0.06                                   |                        |                              |                               |                                     |
| 24                      | 0.05                                   |                        |                              |                               |                                     |
| 25                      | 0.05                                   |                        |                              |                               |                                     |
| 26                      | 0.04                                   |                        |                              |                               |                                     |
| 27                      | 0.04                                   |                        |                              |                               |                                     |
| 28                      | 0.04                                   |                        |                              |                               |                                     |
| 29                      | 0.04                                   |                        |                              |                               |                                     |
| 30                      | 0.00                                   |                        |                              |                               |                                     |

<sup>a</sup> Based on Mortgagee Letter 94-1, which provides a monthly schedule of refund rates

<sup>b</sup> Based on Mortgagee Letter 00-38

<sup>c</sup> Based on Mortgagee Letter 05-03, which provides a monthly schedule of refund rates

**IV. Economic Value and Capital Ratio**

Once all the above future cash flow components are determined, the present value can be measured through a proper discounting method. Then the economic value will be the sum of the total present value of future cash flows and the current capital resources.

**A. Discount Factor**

The discount factors applied in discounting the cash flows are the Federal credit subsidy present-value conversion factors. The discount factor varies depending on how long in the future a cash flow will occur. The discount factors are shown in Exhibit B-8.

**Exhibit B-8**

| Years that<br>Cash Flow<br>Occur | Discount Factor | Years that<br>Cash Flow<br>Occur | Discount Factor | Years that<br>Cash Flow<br>Occur | Discount Factor |
|----------------------------------|-----------------|----------------------------------|-----------------|----------------------------------|-----------------|
| 2006                             | 0.965881        | 2018                             | 0.524234        | 2030                             | 0.258419        |
| 2007                             | 0.927905        | 2019                             | 0.495543        | 2031                             | 0.243004        |
| 2008                             | 0.888689        | 2020                             | 0.468149        | 2032                             | 0.228435        |
| 2009                             | 0.848483        | 2021                             | 0.442028        | 2033                             | 0.214675        |
| 2010                             | 0.807934        | 2022                             | 0.417151        | 2034                             | 0.201684        |
| 2011                             | 0.767273        | 2023                             | 0.393483        | 2035                             | 0.189426        |
| 2012                             | 0.726912        | 2024                             | 0.370989        | 2036                             | 0.177900        |
| 2013                             | 0.688481        | 2025                             | 0.349630        | 2037                             | 0.167075        |
| 2014                             | 0.652294        | 2026                             | 0.329365        | 2038                             | 0.156909        |
| 2015                             | 0.618190        | 2027                             | 0.310153        | 2039                             | 0.147362        |
| 2016                             | 0.585557        | 2028                             | 0.291952        | 2040                             | 0.138396        |
| 2017                             | 0.554236        | 2029                             | 0.274721        | 2041                             | 0.129975        |

**B. Calculating the Economic Value and Capital Ratio**

At the end of FY 2005, the economic value of the MMI Fund was calculated first by determining the present value of the future cash flows for all existing books of business as of September 30, 2005. This figure was then added to the current capital resources of the MMI Fund. The capital ratio is defined as the economic value divided by the unamortized insurance-in-force of the Fund.

For each fiscal year beyond 2005, the economic value of the fund as of the end of the fiscal year is calculated by the following equation:

$$TAC / IFE$$

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*Year End Economic Value =*

*Economic Value at the beginning of the year + Total Return on the Beginning Economic Value + Economic Value of the New Book of Business*

The return on investment of the beginning economic value for each of the future fiscal years is assumed to equal the forward one-year Treasury rates implied by the discount factors. Specifically, these rates are shown in Exhibit B-9.

**Exhibit B-9**

| <b>Interest Rate Earned by MMI Fund</b> |                          |
|---|--------------------------|
| <b>Fiscal Year</b>                      | <b>Interest Rate (%)</b> |
| 2005                                    | 2.23                     |
| 2006                                    | 3.53                     |
| 2007                                    | 4.09                     |
| 2008                                    | 4.41                     |
| 2009                                    | 4.74                     |
| 2010                                    | 5.02                     |
| 2011                                    | 5.30                     |
| 2012                                    | 5.55                     |