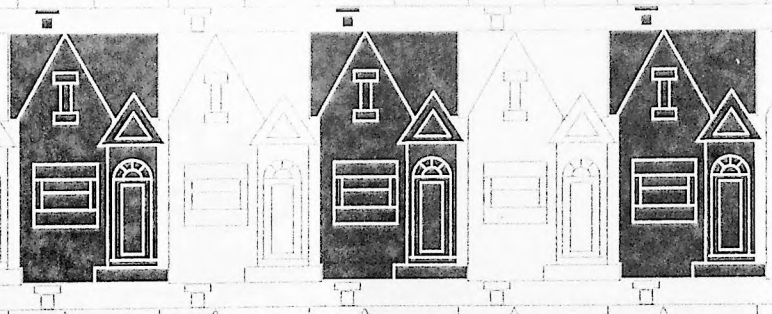
An Actuarial Review for Fiscal Year 1997 of the Federal Housing Administration's Mutual Mortgage Insurance Fund

Final Report

February 19, 1998



Price Waterhouse

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February 19, 1998

The Honorable Nicolas P. Retsinas
Assistant Secretary for Housing -- Federal Housing Commissioner
451 Seventh Street, SW
Room 9100
Washington, DC 20410

Dear Mr. Retsinas:

The Cranston-Gonzalez National Affordable Housing Act requires an independent actuarial analysis of the economic net worth and soundness of the Federal Housing Administration's Mutual Mortgage Insurance (MMI) Fund. We have completed the fiscal year 1997 Actuarial Review of the Mutual Mortgage Insurance Fund and summarize our findings below.

The primary purpose of our review was to estimate

- the economic value of the MMI Fund, defined as the sum of existing capital plus the net present value of current books of business

- the current and projected capital ratio, defined as the economic value divided by the total insurance-in-force.

We estimate that the MMI Fund's economic value was $11.258 billion at the end of fiscal year (FY) 1997 and that the capital ratio was 2.81 percent. We project that in FY 2000 the Fund's economic value will be $15.684 billion and that the capital ratio will be 3.21 percent.

The estimates presented here require projections of events more than 30 years into the future. These projections are dependent upon a number of assumptions, including economic forecasts by DRI/McGraw Hill and the assumption that FHA does not change its refund and premium policies. To the extent these assumptions, or others, are not accurate, the actual experiences will vary from our projections.

The full actual report explains these projections and the reasons for the improvements since last year's actuarial review. If you have any questions, please feel free to call Barry Dennis at (301)897-4239.

Very truly yours,

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FEDERAL HOUSING ADMINISTRATION'S
MUTUAL MORTGAGE INSURANCE FUND

ACTUARIAL REVIEW FOR FISCAL YEAR 1997

I have reviewed the "Actuarial Review for Fiscal Year 1997 of the Federal Housing Administration's Mutual Mortgage Insurance Fund", dated February 19, 1998 (Actuarial Review). The objective of my review was to determine the reasonableness of the methodology used, the underlying assumptions applied, and the resulting estimates derived therefrom.

The Actuarial Review was based upon data and information prepared by the Federal Housing Administration (FHA). In this regard, I have relied upon the FHA for its accuracy and completeness. In addition, I also relied upon the reasonableness of the recently prepared future economic outlook by DRI/McGraw Hill, from which the base case used in the Actuarial Review was derived.

Based on these reliances, it is my opinion that on an overall basis the methodology and underlying assumptions used in the Actuarial Review are reasonable. Although actual experience will not develop exactly as projected, as of this time, the estimates made are within a reasonable range of probable values.

Sam Gutterman

Sam Gutterman, FSA, FCAS, MAAA
Chicago, Illinois
February 19, 1998
(312) 540-2330

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Executive Summary

The Cranston-Gonzalez National Affordable Housing Act (NAHA) requires an independent actuarial analysis of the economic net worth and soundness of the Federal Housing Administration's (FHA's) Mutual Mortgage Insurance (MMI) Fund. This report presents our findings with respect to this required analysis for fiscal year (FY) 1997.

The primary purpose of our review was to estimate

- the economic value of the MMI Fund, defined as the sum of existing capital plus the net present value of current books of business, and
- the current and projected capital ratio, defined as the economic value divided by the total insurance-in-force (IIF).

A. Status of the Fund

NAHA mandated that the MMI Fund achieve a capital ratio of at least 1.25 percent by fiscal year 1992 and a capital ratio of at least 2.00 percent by FY 2000. Last year's Actuarial Review estimated that the MMI Fund's capital ratio at the end of FY 1996 was 2.54 percent, the second consecutive year it exceeded the 2.00 percent year 2000 requirement. This year, as a result of continued strengthening of the Fund, we estimate that the FY 1997 capital ratio has increased to 2.81 percent, again exceeding the FY 2000 statutory requirements of NAHA. We also estimate that the FY 2000 capital ratio will be 3.21 percent. Exhibit ES-1 provides our estimates of the Fund's current and future economic values and capital ratios.

In describing the capital ratio, NAHA stipulates the use of unamortized insurance-in-force. However, "unamortized insurance-in-force" is defined in the legislation as "the remaining obligation on outstanding mortgages" -- a definition generally understood to apply to amortized IIF. Price Waterhouse continues to use the unamortized IIF measure (as generally defined) in calculating the capital ratio, although it is also instructive to consider the capital ratio based on amortized IIF, which is the basis the General Accounting Office has used in its previous reports on the status of the Fund. Our estimate of the FY 1997 capital ratio using amortized IIF is 3.02 percent and our estimate of the FY 2000 capital ratio is 3.57 percent. Unless stated otherwise, all references to the Fund's capital ratios in this report refer to the ratio computed using unamortized IIF.

B. Sources of Change in the Status of the Fund

Change in Economic Value from FY 1996 to FY 1997

We estimate the economic value of the MMI Fund to be $11.258 billion at the end of FY 1997, which represents an increase of $1.861 billion over our estimate of the FY 1996 value reported last year. This 20 percent increase in the estimated economic value of the MMI Fund accompanied a 8.2 percent increase in the unamortized IIF. These resulted in the capital ratio increasing by 0.27 percentage points from 2.54 percent to 2.81 percent.

Exhibit ES-1

Projected MMI Fund Performance for FYs 1997 to 2000 ($ Millions)

Fiscal Year	Economic Value of the Fund*	Capital Ratio	Volume of New Endorsements	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,258	2.81%	$60,051	$400,850	$1,156	n/a
1998	$12,627	2.95%	$54,377	$427,327	$1,032	$338
1999	$14,052	3.08%	$58,175	$455,779	$1,045	$379
2000	$15,684	3.21%	$67,129	$488,106	$1,211	$422

*All values are as of the end of each fiscal year. The economic value for future years (FYs 1998 through 2000) is equal to the economic value of the Fund at the end of the previous fiscal year, plus the interest earned on the Fund's balances in the current year, plus the economic value of the new book of business.

Current Estimate of FY 1997 Economic Value Compared with the Estimate Presented in the FY 1996 Actuarial Review

This year's estimate of the FY 1997 economic value is $588 million higher than the economic value projected for FY 1997 in the FY 1996 Actuarial Review. The difference may be viewed as the sum of four types of changes: changes due to FHA data and origination volume updates; changes due to revised economic forecasts; changes due to econometric model refinements; and changes due to adjustments to financial and cash flow modeling assumptions. Of these four sources of changes, the primary reason for the change in estimated economic value from last year to this year is the change due to adjustments to financial and cash flow assumptions. This change is primarily attributable to a decline in predicted loss rates for higher house price categories and an unanticipated increase in the Fund's capital resources. These changes, in turn, when combined with other less significant adjustments to financial and cash flow assumptions,

resulted in a net increase of $699 million in the estimated economic value. The combined effect of a higher interest rate forecast and continued strong predicted growth in house prices and household income resulted in lower prepayment rates in the near future and increased the estimated economic value by another $145 million. The combined effect of all other changes, including changes in data, estimates of current and future origination volumes, and technical refinements to the econometric model, resulted in a net decrease of $256 million in the Fund's estimated FY 1997 economic value. Table ES-2 provides a breakdown of the changes in the Fund's economic value between FY 1996 and FY 1997.

Exhibit ES-2

Summary of Changes in MMI Fund Estimated Economic Value Between FY 1996 and FY 1997 ($ Millions)

	Change in FY 1997 Economic Value	FY 1997 Economic Value	Change in FY 1997 Capital Ratio	Corresponding FY 1997 Capital Ratio
FY 1997 Economic Value Presented in the FY 1996 Review Excluding the 1997 Book of Business:		**$9,397**		**2.80%**
Plus: Forecasted Value of FY 1997 Book of Business and Interest on Previous Business Presented in the FY 1996 Review	+$1,273			
Equals: **FY 1997 Economic Value Presented in the FY 1996 Actuarial Review**		**$10,670**		**2.80%**
Plus: FHA Data and Origination Volume Updates and FY 1997 Experience	-$171	$10,499	-0.17%	2.63%
Plus: Change in Economic Forecasts	+$145	$10,644	+0.15%	2.78%
Plus: Econometric Model Refinements	-$85	$10,559	-0.14%	2.64%
Plus: Adjustments to Financial and Cash Flow Assumptions	+$699	$11,258	+0.17%	2.81%
Equals: **Estimate of FY 1997 Economic Value**	**+$588**	**$11,258**	**+0.01%**	**2.81%**

The financial position of the Fund continues to be strengthened by the addition of new business and the capital ratio over the next three years is likely to continue growing by approximately 0.13 percentage points each year. As a result, in the absence of major changes in economic conditions or FHA policies, the MMI Fund will exceed the mandated FY 2000 capital ratio requirement of 2.00 percent.

Although the combined effect of changes in data, estimates of current and future origination volumes, technical refinements, and adjustments to the financial and cash flow assumptions contributed to a net increase of $588 million over the FY 1997 economic value estimated in the FY 1996 Review, when viewed individually there were several significant sources of change.

- The net effect of all data and origination volume changes was a net decrease in the FY 1997 economic value of $171 million. Updates to the volume and composition of FY 1996 originations resulted in an increase of $60 million in the estimated FY 1997 economic value and no change in the FY 1997 capital ratio. This updated volume was concentrated in the higher house price categories, which are less risky, and in ARMs, which are riskier. The net of these two offsetting effects is that the overall FY 1996 book of business is predicted to be somewhat less risky than predicted last year. Updates to the actual volume of FY 1997 originations from the projections in the FY 1996 Review resulted in an increase of $453 million in the economic value and a decrease of 0.02 percentage points in the FY 1997 capital ratio. These changes are due to the much higher than expected volume of the FY 1997 book of business. The FY 1997 book was larger than had been projected in the FY 1996 Review by $18.84 billion, or 46 percent. Updates were also made to the actual loan composition of FY 1997 originations, which shifted FHA's portfolio composition toward a larger share of ARMs. Updates to the historical claim and prepayment information contained in FHA's A-43 database and the substitution of actual for predicted FY 1996 and FY 1997 termination rates resulted in a decrease in the estimated FY 1997 economic value of $248 million and a corresponding decrease in the FY 1997 capital ratio of 0.05 percentage points. Finally, the impact from the inclusion of the FY 1997 termination experience in the reestimation of the claim and prepayment econometric models resulted in a decrease of $458 million in the estimated FY 1997 economic value and a decrease of 0.10 percentage points in the FY 1997 capital ratio. These overall negative impacts are reflected in future projections of future terminations and have a more significant negative effect of -0.48 percent on the FY 2000 sapital ratio.

- The most recent long term macroeconomic forecast published by DRI is similar to the forecast that was used in the FY 1996 Review. The slightly higher projected interest rates lead to lower prepayment rates projected for the next few years, which results in a $145 million increase in economic value and an increase of 0.15 percentage points in the FY 1997 capital ratio. The net effect of model modifications was a net decrease of $85 million in the estimated FY 1997 economic value and a decrease of 0.14 percentage points in the FY 1997 capital ratio.

- The last category of change, the effect of changes in financial and cash flow assumptions, resulted in a net increase in the estimated FY 1997 economic value of $699 million and an increase in the estimated FY 1997 capital ratio of 0.17 percentage points. The estimation of the future loss rates on conveyed properties and the increase in the Fund's capital resources represents the most significant adjustments in this category, with respective increases of $444 million and $289 million. Other changes in the financial cash flow assumptions were made to incorporate updated information based on experience, including adjustments to the time lags, claim settlement factors, loss rates on assigned mortgages, higher administrative costs per dollar of IIF, and the incorporation of different loss rates to reflect FHA's expected future loss mitigation activities. Many of these factors, including conveyance loss rates, claim settlement factors, loss rates on assigned mortgages, adjustments to the time lags, and loss rates on preforeclosure sales, jointly determine the overall loss rates that will be experienced in future years. As a result, their effects should always be considered simultaneously, and the focus should be on their joint net effect. Taken together, these factors decrease the FY 1997 economic value by a total of $34 million.

Change in Estimated Future Insurance-in-Force

Our FY 1997 estimates of the Fund's IIF in FYs 1997 to 2000 are higher than our estimates presented in the FY 1996 Actuarial Review. There are three factors that contribute to these higher IIF estimates. First, the FY 1996 volume in the 1996 Review was 4 percent lower than the actual origination volume due to reporting lag. Second, the FY 1997 volume was substantially higher than estimated in the FY 1996 Review due to the continued strength of the national economy. The higher endorsement volume of these two books of business resulted in a higher IIF as of the end of FY 1997. Third, the interest rate forecasts for FYs 1998 to 2000 increased by between 20 to 50 basis points from the forecasts a year ago. The higher interest rate forecast has two impacts on the IIF of the Fund. On one hand, this causes the prepayment rates of existing books of business to decrease, causing IIF to decrease less rapidly than initially projected. On the other hand, the higher interest rate indicates a higher payment burden to potential FHA borrowers, resulting in lower origination volumes in the FY 1998 to FY 2000 books of business. Our revised demand model, however, considers other major economic variables (such as the current historically low unemployment rate and the continued strengthening of the national housing market). When these factors are considered, the revised demand model projects that the FHA endorsement volume will remain at a level similar to levels in the past two fiscal years. The effect of a higher volume of new purchase money mortgage endorsements in the next three years was captured from the results of a series of econometric models designed to forecast future demand for FHA endorsements based on economic and policy variables. The net result of these offsetting effects is an increase of about $73.4 billion in IIF by the end of FY 2000 from the IIF

estimation presented in the 1996 Review. For a complete discussion of the demand model, please refer to Appendix F.

Estimated Loss Rates Using Loss Rate Models

In the process of conducting the FY 1997 Review, we continue to utilize the loss rate model developed in FY 1995 to estimate future loss rates under possible alternative scenarios. In Reviews prior to FY 1996, average historical loss rates were used as estimates for future losses. These loss rates have decreased gradually over the last few years, and during a period of declining loss rates, using the historical average may overestimate the loss rates in the future. Therefore, using the updated loss rate model instead of the historical average has a positive impact on the estimated economic value of the Fund. The loss rate model estimates future loss rates of loans in the larger house price categories to be lower than in previous years, resulting in an increase of $444 million in the FY 1997 economic value and an increase of 0.15 percentage points in the FY 2000 capital ratio.

Termination of Assignment Program

In FY 1996, Congress passed legislation that contains a provision for the termination of the Single-Family Mortgage Assignment Program (the "Assignment Program"). Previous studies by HUD and the General Accounting Office have found that the losses incurred by FHA on assigned mortgage notes are significantly greater than losses on conveyed properties. As a result of the higher loss rates on mortgage assignments, the discontinuation of the assignment program has had a significant positive impact on the Fund's current economic value. Although FHA ceased accepting applications for assignments on April 26, 1996, as of the end of FY 1997, there were approximately 700 applications outstanding that had been received prior to the cut-off date. During our FY 1996 Review, we assumed that all remaining assignments would be claimed during FY 1997. The unresolved 700 assignments result in a marginally higher weighted average loss rate for non-conveyance terminations in FY 1998 than that assumed in the FY 1996 Review. It should be noted that FHA has also tried to reduce loan assignment loss rates through assets sales. Experience with these sales, however, is very limited and has had no material impact on the performance of the MMI Fund.

Effects of Loss Mitigation

The same legislation that terminated the Assignment Program authorized FHA to recompense mortgagees for their actions to mitigate potential losses by providing mortgage foreclosure alternatives, such as special forbearance, mortgage assumptions by lenders, pre-foreclosure sales, deed-in-lieu-of-foreclosure transactions, partial claim payments, and loan modifications. Many

of these loss mitigation techniques have been successfully employed in the conventional mortgage market by private mortgage insurers, Fannie Mae, and Freddie Mac. During FY 1997, FHA continued to explore ways to encourage lenders to use different loss mitigation tools by providing incentives such as a reduction in paper work, reimbursement for administrative expenses, monetary incentives to reward success, and a more flexible approach. From the available data on loss mitigation tools, only pre-foreclosure sales and deed-in-lieu transactions were used to a significant extent and, even in those cases, the number of claims settled using these tools was relatively small, representing only 3,675 out of a total of 61,497 claims, or approximately 6 percent. When combining the FY 1997 experience for pre-foreclosure sales and other loss mitigation tools of partial claim, special forbearance and mortgage modification, the number of claims settled with loss mitigation tools represents a little over 7.23 percent of total claims.

As for the effectiveness of these loss mitigation tools in reduction of claim loss rates, we are able to estimate the loss rate associated with pre-foreclosure sales by using the Pre-foreclosure Sales Program experience from a demonstration program that began in October 1991, and which became a nationwide program in November 1994. In our analysis of FHA's data on the Pre-foreclosure Sales Program we estimated that the average loss as a percent of total claim payments for a pre-foreclosure sale was 25 percent, lower than the loss rate for properties conveyed over the same time period. Based on limited data on the performance of the pre-foreclosure sales program in FY 1996, in last year's Review, we assumed that FHA would successfully resolve 10 percent of claim terminations in FY 1997 and beyond using pre-foreclosure sales and other loss mitigation methods. Given that the pre-foreclosure sales as a percentage of all claims have continued to increase over the recent months, we retain last year's assumption that FHA will resolve 10 percent of claim terminations in FY 1998 and beyond even though the actual FY 1997 experience is less than this estimate.

Additional Comments

The estimates presented here reflect projections of events more than 30 years into the future. These projections are dependent upon a number of assumptions, including economic forecasts by DRI and the assumption that FHA does not change its refund, premium or underwriting policies. To the extent that these or other assumptions are not sufficiently accurate, the actual results will vary, perhaps significantly, from our current projections.

As this report is released, the interest rate environment is heading in a different direction than the one predicted in DRI's long-term forecast in October 1997. The most active quoted FHA rate in the primary market during the first four months of FY 1998 averaged 7.375 percent and the effective rate for the same period averaged 7.405 percent. Both are significantly lower than the DRI forecasts and are near their lowest levels since the early 1970's. This is a result of the

significant decline of the long term interest rate in the capital market. Correspondingly, the MBA refinancing index reached 1842.9 and 3115.8 for the weeks ending January 17 and 24 respectively. The number of refinancing applications during the week ending January 24 is almost double that of the 1993 refinance wave. Many mortgage brokers project that the refinance volume could be as high as that of FY 1993, if the mortgage rates remain low through most of FY 1998.

These conditions are of recent occurrence, and have not persisted long enough to reasonably conclude on the likelihood of their continuance. However, this situation is quite different from the DRI forecast upon which we have completed this year's Actuarial Review. We have completed sensitivity analyses, assuming that the current interest rate situation persists for the remainder of FY 1998. If this were to happen, we estimate that the effect on the Fund would be small. This result occurs because the effect of such rapid prepayments on the total economic value of the book is muted by the fact that most of the economic value of the book is collected through the upfront premium, which is not affected by rapid prepayments.

Estimation of the equations used for predicting prepayments and claims requires large amounts of loan level data. This data takes several weeks to process before it can be used. In addition, complete data for a fiscal year is generally not available for a few months after the end of the fiscal year due to reporting and processing lags. For both reasons, in order to complete the Review within the time frame required by OMB, we continue to use the adjusted twelve-month approach developed in the FY 1996 Review. As part of this approach, we obtained data experience from FHA in July 1997 that represent activity through June 30, 1997. This experience contained loan level information, providing information on both the aggregate level of activity and the distribution of that activity. We used this data to estimate our econometric claim and prepayment models. During subsequent months, we obtained updates to monitor whether significant changes were occurring in the portfolio. In January, we obtained updated aggregate data on the Fund, and adjusted the overall estimated levels in individual loan types to conform to these aggregate levels.

Finally, while we have reviewed the integrity and consistency of the data supplied by FHA and believe it to be reliable, we have not audited it for accuracy. Additionally, the information contained in this report may not correspond exactly with other published analyses that rely on FHA data compiled at a different time or obtained from other systems.

C. Impact of Economic Forecasts

The economic value of the Fund and its pattern of capital accumulation to FY 2000 depends on several factors. One of the most important factors is the nature of the nation's future economy

during the remaining lifetime of FHA's books of business. We capture the most significant factors in the U.S. economy affecting the performance of the Fund's books of business through the use of the following variables in our models:

- FHA mortgage interest rate
- One-year Treasury bill rate
- Growth rate of house prices
- Growth rate of mean household incomes
- Unemployment rate

The performance of FHA's books of business, measured by their economic value, is affected by changes in these economic variables. Higher mortgage interest rates raise initial and ongoing payment burdens on household cash flows, and hence default risks. Lower mortgage interest rates have the reverse effect and tend to accelerate refinancing of earlier originations. Faster average house price growth facilitates the accumulation of home equity, which tends to reduce the likelihood of borrower default. It also contributes to greater mobility and household asset portfolio rebalancing, leading to greater turnover of housing and refinancings, thus increasing prepayment rates. Faster income growth reduces the relative burden of mortgage payments on household cash flows over time, reducing risks of default as mortgages mature.

The base case results in this report are based on DRI's control forecast as of October 1997 for interest rates, average house prices, and inflation rates. We considered two other scenarios based on DRI forecasts: 1) a pessimistic forecast, which projects lower real growth in house prices and mean household income, and higher inflation and interest rates; and 2) a boom-bust forecast, which projects higher real growth in house prices and median household income, and lower inflation and interest rates for the first two years of the projection followed by significantly less favorable conditions for the subsequent two years. These two scenarios do not represent the full range of possible experiences, but represent variations from the base case that might reasonably be expected and demonstrate the sensitivity of the analysis to variations in economic conditions. We present our estimates of the Fund's performance under each of these economic scenarios in Exhibit ES-3.

Estimated FY 1997 economic values under the different scenarios vary by approximately $2.42 billion, and the estimated FY 1997 capital ratio varies from 2.20 percent to 2.81 percent. We project that under all three scenarios, the Fund will exceed the NAHA FY 2000 capital ratio target of 2.00 percent.

Exhibit ES-3

Summary of MMI Performance by Macroeconomic Scenario ($ Millions)			
	Pessimistic	Base Case	Boom-Bust
Current Economic Value (FY 1997)	$8,838	$11,258	$10,890
Current Capital Ratio (FY 1997)	2.20%	2.81%	2.72%
Projected Capital Ratio (FY 2000)	2.67%	3.21%	2.72%

D. The Economic Value of Future Books of Business

Due to the fact that the Fund's capital ratio reflects the cumulative experience of all books of business, the Fund's capital ratio at any point in time does not directly measure the underlying quality or soundness of recent mortgage originations. Consequently, we have developed two measures of the financial performance of a book of business that provide a better indication of the overall quality and profitability of future business. These two measures, the "initial" and "converging" capital ratios, represent, respectively, the present value of net income per dollar of initial IIF for a single book of business (excluding refinancings), and the capital ratio that the entire Fund would eventually approach if all future originations were identical to the book of business under consideration. We calculate these two measures of financial performance based on the FY 2000 book of business in order to reduce the effects of changes in short-term economic forecasts from our estimates.

Last year, we estimated that the initial capital ratio for the FY 2000 book of business was 2.58 percent and that the converging capital ratio for the Fund based on this book was 6.27 percent. This year, we estimate that the initial capital ratio of the FY 2000 book of business will be 1.85 percent, and that the converging capital ratio for the Fund is 4.72 percent. This decrease in the converging capital ratio is largely due to the forecast of lower growth rates for both house prices and household income during the first few policy years of the FY 2000 book of business. Nonetheless, given the forecasted economic conditions, it is evidence that the Fund's recent performance has continued to improve and that the underlying quality of the new business being endorsed is sound relative to the current premium and refund schedules. However, the lower projected initial and converging capital ratios of future books of business indicate that the speed of the improvement of the Fund's overall capital ratio is lower than last year's estimate. This

provides more evidence that the Fund's performance is very sensitive to future economic environments.

E. Volatility in Fund Performance

Despite the continued financial strengthening of the Fund, this Review has highlighted the sensitivity of the Fund to changes in economic conditions, particularly interest rates. The Fund's portfolio is highly concentrated in recent books of business, with almost 60 percent of outstanding insurance-in-force contained in books that are less than four years old. This significant concentration of business in recent books may reduce the Fund's ability to spread risk over time, as it has done in the past (for example, during the late 1980s, when surpluses on books originated in the 1970s offset deficits on books originated during the early to mid-1980s). If these recent books experience adverse economic conditions over the next few years, the economic value of the Fund could decrease significantly below the base case estimates provided in this Review.

Furthermore, while FHA has created a partial hedge against its exposure to interest rate risk and adverse selection by offering an attractive streamline refinancing option, this hedge could reduce future income given the current premium and refund structure. While the value of the Fund increases when loans originated prior to FY 1992 prepay rapidly, this is not the case with originations on or after FY 1992 because of the relatively large refunds on up-front premiums and the loss of annual premiums that would accrue to the Fund if the loans were not paid off. For loans with loan-to-value ratios over 95 percent originated on or after FY 1992, annual premiums typically constitute over 50 percent of total premium revenue, and may constitute as much as 75 percent of total premium revenue. Thus, if prepayment rates increase as a result of interest rate declines, the FYs 1992 and later books will lose significant amounts of annual premium income. Although the amounts vary by book and interest rate scenario, the resulting losses will more than offset any accompanying reduction in expected claims. While much of this loss is likely to be recaptured by future originations of streamline refinancings (SRs), it is unlikely that FHA will be able to recapture significantly more than 50 percent of future refinancings, and those that are recaptured will pay annual premiums for only seven years, instead of 30. Thus, while the Fund as a whole is unlikely to experience losses as a result of moderate interest rate movements, the FYs 1992 to 1997 books (and all future books) can experience reductions in economic value under economic conditions involving rapid prepayment activity. However, the effect of such rapid prepayments on the total economic value of the book is muted by the fact that most of the economic value of the book is collected through the upfront premium, which is not affected by rapid prepayments.

F. Additional Sensitivity Analysis

In order to test the sensitivity of our estimates of Fund value to changes in economic and other controlling assumptions we conducted a number of sensitivity analyses. These analyses focused on assumptions on which the model rests that are either based on less information than we would ideally like, or have a potentially significant effect on the economic value of the Fund. This approach provides information on the extent to which our conclusions on the performance of the Fund would vary due to inaccurate treatment of these issues. The sensitivity analyses we conducted included:

- alternative interest rate scenarios
- alternative assumptions regarding the effects of FHA's loss mitigation efforts
- alternative assumptions regarding claim and disposition lags
- alternative household income growth scenarios
- alternative house price growth scenarios

Under all of these sensitivity analyses, the estimated economic value of the Fund exceeds the mandated FY 2000 capital ratio of 2.00 percent.

Section I: Introduction

The Cranston-Gonzalez National Affordable Housing Act (NAHA), enacted in 1990, mandated that the Federal Housing Administration's (FHA's) Mutual Mortgage Insurance (MMI) Fund attain a capital ratio of 1.25 percent by October 1, 1992. This statute further directed that the Fund achieve a capital ratio of 2.00 percent by October 1, 2000. NAHA defines the capital ratio as the ratio of the Fund's capital or economic net worth[1] to its unamortized insurance-in-force.[2]

In addition to codifying this actuarial standard, NAHA established the requirement that the Department of Housing and Urban Development (HUD) undergo an annual independent actuarial review of the MMI Fund. The purpose of the review is to assess the actuarial soundness of the Fund and to report on FHA compliance with respect to the new capital standards set forth in NAHA. Price Waterhouse LLP has conducted this required review for fiscal years (FYs) 1989 through 1997. This report contains our evaluation of the actuarial soundness of the Fund as of September 30, 1997 (the end of FY 1997) and includes an assessment of the Fund's current and forecasted capital ratios. This analysis is based on information provided by HUD regarding the historical performance of the existing MMI Fund loan portfolio and projected future economic conditions and mortgage originations.

A. Implementation of NAHA and Recent Congressional Revisions

Following the issuance of the FY 1989 Actuarial Review and the ensuing debate, Congress, as part of the Cranston-Gonzalez Act, mandated various changes to the MMI Fund. The revisions to the MMI Fund called for in the NAHA legislation focused on four major issues: 1) the development of an actuarial standard of financial soundness; 2) revisions to the minimum equity requirements; 3) changes in the pricing of insurance premiums; and 4) revisions to policies regarding distributive shares.

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[1] The economic net worth is defined in the National Affordable Housing Act of 1990 as the "current cash available to the Fund, plus the net present value of all future cash inflows and outflows expected to result from the outstanding mortgages in the Fund."

[2] The term "unamortized insurance-in-force" is defined in the legislation as the "remaining obligation on outstanding mortgages" -- a definition generally understood to apply to amortized insurance-in-force. This apparent contradiction has led to some confusion regarding which is the appropriate measure to be used in the actuarial reviews. Price Waterhouse continues to use the unamortized insurance measure as conventionally defined for our calculations of capital ratios. This is consistent with Price Waterhouse's previous reports.

The provisions of NAHA regarding the MMI Fund have had a significant impact on the performance of current and future books of business. The changes called for in the Act were specifically designed to remedy the past financial difficulties encountered by the Fund. Each change was intended to either reduce the risks inherent in the additional books of business or to adjust premiums to more adequately compensate for the costs of these risks.

The NAHA legislation required that the Fund be operated on an actuarially sound basis by providing specific capital standards for the Fund and time frames in which these standards should be met. It also defined the actuarial standard as a ratio of the Fund's capital or economic net worth to its unamortized insurance-in-force.

NAHA also included several changes to both the structure and size of future premiums. Under NAHA, insurance premiums were changed to include a risk-based component that is based on a loan's initial loan-to-value (LTV) ratio. Furthermore, effective July 1991, FHA phased in a new premium schedule consisting of successively lower upfront premiums combined with annual premiums. The NAHA schedules were intended to increase the premiums on more risky loans without affecting the less risky, more financially desirable business. By switching to a combination of upfront and annual premiums, the new schedules reduced the initial financing requirement for borrowers who finance the upfront premium. The introduction of annual premiums enables the Fund to offset the loss in revenue caused by lower upfront premiums.

In October 1992, Congress passed a modification to NAHA that increased the percentage of closing costs that could be financed from 57.25 percent to 100 percent. This change should increase the potential claim risk, since an increase in the percentage of financeable closing costs should result in loans with higher effective LTV ratios. As a result, claims are likely to increase. The FY 1991 Actuarial Review (issued December 1992) estimated that the projected economic value of the Fund would decline by $31 million annually as a result of this change.

The 1992 modification to NAHA also raised the maximum loan size limit from $124,875 to $151,725.[3] An additional modification in FY 1995 changed the maximum loan size limit from a single predetermined value to a variable limit indexed to the conforming loan limit used by Fannie Mae and Freddie Mac. This change resulted in the maximum FHA loan limit increasing, in FY 1996 to $155,250, in FY 1997 to $160,950, and in FY 1998 to $170,400. These changes are likely to increase the value of the Fund, since both an increased volume of loans is being insured and the average size of each individual loan insured increases. FHA's historical experience has shown that, all else being equal, larger loans tend to have lower conditional claim

[3] The new loan limit is still subject to the 95 percent of area median rule, thus continuing to cause the FHA population to consist of below median-priced homes.

rates and lower loss rates. Consequently, insuring larger loans will tend to increase the value of the Fund. The estimated effects of these changes in the loan size limit are provided later in this section.

To further strengthen the capital position of the Fund, the NAHA legislation linked FHA's ability to pay distributive shares to the actuarial soundness of the entire MMI Fund (as defined in the legislation), rather than solely considering the performance of the loans endorsed during a particular year as had been done in the past. This amendment was intended to ensure that distributive share payments are not made if the Fund has not achieved the capital standards established by this legislation. In all our estimates of Fund performance, we have assumed that regardless of whether the Fund meets the NAHA capital requirements, no distributive shares will be paid. We make this assumption because it is consistent with current FHA policy. NAHA prohibits the disbursement of distributive shares until the mandated FY 2000 capital ratio of 2.00 percent is achieved, and while we estimate that since FY 1995 the MMI Fund has surpassed the NAHA mandated capital ratio, FHA management has given no indication that it will pay distributive shares in the near future.

B. Recent FHA Policy Developments and Underwriting Changes

During FY 1997, FHA faced several policy changes, including an increase in the FHA loan limit, elimination of the Single-Family Mortgage Assignment Program, implementation of loss mitigation techniques and the reduction in up-front premium for first time homebuyers who receive counseling. Each of these developments is summarized below.

1. Increase in FHA's Single-Family Loan Ceiling

HUD announced in late December 1997 that it would raise the single-family FHA loan limit by 5.85 percent to $170,400. This change in FHA's loan ceiling follows from the 5.85 percent increase in the conforming loan limit imposed upon Fannie Mae and Freddie Mac and the legislative change in FY 95 that allows FHA's high-cost loan limit to be 75 percent of the conforming loan limit. This change is likely to increase the volume of loans insured as well as the size of individual loans insured by FHA.

2. Elimination of the Single-Family Mortgage Assignment Program

In FY 1995, Congress passed legislation containing a provision for the termination of the Single-Family Mortgage Assignment Program (the "Assignment Program"). Previous studies by HUD and the General Accounting Office have found that the losses incurred by FHA on assigned mortgage notes are significantly greater than losses on conveyed properties. As a result of the

higher loss rates on mortgage assignments, the discontinuation of the assignment program has had a significant positive impact on our assessment of the Fund's current economic value. In the FY 1995 Review, we estimated that the economic value of the Fund in FY 1995 would have been $513 million lower than the values projected had the Assignment Program been maintained.

The termination of the assignment program had an impact on the Fund in FY 1997. FHA ceased accepting applications for assignments on April 26, 1996. At that time, there were approximately 12,000 applications outstanding. About 3,600 of these applications were processed during FY 1996 and about another 7,700 were processed during FY 1997. According to FHA, the remaining 700 loans are expected to be processed before the end of FY 1998. These estimates have been used in our analysis to derive the weighted average loss rates between conveyances and assignments for FY 1998 terminations. Although we have been generally estimating higher loss rates on assigned notes than on conveyances, it should be noted that FHA has recovered up to 91 percent of amortized loan amounts in the first few bulk auctions it held.

3. Implementation of Loss Mitigation Techniques

The same legislation that terminated the Assignment Program authorized FHA to recompense mortgagees for their actions to mitigate potential losses by providing mortgage foreclosure alternatives, such as special forbearance, mortgage assumptions by lenders, pre-foreclosure sales, deed-in-lieu-of-foreclosure transactions, partial claim payments, and loan modifications. Many of these loss mitigation techniques have been successfully employed in the conventional mortgage market by private mortgage insurers, Fannie Mae, and Freddie Mac. Except in the case of pre-foreclosure sales, the uncertainty surrounding these techniques and FHA's ability to utilize them effectively makes it difficult for us to provide a dollar estimate of the effects they will have on the MMI Fund.

We are able to provide such estimates for the Pre-foreclosure Sales Program, however, which began as a demonstration program in October 1991 and became a nationwide program in November 1994. Using FHA's data on the Pre-foreclosure Sales Program, we estimated that the average loss as a percent of total claim payments for a pre-foreclosure sale was 25 percent, versus 35 percent for properties conveyed over the same time period (as a percent of unpaid principal balance the estimated loss rates were 27 percent and 40 percent, respectively, which are identical to the rates reported by HUD in its 1994 report on the demonstration program). During FY 1997 FHA successfully resolved about 5.98 percent of terminations using pre-foreclosure sales. This is higher than the 4.6 percent for FY 1996.

Combining this with other loss mitigation methods, which account for another 1.25 percent of all claims, all loss mitigation methods resolved about 7.23 percent of the total claims during FY

1997. This is below FY 1996 Review's assumption that FHA would resolve 10 percent of all claims through loss mitigation in FY 1997 and beyond. FHA suspects that this can partially be attributed to the fact that most lenders were still focused on processing the outstanding loan assignments. Given that there is only a small number of assignment applications outstanding and given the upward trend in the percentage of pre-foreclosure sales in recent months, we retain the assumption that FHA will resolve 10 percent of claim terminations in FY 1998 and beyond using all loss mitigation methods. This is lower than HUD's estimation that FHA will use pre-foreclosure sales to resolve approximately 24 percent of claim terminations.

4. Reduction in Up-front Premium for First-Time Homebuyers who Receive Counseling

In FY 1997, FHA implemented a reduction in the up-front premium for first-time homebuyers who attend home ownership counseling. The purpose of the program is to increase home affordability by reducing the closing costs to those first-time home buyers who undergo a credible home purchase counseling program. The up-front premium was first reduced from 2.25 percent to 2.00 percent in December 1996 and again from 2.00 percent to 1.75 percent in September 1997. Assuming that the loans insured under this program have a claim risk profile similar to those of other FHA insured loans, this reduction of up-front premium will reduce the revenue of the MMI Fund and the overall capital ratio. By the end of FY 1997, a very limited number of loans were insured under this program, leaving the weighted average up-front premium of all FHA endorsements virtually unchanged. Although this program may grow over time, there is no reliable data that allows us to quantify the future financial impact of this policy change.

5. Termination of ARM "Buy Down" Program

In January 1998, HUD has adopted a new policy that terminates the ARM buydown program. Traditionally, home sellers could pay a nominal amount to buy down the first year's interest rate for the home buyers. The purpose of such a policy was to help the liquidity of the home purchase market. This program was heavily used by sellers in areas that were experiencing housing market recessions. With this lower-than-market first year payment level, buyers subject to income constraints more easily qualify for a mortgage and therefore could afford to purchase a home that would otherwise have been out of their reach. However, due to the gradual interest rate rise during the last few years from its 1993 level, these ARM borrowers are subject to payment burdens beyond their expectations. In turn, the ARM claim rate has risen significantly during the past 18 months. A significant portion of the higher claim rates is attributable to loans originated in California, where the buy down program was heavily used and where the housing market has experienced a recession over a sustained period.

The same January, 1998 mortgagee letter that terminated the buy down program also specified that the interest rate of ARMs, for loans with LTV of 95 percent or more, should be recorded as the maximum interest rate during the second year, i.e. the contract or initial rate plus 1 percent. In addition, the payment to income ratios are to be computed by using the expected payment for the second year. These two policy changes will likely reduce the number of abnormally high-risk ARMs from entering future books of business and should improve the prospective performance of the MMI Fund. However, the impact of these new policy changes will only become evident when performance data of future books of business become available.

C. Trends in Housing Finance

The interest rates of Treasury securities increased through FY 1997 from their FY 1996 level. This translated into a one-year Treasury interest rate of 5.68 percent and a ten-year rate of 6.46 percent; the corresponding FY 1996 rates were, respectively, 18 basis points and 13 basis points lower. The movement in mortgage interest rates in FY 1997 was relatively small, at 7.72 percent rate for conventional mortgages, the same level as the corresponding FY 1996 rate. In contrast, the FHA contract rate during the same period increased by 17 basis points to 8.01 percent.

The low interest rates and the positive economic environment, evidenced by continued household income growth in FY 1997, have increased the affordability of housing. In addition, the recovery of the housing market from the slow house price growth rate during the early 1990s has also reduced potential home buyers' fear of losing home equity. As a result of these more general economic conditions, FHA's total origination volume in FY 1997 has only declined by approximately 2 percent from its FY 1996 level to a total of $60 billion. Because of the higher FHA mortgage interest rates, the proportion of streamline refinancings among total endorsements decreased from about 13 percent in FY 1996 to 7 percent in FY 1997. Since a large portion of higher interest rate loans had already refinanced during the low interest rate period of the early 1990s and during FY 1996, the streamline refinancing percentage is substantially lower than that of FYs 1993 and 1994. Given that the interest rates for the next few years are expected to remain at their current levels (based on the DRI 1997 October forecasts) and given that most existing mortgages have contract rates lower or marginally higher than the current market rate, we expect the refinancing volume to remain low.

However, the interest rates in the first few months of FY 1998 are heading toward a different direction than the DRI 1997 October forecasts. The FHA effective rates averaged 7.4 percent during the first four months of FY 1998. The continuing decline of interest rates in the past few months has led to a surge in mortgage refinancing. To gain an understanding of the impact of this low interest rate phenomenon on the MMI Fund's performance, we have conducted a

sensitivity analysis in which the FHA effective rate in FY 1998 is assumed to remain at the same level as that in the first four months. Section V provides the results of this sensitivity analysis.

FHA's non-refinancing endorsement volume increased by about 5 percent to $56 billion from FY 1996. Among the non-refinancing originations, the share of 30-year FRMs decreased from 70 percent to 62 percent, while the share of ARMs increased from 30 percent to 38 percent. It is worthwhile to note that, in the last quarter of FY 1997, FHA reached the upper limit of the number of allowable ARM endorsements for the first time. The upper limit is set to 30 percent of the previous year's total endorsement volume. This limit prevented the overall ARM share from further increasing. The high ARM volume could be partially attributed to the fact that the initial ARM rate is about 144 basis points lower than the rate of FRMs. For a given income level, a home buyer is more likely to qualify for an ARM than a FRM. With FHA's new policy of eliminating buy downs and qualifying borrowers by the second year expected payment, the ARM share is likely to decrease in the future from its record high in FY 1997.

FHA's share of the new home market had fallen from over 20 percent during the 1980s to about 12 percent in the three years prior to FY 1997; preliminary FY 1997 figures show that FHA's share may have fallen to as low as 9 percent.[4] This appears to be the result of the increased origination of loans with high loan-to-value ratios (LTV) by conventional lenders. During the past two years, both Fannie Mae and Freddie Mac have increased their efforts in promoting products with high loan-to-value ratios. This market outreach has allowed more borrowers to obtain a conventional mortgage with an initial LTV ratio as high as 97 percent. As conventional lenders continue to increase their activities in the high LTV market, we expect FHA's market share to decline over the next few years.

Meanwhile, the introduction of automated underwriting systems and mortgage score analytics by Fannie Mae and Freddie Mac in 1996 are believed to be able to more effectively distinguish good loans from poor quality loans. The general concern is that the improvement of the government-sponsored enterprises' (GSEs') ability to underwrite high quality, high LTV loans might cause an adverse selection effect. That is, without modifying its underwriting rules, FHA might end up with lower average quality loans. Recently, Freddie Mac initiated a pilot program testing Loan Prospector on FHA borrowers. FHA is studying the potential development of its own mortgage scoring system. However, because of the relatively low volume and short performance history, little information can be drawn to quantify any of these effects. The ongoing developments in these areas should continue to be closely followed in the future.

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[4]"Housing Finance," *U.S. Housing Market Conditions,* 1st Quarter 1997, 2nd Quarter 1997, and 3rd Quarter 1997.

D. Current and Future Economic Environment

During FY 1997, the national housing market continued to grow stronger with an 8 percent increase in the house price index, the highest level in the past ten years. The current trend is expected to continue with the growth in this index, although at a lower level. The growth rate of the national mean household income remained high at 2.2 percent, its highest growth rate of the last nine years, with the exception of FY 1995. This growth rate, however, is expected to decline significantly over the next three years.

The long-run forecasts we have used in estimating the Fund's future economic value are consistent with current economic conditions. These economic projections have been obtained from DRI/McGraw-Hill's April 1997 long-range forecast and then updated using the October 1997 revisions. Generally, the annual growth rates in the house price index are projected to be about 5 percent per annum from now through the end of FY 2000. The projected household income growth rates, however, are projected to rapidly decrease to about .8 percent by FY 2000. The slower growth rates in house price and household income imply a deceleration of economic growth in the late 1990s and early 2000s. Beyond that, the house price growth rates are projected to fall below 2 percent for a consecutive four year period, whereas the historical average growth rate is over 5 percent per annum. This represents a temporary recession in the housing market and affects the strength of the MMI Fund. Section II presents these forecasts in greater detail while Section V provides an analysis of the fund's sensitivity to changes in specific economic variables.

Most recently, within the first few weeks of calendar year 1998, the long term interest rates have dropped noticeably. Mortgage interest rates have also dropped to their lowest levels since the early 1970s. Given that the aggressive marketing by mortgage brokers is likely to continue and that refinancing activity was relatively low during FY 1997, it is likely that another high refinancing wave will occur in FY 1998 if mortgage rates remain low through the end of FY 1998. Such a situation would not be consistent with DRI's October forecast and the assumptions used in this Review. If the average interest rate level in FY 1998 turns out to be much lower than what was projected by DRI, then the Fund will experience much higher prepayment rates, lower claim rates, and higher streamline refinancing volume. The net effect may be a noticeably lower capital ratio.

E. Data Sources and Future Projections

The estimates presented here require projections of events more than 30 years into the future. These projections are dependent upon a number of assumptions, including economic forecasts by DRI and the assumption that FHA does not change its refund and premium policies. To the

extent that these or other assumptions are not accurate, the actual results will vary, perhaps significantly, from our current projections.

Furthermore, Price Waterhouse's analysis is based on an extract of FHA's A-43 database that was obtained at the end of June 1997 as well as the subsequent data updates covering the remainder of FY 1997. While we have reviewed the integrity and consistency of this data and believe it to be reliable, we have not audited it for accuracy. The information contained in this report may not correspond exactly with other published analyses that rely on FHA data compiled at a different time or obtained from other FHA systems.

F. Structure of the Report

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

II. Summary of Findings and Comparison with FY 1996 Actuarial Review - presents the Fund's estimated economic value, capital ratio, and insurance-in-force for FYs 1997 through 2000. This section also provides a reconciliation and explanation of the major differences between the FY 1996 Review and the FY 1997 Review;

III. Current Status of the Fund - presents the estimated economic value and capital ratio of the Fund for the end of FY 1997 and provides an analysis of the performance of the FYs 1975 through 1997 books of business;

IV. Characteristics of the FY 1997 Book of Business - describes the FY 1997 book of business and compares the risk characteristics of the current book to previous books;

V. MMI Fund Sensitivities - presents sensitivity analyses of the MMI Fund using alternative economic assumptions and loan characteristics;

VI. Performance of Future Books of Business - presents the economic values of future books of business and discusses the volume and distribution of future books of business;

VII. Methodology - presents an overview of our econometric and cash flow models and highlights the technical changes made from the FY 1996 Review to the FY 1997 Review;

VIII. Conclusions - provides a summary of the report's results and the conclusions that can be drawn from those results;

Appendix A. Econometric Analysis of FRMs - provides a technical description of our econometric model for both 30-year and 15-year fixed-rate mortgages;

Appendix B. Econometric Analysis of ARMs - details the general approach for modelling adjustable-rate mortgages;

Appendix C. Econometric Analysis of SRs - provides a detailed explanation of our approach to modelling both 30-year and 15-year streamline refinancings;

Appendix D. Loss Rate Analysis - provides a technical description of our model for forecasting future loss rates based on analysis of historical data;

Appendix E. Cash Flow Analysis - provides a technical description of our cash flow model;

Appendix F. Analysis of Demand for FHA Insurance - provides a detailed explanation of the model used to predict future FHA origination volume;

Appendix G. Loss Mitigation - provides an overview of FHA's recent initiative to reduce loss severity by implementing various loss mitigation methods ;

Appendix H. Econometric and Cash Flow Results - presents claim and prepayment rates from our econometric model and detailed results from our cash flow model.

Section II: Summary of Findings and Comparison with FY 1996 Actuarial Review

This section presents the economic value and capital ratios of the Fund for fiscal year (FY) 1997 and presents an explanation of how the results of this year's Review compare with those of last year.

A. The FY 1997 Actuarial Review

The FY 1997 Actuarial Review assesses the actuarial soundness of the MMI Fund as of the end of FY 1997 (September 30, 1997) and projects the status of the Fund through FY 2000. We conducted the Review using the econometric and financial cash flow models that Price Waterhouse developed in previous Actuarial Reviews, with certain refinements added for this year's review. The objectives of our analysis include:

- evaluating the historical experience of the fund, including loan termination experience due to claims and prepayments and losses associated with those terminations;
- estimating future loan termination rates and their corresponding losses and projecting future cash flows of the existing Fund portfolio and future books of business;
- determining the adequacy of current and future capital resources to meet estimated cash requirements.

We conducted this review by estimating the economic relationships of historical loan performance using historical data provided by FHA, applying the appropriate policy parameters, and using forecasts of future macroeconomic conditions.

The econometric and cash flow models used in the FY 1997 analysis are similar to those used in the FY 1996 Review. The analysis continues to reflect loan level data on the Fund's experience reported through June 1997 and aggregate fund level data through September 30, 1997. These models also incorporate an updated set of economic assumptions and forecasts. The model continues to estimate loss rates in the future with an econometric model. (For descriptions of the individual models see Appendices A through D.) Our major findings are as follows:

- as of the end of FY 1997, the MMI Fund had an estimated economic value of **$11.258** billion and an unamortized insurance-in-force (IIF) of **$400.850** billion;
- the FY 1997 book of business has added an estimated **$1.156 billion** to the economic value of the MMI Fund;

- we estimate that the capital ratio was **2.81 percent** as of September 30, 1997, and project that it will be **3.21 percent** as of September 30, 2000. Based on these estimates, we conclude that the Fund already exceeds the NAHA mandated 2.00 percent capital ratio for FY 2000.

Our current projections indicate that the Fund's economic value will continue to increase in the future, rising by an average of 12 percent in each successive fiscal year until FY 2000. These projections also indicate that the Fund's reported capital ratio will increase by approximately 13 basis points each year over the next three years. Exhibit II-1 provides estimates of the Fund's economic value, IIF, and capital ratio until the end of FY 2000.

Exhibit II-1

Projected MMI Fund Performance for FYs 1997 to 2000 ($ Millions)

Fiscal Year	Economic Value of the Fund[a]	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,258	2.81%	$60,051	$400,850	$1,156	n/a
1998	$12,627	2.95%	$54,377	$427,327	$1,032	$338
1999	$14,052	3.08%	$58,175	$455,779	$1,045	$379
2000	$15,684	3.21%	$67,129	$488,106	$1,211	$422

[a]All values are as of the end of each fiscal year. The economic value for future years (FYs 1998 through 2000) is equal to the economic value of the Fund at the end of the previous year, plus the current year's interest earned on previous business, plus the economic value of the new book of business.

B. Change in Estimated Strength of the Fund

Exhibit II-2 displays the components of the Fund's current economic value and capital ratio from the FY 1997 Review and the FY 1996 Review. The FY 1996 Review estimated that the Fund had total capital resources of $11.551 billion at the end of FY 1996, that the present value of future cash flows was -$2.296 billion, and that the Fund had collected up-front premiums of $142 million from loans originated in FY 1996, but endorsed in FY 1997. These up-front premiums are added to our estimates of economic value because the Actuarial Review assigns loans based

Exhibit II-2

Estimates of MMI Fund Economic Value End of FY 1996 and End of FY 1997 ($ Millions)

	End of FY 1996[a]	End of FY 1997[b]
Capital Resources		
Cash	$ 3,863	$528
Investments	7,642	13,201
Properties	949	1,255
Mortgages	2,344	483
Other Assets	332	458
Net Receivables and Payables	-3,579	-3,608
Total Capital Resources[c]	**$11,551**	**$12,317**
PV of Future Cash Flows		
Pre-1975 Business	$15	$12
1975-1993 Business	-1,703	-961
1994 Business	-416	1
1995 Business	-134	89
1996 Business	-58	-128
1997 Business	n/a	-293
Total PV Future Cash Flows	**-$2,296**	**-$1,280**
Additional FY 1997 Up-front	$142[d]	$220[e]
Economic Value	**$9,397**	**$11,258**
Unamortized Insurance-in-Force	$370,484	$400,850
Current Capital Ratio	**2.54%**	**2.81%**

[a]Cash flows are from the FY 1996 Review and are valued as of the end of FY 1996.
[b]Cash flows for FY 1997 Review are valued as of the end of FY 1997.
[c]From FY 1997 Pre-Audited Financial Statements.
[d]Upfront premiums associated with loans originated in FY 1996, but endorsed in FY 1997.
[E]Upfront premiums associated with loans originated in FY 1997, but endorsed in FY 1998.

on origination date instead of endorsement date, the basis used in the financial statements. Thus, the up-front premiums associated with these loans are not included in the FY 1997 capital resource values obtained from FHA's financial statements. Therefore, as of September 30, 1996, the Fund had $9.397 billion more in capital resources than was needed to cover the present value of projected remaining cash flows from the FY 1996 and prior books.

The FY 1997 Review estimates that the fund had total capital resources of $12.317 billion at the end of FY 1997, that the present value of future cash flows was -$1.28 billion, and that the Fund collected up-front premium income of $220 million from loans originated in FY 1997, but endorsed in FY 1998. Thus, the Fund had $11.258 billion more in capital resources than was needed to cover the present value of projected remaining cash flows from the FY 1997 and prior books.

As seen in Exhibit II-2, this improvement in the Fund's capitalization is due in large part to an increase in the estimated present value of the future cash flows of the FYs 1975 to 1995 books. The details by book are displayed in Exhibit II-3. The main reason for the cash flow increase in the FYs 1984 to 1991 books is that since FY 1996, an additional year of claims and prepayments has resulted in less volume remaining that may ultimately claim. These books of business have also passed their peak claim period, which is typically between policy years 4 and 7. As the future claim rates of these books of business are expected to continuously decline, the present value of future cash outflows decreases. The same reason also causes the estimated present value of the future cash flows associated with the FYs 1975 to 1983 books to decrease. However, these books continue to pay annual premiums; therefore, reductions in volume will also resulted in reductions in the present value of the future cash inflows of these books.

A similar explanation accounts for a portion of the reduction in the present value of the future cash flows associated with the FYs 1992 to 1996 books. However, much of the increase in the present value of the future cash flows from the FYs 1992 to 1996 books is attributable to the projected reduction in loss rates associated with future claims that are likely to be experienced by these books. Because these books of business are still relatively unseasoned, most of the claims that are likely to be experienced are expected to occur in the near future. As a result, a reduction of loss rates associated with individual claims would have the most significant effect on these newer books of business.

C. Decomposition of Changes from FY 1996 Review to FY 1997 Review

This section describes the sources of change in the current economic value of the Fund and the FY 2000 capital ratio from the FY 1996 Review to the FY 1997 Review. Separating out the effects of interrelated approaches and assumptions can be done only to a certain degree of accuracy. The interrelationships among the approaches and assumptions prevent us from identifying and analyzing these as purely independent effects -- the effects are sometimes jointly determined. However, this section presents a reasonable allocation of all changes from last year, by source of change. The

purpose of the decomposition is twofold. First, it describes the change in the economic value from FY 1996 to FY 1997. Second, it explains changes between the current estimates of the economic value and capital ratio in FY 1997 and the estimates for FY 1997 that were presented in the FY 1996 Review.

Exhibit II-3

Present Value of Future Cash Flows by Book of Business, FY 1996 Review, FY 1997 Review, and Difference ($ Millions)

Book of Business	1996 Review[a]	1997 Review[b]	Difference
pre-1975	$13	12	$1
1975	7	5	-2
1976	10	8	-2
1977	17	14	-3
1978	30	26	-4
1979	47	42	-5
1980	28	30	2
1981	7	11	4
1982	-4	2	6
1983	10	22	12
1984	-45	-26	19
1985	-50	-27	23
1986	-188	-79	109
1987	-313	-182	131
1988	-210	-148	62
1989	-217	-195	22
1990	-300	-252	48
1991	-231	-185	46
1992	-90	-71	19
1993	-209	44	253
1994	-416	1	417
1995	-134	89	223
1996	-134	-128	6
1997	n/a	-293	-293
Total[c]	**-$2,296**	**-$1,280**	**$1,016**

[a] Values as of the end of FY 1996
[b] Values as of the end of FY 1997
[c] Numbers do not add due to rounding

1. Change in Economic Value from FY 1996 to FY 1997

The FY 1996 Review estimated that the economic value of the Fund as of the end of FY 1997 would be $10.670 billion, and projected the FYs 1997 and 2000 capital ratios to be 2.80 percent and 3.57 percent, respectively. We estimate the current economic value of the MMI Fund to be $11.258 billion, which represents an increase of $588 million over the estimated FY 1996 economic value. This 5.51 percent increase in the estimated economic value of the MMI Fund, which accompanied a 5.03 percent increase in the unamortized IIF, resulted in the estimated capital ratio increasing by 0.01 percentage points from 2.80 percent in the FY 1996 Review to 2.81 percent in the FY 1997 Review.

2. Current Estimate of FY 1997 Economic Value Compared with the Estimate Presented in the FY 1996 Actuarial Review

The FY 1996 Review projected that the FY 1997 book of business and interest on the Fund's balances would add $990 million and $282 million respectively to the economic value of the Fund, resulting in a projected FY 1997 economic value of $10,670 billion. This year's estimate of the FY 1997 economic value is $588 million higher than the corresponding economic value projected for FY 1997 in last year's Review. Exhibit II-4 provides a summary of the decomposition of changes in the current economic value of the Fund and the FY 2000 capital ratio from the FY 1996 Review to the FY 1997 Review. This increase is mainly attributable to the projected reduction in future loss rates and the higher than expected volume of the FY 1997 book of business. However, not all changes between the FY 1996 Review and this Review have had a positive impact on the Fund's economic value and capital ratio. Several changes have had a negative impact, most noticeably the higher overall claim rates experienced during FY 1997 which lead to higher projected claim rates across all books of business in the future and result in a reduction in the present value. This reduction partially offsets the increases mentioned above.

The change in the estimated status of the Fund which resulted from incorporating the changes that occurred during FY 1997 and new economic forecasts is decomposed into 14 component pieces. These changes are grouped into three categories: changes due to FHA data and origination volume updates and FY 1997 experience; changes resulting from model refinements and economic forecasts; and changes resulting from modifications to financial and cash flow assumptions. Exhibit II-4 summarizes the cumulative effects of these three categories while Exhibits II-5, II-7, and II-9 illustrate the individual effects of each of these changes on the Fund's economic value and capital ratio in FYs 1997 and 2000.

Exhibit II-4

Summary of Changes in MMI Fund Estimated Economic Value Between FY 1996 and FY 1997 ($ Millions)					
		Change in FY 1997 Economic Value	FY 1997 Economic Value	Change in FY 1997 Capital Ratio	Corresponding FY 1997 Capital Ratio
FY 1997 Economic Value Presented in the FY 1996 Review, Excluding the FY 1997 Book of Business:			**$9,397**		**2.80%**
Plus:	Forecasted Value of 1997 Book of Business and Interest on Previous Business Presented in the FY 1996 Review	+$1,273			
Equals:	**FY 1997 Economic Value Presented in the FY 1996 Actuarial Review**		**$10,670**		**2.80%**
Plus:	FHA Data and Origination Volume Updates and FY 1997 Experience	-$171	$10,499	-0.17%	2.63%
Plus:	Changes in Economic Forecasts	+$145	$10,644	+0.15%	2.78%
Plus:	Econometric Model Refinements	-$85	$10,559	-0.14%	2.64%
Plus:	Adjustments to Financial and Cash Flow Assumptions	+$699	$11,258	+0.17%	2.81%
Equals:	**Estimate of FY 1997 Economic Value**	**+$588**	**$11,258**	**+0.01%**	**2.81%**

3. Changes due to FHA Data and Origination Volume Updates and FY 1997 Experience

Exhibit II-5 depicts changes in the Fund's economic value and capital ratio resulting from new FHA data on 1996 and 1997 terminations, origination volumes, and distributions. Adjusting the model to include the most recent FHA data involved the incorporation of one additional year of historical experience regarding claim and prepayment rates and actual FY 1997 origination volume. These adjustments also included updating the volume and distribution of FY 1996 originations.

The effects of updates in loan volume have been divided into the effect associated with the change compared to last year's estimate in total dollar volume, and the effect associated with the change in the composition of loan volume in terms of loan type, loan-to-value (LTV) ratio, and house price categories. Additionally, we have provided the effect of changes in our estimates of the future volume of originations on the estimated capital ratio in FYs 1998 to 2000. The effects on FYs 1997 and 2000 are shown in Exhibit II-5.

Exhibit II-5

Change in MMI Fund Estimated Economic Value Between FY 1996 and FY 1997 Resulting From FHA Data and Origination Volume Updates and FY 1997 Experience ($ Millions)

	Change in FY 1997 Economic Value	FY 1997 Economic Value	Change in FY 1997 Capital Ratio	Corresponding FY 1997 Capital ratio	Change in FY 2000 Capital Ratio	Corresponding FY 2000 Capital Ratio
Estimated FY 1997 Economic Value Presented in the FY 1996 Review	n/a	$10,670	n/a	2.80%	n/a	3.57%
Plus: Updates to 1996 Volume and Loan Composition	+$60	$10,730	+0.00%	2.80%	+0.01%	3.58%
Plus: Updates to Actual 1997 Volume	+$453	$11,183	-0.02%	2.78%	-0.02%	3.56%
Plus: Updates to Actual 1997 Loan Composition	-$8	$11,175	-0.00%	2.78%	+0.00%	3.56%
Plus: Updates to FHA 1996 Termination Data and Actual 1997 Terminations	-$248	$10,927	-0.05%	2.73%	-0.10%	3.46%
Plus: Econometric Reestimation with Updated Data	-$428	$10,499	-0.10%	2.63%	-0.37%	3.09%
Estimates after FHA Data Updates and FY 1997 Experience	-$171	$10,499	-0.17%	2.63%	-0.48%	3.09%

a. Additional FY 1996 Volume and Loan Composition

The FY 1996 data used in last year's Review had been tabulated before all information for the fiscal year was collected and entered in FHA's A-43 database. As a result, the FY 1996 Review, which was based on the June 30, 1996 extract, and updated by aggregated origination volume as of December 1996, did not include information on all loan origination volume during the last quarter of the year. This missing volume is due to the reporting lag. This year, the June 30, 1997 extract captured this additional loan volume and showed a positive effect on the economic value of the Fund. This additional volume experienced was concentrated in increases of loan volume in higher house price categories which reduced the overall value of the Fund and in ARMs which increased the overall

value of the Fund. The net effect of the additional volume and change in distribution among categories of the FY 1996 book of business resulted in an increase of $60 million in economic value.

b. Higher Than Expected Volume in FY 1997

Because of lower than expected mortgage interest rates and unemployment rates in FY 1997, the FY 1997 book turned out to be 46 percent larger than projected in the FY 1996 Review. The overall increase in the FY 1997 book of business' origination volume increased the economic value contributed by the FY 1997 book of business by 46 percent or $453 million. As a result, the estimated overall economic value increases by the same amount.

c. Updates to FY 1997 Composition

The actual composition of the FY 1997 book, particularly the heavy concentration in ARMs and in high relative house price categories, resulted in a book of business with an economic value $8 million lower than last year's projection (holding total volume constant). This is largely due to the higher claim rates of ARMs projected under the relatively flat interest rate forecast.

d. Changes in Termination Experience

The termination experience for FY 1996 reported in this year's Review has changed from that reported last year for several reasons. First, due to the delay of data entry to the A-43 database, the termination experience in FY 1996 was understated in the FY 1996 Review. Capturing these additional claims decreases the economic value in FY 1997.

Second, the actual FY 1997 conditional prepayment rates for most books were lower than the estimated conditional prepayment rates in the FY 1996 Review. In particular, the prepayment rates were significantly lower for books originated between FYs 1984 and 1993. This could be the result of more aggressive marketing for refinancing by mortgage brokers during recent years. Most borrowers who are able and willing to refinance would have already done so during the FY 1996. This reduced the demand for refinancing during FY 1997. Since most of the books of business before FY 1992 pay no annual premiums or receive low upfront premium refunds, an increase in prepayments tends to increase the value of the Fund. Thus, the lower-than-expected prepayment rates in FY 1997 tend to reduce both the value of these books and the overall Fund's value. The higher-than-expected prepayment rate for books originated between 1994 and 1997 increases refunds of up-front premiums. This increased premium refund expense tends to also reduce the economic value of the Fund.

Exhibit II-6

Comparison of Actual and Forecasted Conditional Claim and Prepayment Rates for FY 1997 for All 30-Year Fixed-Rate Mortgages, by Book of Business

Amortization Year	FY 1997 Actual Claim Rates	FY 1996 Predicted Claim Rates	FY 1997 Actual Prepayment Rates	FY 1996 Predicted Prepayment Rates
1975	0.07	0.24	8.31	7.43
1976	0.10	0.24	8.25	8.21
1977	0.13	0.23	9.83	8.70
1978	0.18	0.3	8.69	6.93
1979	0.31	0.42	8.60	6.39
1980	0.48	0.65	8.52	5.62
1981	0.72	1.16	6.51	7.46
1982	0.69	1.95	3.66	17.72
1983	0.99	1.31	7.34	8.70
1984	1.43	2.22	7.27	9.10
1985	1.83	2.05	8.55	11.85
1986	1.40	1.27	9.30	10.77
1987	1.16	0.82	8.27	6.53
1988	1.80	1.71	9.49	8.15
1989	2.02	1.78	9.57	12.12
1990	1.98	1.88	9.36	13.71
1991	2.02	1.47	9.48	15.80
1992	1.45	0.96	8.35	10.53
1993	1.16	0.80	6.54	9.76
1994	1.08	1.01	5.42	4.85
1995	1.01	0.85	5.91	6.25
1996	0.17	0.24	1.85	1.77
1997	0.00	0.02	0.43	0.34

Sources: A-43 database, June 30, 1997 extract.

Finally, the actual FY 1997 conditional claim rates were higher for FYs 1987 to 1993 books than the estimated conditional claim rates in our FY 1996 Review. This is partially caused by the lower than expected prepayment rates mentioned earlier. The lower prepayment rates left more loans to be exposed to claim risk. As a result, and due to the high percentage of loans in the most recent books, the total FY 1997 claims end up higher than the estimates in the FY 1996 Review. Exhibit II-6 compares the actual conditional claim rates for all 30-year FRMs in FY 1997 to predicted rates from the FY 1996 Review.

The combined effects of the higher claim and lower prepayment rates observed in FY 1997 was a decrease of $248 million in the FY 1997 Fund value, and a decrease in the estimated FY 2000 capital ratio by 0.10 percent.

e. Econometric Reestimation with Updated Data

The actual experience of claim and prepayment rates during FYs 1996 and 1997 are used to reestimate the econometric models. The lower prepayment rates and higher claim rates experienced in FY 1997 translate into overall higher projected claim rates and lower projected prepayments for all existing and future books of business. Because of longer time exposure to the overall weaker performance projections, this change has a greater impact on the FY 2000 capital ratio than on the FY 1997 capital ratio. The net effect is a decrease in the FY 1997 economic value by $428 million, a decrease in FY 1997 capital ratio by 0.10 percentage points, and a decrease in FY 2000 capital ratio by 0.48 percentage points.

4. Decomposition Related to Economic Forecasts and Model Refinements

Exhibit II-7 describes changes in the Fund's economic value resulting from new economic forecasts and modifications made to the econometric models used to forecast the Fund's performance.

a. Changes in Economic Environment

The inclusion of the new economic forecasts increased the estimated FY 1997 economic value by $175 million. The increase in the estimated FY 1997 Fund value results primarily from higher house price growth and higher mortgage interest rates in the near future. The higher house price growth reduces claim rates directly, while the higher interest rates reduce prepayment rates, particularly on relatively unseasoned books, such as those that originated in FYs 1992 to 1997. Higher interest rates also reduce conditional claim rates of existing books with lower contract rates. For these books, lower prepayment rates, particularly in the first seven years, increase economic value since they lower refund costs and increase annual premium revenue more than they increase the number of loans that are exposed to claim risk.

Exhibit II-7

Change in MMI Fund Estimated Economic Value Between FY 1996 and FY 1997 Resulting From Economic Forecasts and Model Refinements ($ Millions)

	Change in FY 1997 Economic Value	FY 1997 Economic Value	Change in FY 1997 Capital Ratio	Corresponding FY 1997 Capital ratio	Change in FY 2000 Capital Ratio	Corresponding FY 2000 Capital Ratio
FY 1996 Estimates with Data Updates and FY 1997 Book of Business	n/a	$10,499	n/a	2.63%	n/a	3.09%
Plus: Changes in Economic Forecasts	+$145	$10,644	+0.15%	2.78%	+0.21%	3.30%
Plus: Refinements to Econometric Models	-$85	$10,559	-0.14%	2.64%	-0.26%	3.04%
Estimates after Model Refinements and Forecasts	+$60	$10,559	+0.01%	2.64%	-0.05%	3.04%

In the FY 1996 Actuarial Review, our forecasts of future purchase money mortgage originations were based on a combination of macroeconomic time series and microsimulation models. This year, these forecasts have been modified to rely exclusively on a macroeconomic time series model. This approach provides estimates of future demand that are less sensitive to small changes in the detailed driving factors, but more likely to provide accurate forecasts of base line FHA origination volume and loan distribution in the future. The forecasts of origination volume for FYs 1997 to 2000 in this Review are significantly higher due to these modification to the demand model. The effect of this new origination volume forecast is an increase in insurance-in-force of $73.4 billion in FY 2000.

In general, the long term economic forecasts published by DRI in April and October 1997 are comparable to those used in the FY 1996 Review. Exhibit II-8 compares the five year economic forecasts used in the FY 1996 and FY 1997 Reviews. As this Exhibit illustrates, both the house price growth rates and the mean household income growth rates are expected to be higher during the next four years. The interest rates are also expected to be slightly higher than last year's projections. These changes in macroeconomic forecasts together add$145 million to the FY 1997 economic value and 0.21 percentage points to the capital ratio of FY 2000.

Exhibit II-8

Forecast of Economic Variables Used in the Econometric and Cash Flow Analyses[a]

	House Price Growth		FHA Effective Rate[b]		FHLMC Commitment Rate		Mean/Median Household Income Growth[c]		Financing Account Rate[d]	
Year	1997 Review	1996 Review	1997 Review	1996 Review	1997 Review	1996 Review	1997 Review	1996 Review	1997 Review	1996 Review
1997	8.02%	5.71%	8.13%	8.23%	7.72%	8.25%	2.22%	1.72%	6.51%	6.33%
1998	7.52%	6.76%	8.48%	8.17%	8.24%	8.19%	1.79%	1.59%	6.51%	6.33%
1999	4.87%	4.38%	8.45%	7.97%	8.21%	7.99%	0.82%	0.98%	6.51%	6.33%
2000	4.57%	3.89%	8.25%	7.87%	7.99%	7.89%	0.78%	0.68%	6.51%	6.33%

Source: DRI October, 1997 10-year trend forecast

[a] Values in shaded cells represent actual experience.

[b] The FHA effective rates are the primary lending quote rates and their future values are forecasted as a function of the Freddie Mac Commitment Rate.

[c] In the FY 1996 Review, median household income was used. In the FY 1997 Review, the mean household income is computed as the disposable income divided by the number of households.

[d] The financing account rate is set at the credit reform interest rate in effect for the last quarter of FY 1997. This rate is used to discount future cash flows.

b. Econometric Modifications

As part of this year's Review we made minor modifications to our econometric claim and prepayment rate models to improve their predictive ability and enable them to better accommodate increased data. The main change is the estimation of future house price dispersion. Instead of assuming house price dispersion will gradually decline in future years, we have used an autoregressive model to project the future dispersion level. The future dispersion measures are estimated to be significantly higher than those used in last year's Review. These modifications resulted in a net decrease of $85 million in the estimated FY 1997 economic value, and a corresponding reduction of 0.14 percentage points in the FY 1997 capital ratio.

5. Adjustments to Financial and Cash Flow Assumptions

a. Difference Between Expected and Actual Change

Our projections of the FY 1997 economic value in the FY 1996 Review implicitly assumed that the Fund's capital resources would increase by $552 million in FY 1997. This increase represented the sum of all cash flows, expenses, and interest earned by the Fund. The actual increase in the capital resources was $767 million; the increase in the missed premiums was $77 million; and the decrease in the pre-1975 book of business was $3 million; all of which combine resulted in a net increase of $841 million. Thus, the net effect of the difference between the actual and expected growth in capital resources is an increase in the estimated FY 1997 economic value of $289 million.

Exhibit II-9

Change in MMI Fund Estimated Economic Value Between FY 1996 and FY 1997 Resulting From Changes to Financial and Cash Flow Assumptions ($ Millions)

	Change in FY 1997 Economic Value	FY 1997 Economic Value	Change in FY 1997 Capital Ratio	Corresponding FY 1997 Capital ratio	Change in FY 2000 Capital Ratio	Corresponding FY 2000 Capital Ratio
FY 1996 Estimates with Data Updates, Model Refinements, and New Economic Forecasts and FY 1996 Book of Business	n/a	$10,559	n/a	2.64%	n/a	3.04%
Plus: Difference Between Expected and Actual Change in Capital Resources	+$289	$10,848	+0.07%	2.71%	+0.05%	3.09%
Plus: Change in Administrative Cost Factor	-$37	$10,811	-0.01%	2.70%	-0.02%	3.07%
Plus: Change in Conveyance Loss Rates	+$444	$11,255	+0.11%	2.81%	+.15%	3.22%
Plus: Change in Claims Settlement Adjustment Factor	-$95	$11,160	-0.03%	2.78%	-0.03%	3.19%
Plus: Change in Non-Conveyance Loss Rates	+$20	$11,180	+0.01%	2.79%	0.01%	3.20%
Plus: Change in Default to Claim Lag	+$6	$11,186	+0.00%	2.79%	+0.00%	3.20%
Plus: Change in Disposition Lag	+$72	$11,258	+0.02%	2.81%	+0.01%	3.21%
Equals: **FY 1997 Estimates**	+$699	$11,258	+0.17%	2.81%	+0.17%	3.21%

b. Change in Administrative Cost Factor

Based on current data, we found that the overall MMI Fund administrative costs increased to approximately 10 basis points from the 9 basis points assumed in the FY 1996 Review. Administrative cost factors in FY 1997 and FY 1996 were 0.1022 percent and 0.0965 percent, respectively. The increase in the administrative expenses caused the economic value of the Fund to

decrease, resulting in a $37 million decrease in the FY 1997 economic value and a decrease of 0.02 percentage points in the FY 2000 capital ratio.

c. Change in Loss Rates

In the FY 1997 Review, we continued to use the loss rate model developed in the FY 1995 Review and applied in the FY 1996 Review to estimate future conveyance loss rates under different situations. The loss rate model was reestimated using updated loss rate data and the results were incorporated into the cash flow model. These loss rates are applied to the acquisition cost of the loan (the outstanding balance of the loan plus additional costs of claims settlement) in order to estimate losses due to claims. The loss rates of mortgages in the MMI Fund have decreased gradually during the last few years. In Reviews prior to FY 1996, average historical loss rates were used as estimates for future claims. The loss rate model estimated this year better captures the declining trend in loss rates during recent years and provides lower forecast loss rates, resulting in higher estimated economic values and capital ratios.

As can be seen in Exhibit II-10, the loss rates estimated by the econometric model are higher than the rates used in the FY 1996 Review for the lower house price categories (categories 1-2, 30-year FRMs and ARMs) but significantly lower for all the other house price categories leading to an increase of the estimated FY 1997 economic value of the Fund by $444 million and an increase in the FY 2000 capital ratio by 0.15 percentage points. Note that the loss rates for category 8 have been obtained by using historical averages instead of estimation by the econometric model. Because of the low volume of loans in this category, it has a relatively small impact on the Fund.

d. Change in Claim Settlement Adjustment Factor

When FHA pays a claim, the claim payment typically consists of the unpaid principal balance on the mortgage, the interest expense on the unpaid principal balance, and foreclosure and acquisition costs. The claim settlement adjustment factor used in the model estimates the foreclosure and acquisition costs incurred by FHA. This factor is based on the relationship between the actual historical dollar value of FHA claim payments and estimates of those claim payments associated with the unamortized balance of the corresponding mortgages generated by the Actuarial model in the same fiscal years. In the previous Review, we estimated this factor to be 11 percent; in the current Review we have increased this factor to 13.6 percent based on recent Fund experience and our use of new loss rates (see below). The effect of this change has been to reduce the estimated FY 1997 economic value by $95 million, and the FY 2000 capital ratio by 0.03 percentage points.

e. Change in Assumption on Assignment Program

Estimates of future non-conveyance loss rates were based on the historical average pre-foreclosure loss rates. Although the assignment program has been terminated, about 700 remaining assignment applications are expected to be settled during FY 1998. A weighted average loss rate of 26 percent is used for FY 1998 based on the relative number of non-conveyance claims that are expected to be settled as either assignments or loss mitigation. After FY 1997, no further assignments are expected to remain. Therefore the non-conveyance loss rate will be comprised of solely the loss mitigation loss rate, which is currently estimated to be 25%. The effect of these changes is to increase the estimated FY 1997 economic value by $20 million.

Exhibit II-10

Loss Rates for FY 1997 - FY 1997 Review								
Mortgage Type	House Price 1	House Price 2	House Price 3	House Price 4	House Price 5	House Price 6	House Price 7	House Price 8
30-year FRMs	0.42	0.35	0.30	0.27	0.25	0.24	0.23	0.13
30-year SRs	0.41	0.33	0.29	0.26	0.24	0.23	0.22	0.12
ARMs	0.43	0.35	0.31	0.28	0.26	0.25	0.24	0.13
15-year FRMs	0.43	0.35	0.31	0.28	0.26	0.25	0.24	0.13
15-year SRs	0.36	0.29	0.24	0.21	0.19	0.18	0.17	0.10
GPMs	0.43	0.36	0.31	0.28	0.26	0.25	0.24	0.13
Loss Rates for FY 1996 - FY 1996 Review								
Mortgage Type	House Price 1	House Price 2	House Price 3	House Price 4	House Price 5	House Price 6	House Price 7	House Price 8
30-year FRMs	0.38	0.34	0.33	0.33	0.33	0.32	0.33	0.33
30-year SRs	0.36	0.33	0.32	0.31	0.31	0.31	0.31	0.32
ARMs	0.34	0.31	0.29	0.29	0.29	0.29	0.29	0.30
15-year FRMs	0.30	0.27	0.26	0.25	0.25	0.25	0.25	0.26
15-year SRs	0.32	0.29	0.28	0.27	0.27	0.27	0.27	0.28
GPMs	0.33	0.29	0.28	0.28	0.28	0.28	0.28	0.29

f. Change in Default-to-Claim Lag

The default-to-claim lag is the amount of time that elapses between loan default and claim payment (and acquisition in the case of a conveyance). Since FHA pays interest and certain carrying costs during this period, the longer the period, the greater the cost per claim to FHA. The FY 1997 review assumes that the lag between loan default and claim payment is 14.43 months and 14.56 months in FY 1998 onward. The FY 1996 Review assumed a lag of 14.51 months in FYs 1998 onward. This represents a minor increase in the default-to-claim lag time for FY 1998 and a minor decrease in the lag for FY 1999. The net effect of these changes in the lags for fiscal years after 1997 was an increase of the estimated FY 1997 economic value by $6 million. This change has no discernible effect on the estimated FY 1997 and FY 2000 capital ratios.

g. Change in Disposition Lag

The disposition lag is the amount of time that elapses from the date FHA acquires a property to the date that it disposes of that property and receives a cash payment or recovery in exchange. This time has decreased in recent years, dropping from approximately 7.2 months in FY 1989 to 3.9 months in FY 1996. In the FY 1996 Review, we assumed the average disposition lag would be 3.9 months. In the FY 1997 Review, based on our analysis of disposition lags, we used a lag of 5.26 months in FY 1997, 4.85 months in FY 1998, and 4.96 months in FYs 1999-2000. These lags are slightly higher than the lag used last year.

These lags account for the zero disposition lag associated with loss mitigation methods, as well as the lags pertaining to assignments. After FY 1997, loss mitigation were assumed to account for ten percent of all terminations. For FY 1997, actual percentages of pre-foreclosure sales, assignments, and conveyances were used. These percentages, along with average lags from loans that terminated from FY 1992 to FY 1995, were used to yield a single weighted average lag. The effect of this increase in the disposition lag has been an increase in the estimated value of the Fund by $72 million and an increase in both the FY 1997 and FY 2000 capital ratios by 0.02 and 0.01 percentage points, respectively. There are two reasons for this counter-intuitive result. First, one of the primary effects of an increase in the disposition lag is to shift cash flows from the current to the future fiscal year. When the disposition lag increases by one month, for example, proceeds from the disposition of property previously expected to occur in the last month of FY 1997 now occur in the first month of FY 1998. This change in the timing of cash flows increases future cash flows expected, adding to the economic value of the Fund. Second, the increase in the conveyance loss rate, which is described above, is in part due to the change in the disposition lag. Therefore, the analysis of the effect of the reduction in conveyance loss rates, presented earlier, captures part of the effect of the change in the disposition lag.

Section III: Current Status of the MMI Fund

As of the end of fiscal year 1997, the MMI Fund had an estimated economic value of $11.258 billion and a capital ratio of 2.81 percent. Both of these figures reflect increases from last year and suggest continued improvement in the Fund's performance. This section provides a more detailed analysis of the MMI Fund's current status by examining the Fund's current situation and the projected future performance of the FY 1975 through FY 1997 books of business. It includes a description of the basic components of the Fund's economic value and an explanation of the historical and estimated claim and prepayment rates that are used to estimate future performance.

A. Estimating the Current Economic Value of the MMI Fund

According to the statutory definition, the economic value (or economic net worth) of the Fund is the "cash available to the Fund, plus the net present value of all future cash inflows and outflows expected to result from the outstanding mortgages in the Fund." We base our estimate of this value on the level of capital resources as stated on the MMI Fund balance sheet plus the present value of expected future cash flows of the existing loan portfolio as estimated from our financial models.

Capital resources include cash, investments, properties, mortgages, and receivables net of payables. The present value of expected future cash flows is calculated by a financial model which uses the most current information available to estimate cash flows, including the present value of the expected cash inflows (premiums, income from recoveries, and investment income), and outflows (claim payments, premium refunds, and administrative costs). The cash flows included in these calculations are those from the origination year to the year of maturity (*e.g.*, 30 years from the first policy year for 30-year mortgages). Exhibit II-2 in Section II presents our estimate of the economic value of the MMI Fund as of the end of FY 1997.

1. Economic Value by Book of Business

In order to estimate the economic value of the entire Fund, we have estimated the economic value of each book of business by loan-to-value (LTV) category for each major mortgage type. Exhibit III-1 displays the economic values for each LTV category within a book of business. The economic value of the loans in an individual LTV category reflects the results of the termination patterns and the premiums of a particular category. These economic values represent simulated historical and projected future values, and should not be interpreted as the current economic value of the entire Fund. In particular, these values do not include the residual surplus from loans originated prior to FY 1975, nor the net accumulated interest earned on prior fund balances.

Rather, this exhibit is offered to facilitate comparison between books of business and LTV categories, and not to decompose total fund value.

The "No Appraisal" category in Exhibit III-1 primarily consists of streamline refinancings (SRs) from FYs 1991 to 1997. For years prior to FY 1991, it consists of loans without LTV values assigned in the A-43 database. These older loans have exhibited the highest claim rates of any LTV category, which accounts for the large negative values associated with this category in the early 1980s.

Exhibit III-1

1997 Economic Values by Origination Year and LTV For All Mortgage Types ($ Millions)[a]

Book of Business	No Appraisal[b]	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor[c]	Total
1975	$18	$5	$21	$50	$51	$46	$63	$35	$29	$317
1976	$1	$4	$17	$42	$47	$61	$88	$84	$31	$376
1977	$39	$6	$28	$63	$83	$99	$128	$155	$43	$644
1978	$113	$10	$33	$66	$72	$91	$129	$207	$51	$772
1979	$90	$17	$60	$97	$56	$54	$41	($31)	$47	$431
1980	($51)	$20	$38	($47)	($211)	($96)	($138)	($432)	($25)	($942)
1981	($405)	$5	($22)	($242)	($190)	($99)	($229)	($512)	($183)	($1,877)
1982	($245)	$3	($33)	($178)	($108)	($99)	($262)	($442)	($167)	($1,531)
1983	($453)	$42	$27	($143)	($218)	($176)	($433)	($752)	($222)	($2,328)
1984	($74)	$13	($15)	($109)	($144)	($128)	($287)	($831)	($289)	($1,864)
1985	($40)	$16	$0	($127)	($142)	($135)	($346)	($743)	($504)	($2,019)
1986	($23)	$84	$136	$45	($66)	($86)	($255)	($679)	($268)	($1,113)
1987	($5)	$101	$193	$159	$64	$25	($69)	($274)	$31	$225
1988	($1)	$14	$32	$26	$8	($9)	($85)	($302)	($37)	($355)
1989	($8)	$10	$28	$17	$11	($5)	($60)	($283)	($19)	($309)
1990	($5)	$12	$29	$26	$11	($2)	($35)	($259)	($3)	($226)
1991	($11)	$8	$17	$23	$4	($2)	($10)	($118)	($8)	($98)
1992	$47	$20	$49	$176	$160	$241	$556	$172	$53	$1,474
1993	$268	$18	$54	$217	$197	$279	$637	$475	$69	$2,214
1994	$362	$17	$50	$190	$175	$254	$621	$507	$86	$2,263
1995	$2	$6	$18	$80	$89	$137	$349	$278	$49	$1,008
1996	$24	$7	$28	$130	$136	$219	$535	$384	$83	$1,546
1997	($1)	$8	$26	$108	$112	$173	$403	$256	$70	$1,156

[a] All values are as of the end of FY 1997.
[b] See Appendix C for a full description of loans contained within this category.
[c] Includes investor loans and all dwellings with two or more units.

Similarly, the "Investor" category in Exhibit III-1 consists of a number of different loan types. The A-43 database does not explicitly identify investor loans. This category contains loans that, based on previous statistical analyses conducted by Price Waterhouse LLP, have been identified as loans that are likely to have participated in FHA's Investor Program, which was discontinued in FY 1991. Since most loans for properties with two-to-four living units originated prior to FY 1991 were likely to have participated in the Investor Program, all of these loans are included in the Investor category. New loans for two-to-four unit properties, which represent approximately four percent of the MMI Fund's new loan volume, are included for estimation purposes in the Investor category as well, despite the fact that they are not investor loans.

2. Capital Resources

Capital resources are the net assets of the Fund which, if necessary, can be converted into cash to meet the Fund's obligations. These resources consist of cash, investments, properties, mortgages, and the net of miscellaneous receivables and payables. These values, shown in Exhibit III-2, are taken from the annual audited financial statements of the Fund.

The value included in the capital resources line item is derived primarily from four sources:

- residual surplus from insurance on loans (most of which were originated prior to 1975) that had matured by FY 1997
- conveyed property and other assets awaiting disposition
- any prior capital provided by the government
- current net reserve of premium income from existing insurance-in-force.

Since assets are valued at market value when booked, shifts among the capital resource accounts have relatively little impact on our analysis. For comparative purposes, all capital resources and their associated expected cash flows are treated as equivalent to cash.

Exhibit III-2

MMI Fund Capital Resources End of Fiscal Year Value in FY 1992 Through FY 1997 ($ Millions)						
Capital Resources	FY 1992 Audit	FY 1993 Audit	FY 1994 Audit	FY 1995 Audit	FY 1996 Audit	FY 1997* Audit
Cash	$758	$1,242	$1,277	$1,232	$3,863	$528
Investments	5,781	5,140	5,665	6,587	7,642	13,201
Properties	1,721	1,281	1,187	1,001	949	1,254
Mortgages	2,275	2,639	3,134	3,318	2,344	483
Other Assets	n/a	n/a	n/a	317	332	459
Net Receivables and Payables	(582)	(604)	(503)	(1,638)	(3,579)	(3,608)
Total Capital Resources	$9,503	$9,698	$10,760	$10,592	$11,551	$12,317

Source: Audited Financial Statements for FYs 1992-1996.
* FY 1997 figures are based on pre-audited financial statements.

3. Estimated Contribution of Existing Books of Business to Capital Resources

The estimated "contribution of a book of business to capital resources" refers to the net accumulated contribution of the book to the total estimated capital resources of the Fund, from its origination through the end of FY 1997. According to our financial cash flow model, the insurance endorsed between FYs 1975 and 1997 has contributed an estimated $1.055 billion to the Fund's capital resources as of the end of FY 1997 (see Exhibit III-3). In other words, the FYs 1975 to 1997 books have increased the current total estimated capital resources of the Fund by $1.055 billion.

We estimate the contribution to capital resources using historical claim, prepayment, loss, and interest rates, along with assumptions regarding premiums, premium refunds, and administrative costs, to estimate the cash flows associated with each book of business through the end of FY 1997. These cash flows are added to each book's initial estimated cash balances, which are created through the payment of up-front and annual premiums. Thus, each year's cash flows either build or deplete a given book's capital resource balance until an end-of-year contribution to Fund capital resources for FY 1997 is calculated. Exhibit III-3 shows the estimated contribution

Exhibit III-3

Estimated Contribution to Capital Resources and Net Present Value of Future Cash Flows at End of FY 1997 by Loan Type ($ Millions)

	Total MMI FY 1997		30-Year FRMs		30-Year SRs		ARMs		15-Year FRMs		15-Year SRs		GPMs	
Year	ECCR[a]	PV FCF[b]	ECCR	PV FCF	ECCR	PV FCF	ECCR	PV FCF	ECCR	PV FCF	ECCR	PV FCF	ECCR	PV FCF
1975	$ 312	$5	$312	$5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1976	367	8	367	8	0	0	0	0	0	0	0	0	0	0
1977	630	14	629	14	0	0	0	0	0	0	0	0	1	0
1978	746	26	630	23	0	0	0	0	0	0	0	0	116	3
1979	390	42	243	29	0	0	0	0	0	0	0	0	146	12
1980	(972)	30	(519)	22	0	0	0	0	0	0	0	0	(453)	8
1981	(1,887)	11	(1,254)	9	0	0	0	0	0	0	0	0	(633)	2
1982	(1,533)	2	(1,010)	2	0	0	0	0	(3)	0	0	0	(520)	(0)
1983	(2,350)	22	(1,645)	21	0	0	0	0	(12)	0	0	0	(694)	1
1984	(1,839)	(26)	(1,329)	(22)	0	0	(0)	(0)	(42)	(0)	0	0	(468)	(4)
1985	(1,992)	(27)	(1;702)	(23)	0	0	(1)	(0)	(52)	(0)	0	0	(237)	(3)
1986	(1,034)	(79)	(986)	(76)	0	0	1	(0)	30	(1)	0	0	(79)	(1)
1987	407	(182)	354	(177)	0	0	21	(1)	72	(2)	0	0	(40)	(2)
1988	(207)	(148)	(195)	(142)	(5)	(0)	24	(3)	5	(1)	(0)	(0)	(36)	(1)
1989	(114)	(195)	(83)	(191)	(6)	(0)	10	(1)	6	(2)	(0)	(0)	(40)	(1)
1990	26	(252)	67	(248)	(2)	(0)	9	(1)	9	(2)	(0)	0	(56)	(1)
1991	87	(185)	75	(176)	5	(1)	41	(4)	11	(3)	1	(0)	(46)	(1)
1992	1,545	(71)	1,095	(44)	82	(24)	307	(0)	52	(0)	16	(2)	(8)	0
1993	2,170	44	1,232	249	527	(211)	267	30	29	(3)	114	(21)	(0)	0
1994	2,262	1	1,089	283	664	(279)	356	31	25	(6)	126	(28)	1	0
1995	919	89	639	107	33	(33)	230	21	9	(3)	7	(3)	1	(0)
1996	1,674	(128)	1,030	99	190	(163)	416	(47)	16	(6)	23	(11)	1	(0)
1997	1,449	(293)	819	(80)	119	(122)	482	(76)	19	(10)	10	(5)	0	(0)
Total	$1,055	$(1,291)	$(142)	$(307)	$1,606	$(833)	$2,162	$(52)	$174	$(39)	$296	$(70)	$(3,042)	$10

[a]ECCR is estimated contribution to capital resources at the end of year.
[b]PV FCF is present value of future cash flows at the end of the year.

to capital resources and present value of future cash flows of each book of business from FYs 1975 through 1997 for the MMI Fund as a whole, as well as for each loan type.

The present value of the future cash flows of a book of business is the sum of all discounted remaining cash flows of the book from the end of FY 1997 onward. Based on the results of our cash flow models, the total net present value of future cash flows resulting from books of business written from FY 1975 through FY 1997 is -$1.291 billion. In other words, the future cash outflows from the Fund to cover claims and other costs associated with these books will be $1.291 billion more, in present value terms, than the future cash inflows these books will generate through premiums, recoveries, and other non-interest income.

These negative present values are expected given FHA's premium structure, which includes relatively large upfront premiums and in some cases small annual premiums. The Fund collects much of its premium income in the first year of a book of business, invests the balances, and pays claims in the future as they occur. For example, of the total present value of future cash flows for the FY 1997 book of business, a negative $293 million is attributable to the projected future cash flows of the FY 1997 book of business. However, because of its current estimated contribution to capital resources of $1,449 million (due primarily to the collection of upfront premiums in FY 1997), the economic value of the FY 1997 book is $1,156 million. Thus the FY 1997 book has a positive economic value, despite the fact that the present value of its future cash flows is negative.

4. Amortization of Current Books of Business

For purposes of calculating the MMI Fund's capital ratio, we use unamortized insurance-in-force (IIF), although it is also instructive to consider the capital ratio based on amortized IIF, which is the basis the General Accounting Office (GAO) used in its April 1997 report on the status of the Fund. At any given time, the actual dollar value that is at risk is the amortized IIF. In Exhibit III-4, we present the volume of mortgage endorsements, the unamortized IIF at the end of FY 1997, and the amortized IIF at the end of FY 1997 for all mortgage types.

As Exhibit III-4 indicates, the FY 1997 book of business constitutes approximately 16 percent of the Fund's total amortized IIF. Over 80 percent of the amortized IIF at the end of FY 1997 is from the 1990's. Consequently, a significant proportion of the MMI Fund's exposure is in relatively recent mortgage originations.

Exhibit III-5 displays estimated capital ratios of the Fund using amortized IIF instead of the estimates of unamortized IIF used elsewhere in this report. The Fund's estimated capital ratio for FY 1997 and FY 2000 would be 3.02 and 3.57 percent, respectively, if amortized IIF were

substituted for unamortized IIF. Price Waterhouse continues to use the unamortized IIF measure (as generally defined) in calculating the capital ratio, although it is also instructive to consider the capital ratio based on amortized IIF.

Exhibit III-4

Endorsements and Insurance-in-Force as of End of FY 1997 for All Mortgages ($ Thousands)			
Book of Business	**Mortgage Endorsements**	**Unamortized Insurance-in- Force[a]**	**Amortized Insurance-in-Force[a]**
1975	$4,690,760	$1,036,565	$550,667
1976	$5,733,744	$1,344,912	$780,633
1977	$7,176,603	$2,031,678	$1,239,060
1978	$10,024,704	$2,911,032	$1,950,896
1979	$15,656,213	$3,892,468	$2,901,764
1980	$14,874,833	$2,324,611	$1,890,623
1981	$10,266,780	$1,081,102	$949,632
1982	$7,321,058	$609,537	$564,064
1983	$26,781,701	$2,522,597	$2,092,164
1984	$15,919,384	$1,372,691	$1,175,338
1985	$24,042,547	$2,032,058	$1,727,681
1986	$57,520,636	$12,353,879	$10,485,256
1987	$69,944,118	$23,809,998	$20,564,367
1988	$37,432,308	$9,056,627	$7,868,939
1989	$39,763,899	$8,956,081	$8,178,101
1990	$47,126,286	$11,450,284	$10,640,355
1991	$44,067,212	$12,867,744	$11,781,499
1992	$45,092,202	$23,810,333	$21,533,998
1993	$73,789,938	$53,108,027	$49,331,388
1994	$79,670,564	$64,926,627	$60,855,414
1995	$41,493,497	$33,096,612	$31,338,118
1996	$61,148,019	$58,905,999	$57,404,158
1997	$60,051,421	$59,817,648	$59,323,506
Total	**$799,588,426**	**$393,319,110**	**$365,127,620**

[a] Figures calculated as end of year insurance-in-force.

Exhibit III-5

Projected MMI Fund Performance Using Amortized Insurance-in-Force ($ Millions)			
At End of Fiscal Year	Economic Value of the Fund*	Capital Ratio	Amortized Insurance in Force
1997	$11,258	3.02%	$372,659
1998	$12,627	3.21%	$392,957
1999	$14,052	3.39%	$414,469
2000	$15,684	3.57%	$439,707

*All values are as of the end of each fiscal year. The economic value for future years (FYs 1998 through 2000) is equal to the economic value of the Fund at the end of the previous fiscal year, plus the interest earned on the Fund's balances in the current year, plus the economic value of the new book of business.

B. Historical and Estimated Claim and Prepayment Rates

1. Historical and Estimated Claim Rates

The historical and forecasted conditional claim rates of 30 year fixed-rate mortgages for the first 15 policy years and the 30-year cumulative claim rates are shown below in Exhibit III-6. (Complete tables for all policy years and each LTV category are included in Appendix G.) The results indicate that projected conditional claim rates for books of business originating between FYs 1980 and 1986 will continue to remain high. However, over 85 percent of the loans on these books have already been either prepaid or claimed. As a result, the economic costs of future claims and prepayments on these books should be relatively small. Partially due to new underwriting guidelines implemented by FHA in FY 1987, the claim rates for books originated after FY 1986 have experienced significantly lower conditional claim rates. The claim rates of loans originated after FY 1992 are the lowest among all books of business since FY 1978. Because of the large outstanding balance of these books of business, these loans will be the primary source of claim payments over the next few years. Due to the high refinancing rates and low claim rates during its first three policy years, the FY 1993 book of business is estimated to have the highest ultimate prepayment rate and the lowest ultimate claim rate. In general, the conditional claim rates are expected to slow down during FY 1998 and FY 1999 mainly due to higher expected FHA contract rates. Borrowers with lower than market interest rate mortgages are less likely to default on their mortgages such that they can continue to enjoy the below market monthly payments. The conditional claim rates then are expected to revert to their average levels

after FY 1999 when the FHA interest rate is projected to gradually decrease to about 8 percent. Due to their projected average contract rates, the future FY 1998 to FY 2000 books of business are estimated to have claim rates slightly higher than the loans originated in the first half of the 1990's.

Exhibit III-6

Historical and Forecasted Conditional Claim Rates for 30-Year Fixed-Rate Mortgages
Annual Rates for the First Fifteen Policy Years and 30-Year Ultimate Rates

Y	Endorsement Year																							
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
1	0.06	0.11	0.05	0.03	0.03	0.03	0.10	0.15	0.02	0.04	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
2	0.80	0.94	0.52	0.44	0.49	0.80	1.59	2.32	0.56	1.19	0.98	0.50	0.40	0.46	0.39	0.34	0.36	0.24	0.17	0.19	0.28	0.17	0.25
3	1.17	1.01	0.66	0.61	0.94	1.43	3.58	4.49	1.71	3.12	3.49	1.87	1.14	1.26	1.22	1.17	1.22	0.84	0.62	0.67	1.01	0.61	0.73
4	0.91	0.77	0.47	0.56	0.83	1.74	3.30	5.21	2.31	4.98	6.07	2.33	1.37	1.66	1.71	1.73	1.93	1.31	0.91	1.08	0.88	0.80	1.07
5	0.62	0.47	0.36	0.45	0.92	1.55	3.40	5.58	3.34	6.71	5.48	2.16	1.40	1.89	1.94	2.28	2.34	1.28	1.16	0.81	0.87	0.88	1.25
6	0.40	0.33	0.28	0.51	0.82	1.55	3.21	6.37	4.70	5.86	4.19	1.99	1.39	1.89	2.43	2.43	1.98	1.45	0.66	0.67	0.79	0.85	1.24
7	0.29	0.28	0.30	0.42	0.82	1.52	3.89	6.29	4.08	4.11	3.54	1.79	1.29	2.19	2.59	1.97	2.02	0.91	0.55	0.61	0.77	0.84	1.21
8	0.21	0.29	0.24	0.43	0.84	1.85	4.39	4.25	2.86	3.19	3.16	1.66	1.40	2.31	2.13	1.98	1.33	0.79	0.54	0.62	0.81	0.87	1.24
9	0.27	0.26	0.26	0.43	0.97	2.27	3.24	2.85	2.44	2.85	3.06	1.81	1.38	1.89	2.02	1.82	1.22	0.77	0.56	0.65	0.84	0.89	1.23
10	0.22	0.21	0.26	0.48	1.19	1.93	2.56	2.18	2.20	2.44	2.89	1.86	1.17	1.80	1.89	1.56	1.07	0.69	0.49	0.59	0.76	0.77	1.03
11	0.22	0.23	0.29	0.64	1.07	1.57	2.07	1.85	1.91	2.39	2.69	1.51	1.16	1.60	1.76	1.52	1.07	0.73	0.52	0.62	0.77	0.76	0.99
12	0.19	0.24	0.39	0.62	0.91	1.35	1.73	1.42	1.87	1.95	1.94	1.40	0.71	1.33	1.53	1.36	1.02	0.70	0.50	0.57	0.70	0.67	0.87
13	0.21	0.34	0.39	0.55	0.82	1.17	1.50	1.33	1.59	1.61	1.83	0.77	0.56	1.12	1.33	1.23	0.93	0.62	0.43	0.48	0.58	0.55	0.72
14	0.26	0.34	0.38	0.49	0.70	1.12	1.34	1.06	1.07	1.43	1.38	0.69	0.51	1.02	1.24	1.15	0.86	0.56	0.39	0.42	0.51	0.49	0.65
15	0.27	0.34	0.32	0.39	0.60	1.02	1.25	0.75	0.99	1.56	1.21	0.60	0.46	0.95	1.15	1.05	0.77	0.49	0.34	0.37	0.45	0.44	0.58
[illegible]	5.6	5.6	4.9	6.6	10.8	15.7	21.9	19.9	15.7	19.9	18.0	13.4	10.2	11.6	10.7	9.3	7.7	6.7	5.6	6.8	6.8	7.3	9.4

ded values indicate actual experience.

2. Historical and Estimated Prepayment Rates

The historical and forecasted conditional prepayment rates for the first 15 policy years and 30-year ultimate prepayment rates are shown in Exhibit III-7. (Complete tables for all policy years and each LTV category are included in Appendix G.) The rates along the shaded diagonal illustrate a significant drop in FY 1997 prepayment rates from their FY 1996 levels. This is due to the slight interest rate rise from its recent trough in the middle of FY 1996 in the base case economic scenario. Many borrowers who could afford refinancing should have already done so during the FY 1996. This drop partially contributes to the higher overall conditional claim rates observed during FY 1997 due to the competing nature between prepayment and claim risks. Given that the future mortgage rates are forecasted to stay in a narrow range between 8.0 and

8.25 percent, we expect the prepayment rates of the FY 1998 to FY 2000 books of business to be low.

Exhibit III-7

Historical and Forecasted Conditional Prepayment Rates for 30-Year Fixed-Rate Mortgages
Annual Rates for the First Fifteen Policy Years and 30-Year Ultimate Rates

	Endorsement Year																						
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
1	0.20	0.28	0.36	0.35	0.29	0.36	0.17	0.35	0.28	0.21	0.30	0.51	0.26	0.37	0.45	0.38	0.37	0.36	0.63	0.30	1.72	0.38	0.43
2	1.88	3.39	3.25	2.46	0.82	0.92	0.42	17.43	0.92	1.41	11.19	3.73	1.02	1.50	2.01	2.06	5.46	7.27	4.04	1.99	8.47	1.85	2.16
3	6.76	8.39	6.18	2.05	0.68	0.35	7.10	9.35	2.19	18.65	23.35	2.68	1.74	3.06	4.12	9.72	25.93	16.65	3.95	6.04	5.91	4.12	4.68
4	9.97	8.98	3.53	1.32	0.36	1.76	4.76	12.31	17.64	25.75	10.60	3.18	2.85	4.60	14.94	29.45	29.85	6.33	7.21	5.42	6.16	5.46	6.76
5	8.96	4.73	1.82	0.75	1.42	2.03	6.03	29.05	26.79	11.34	8.51	4.47	3.42	14.29	28.61	29.36	7.84	10.67	6.54	4.50	6.22	6.16	7.22
6	4.48	2.41	0.79	1.99	1.64	2.65	19.39	26.24	10.82	9.19	10.34	5.49	8.49	26.88	27.67	8.27	12.72	8.35	7.44	4.54	7.29	6.45	6.77
7	2.35	1.00	2.69	2.08	2.04	9.21	21.59	11.76	8.45	9.95	12.40	14.41	19.65	26.15	8.21	12.48	9.48	9.33	9.82	6.25	9.28	7.51	8.01
8	1.15	3.25	2.76	2.40	4.81	14.12	9.80	8.27	9.78	10.52	21.61	26.40	21.03	7.88	12.12	9.36	12.33	9.96	11.71	6.97	9.56	8.09	8.79
9	3.30	3.34	3.16	5.29	7.59	7.24	7.24	6.64	11.75	16.23	23.14	25.37	6.49	11.90	9.57	9.26	10.61	9.87	10.75	6.15	8.38	7.25	7.99
10	3.37	3.60	5.80	7.66	5.49	5.87	7.11	6.02	19.33	17.47	22.74	7.55	10.14	9.49	8.64	8.18	10.88	10.17	10.76	6.03	8.20	7.19	7.83
1	3.59	6.10	7.65	5.64	5.17	6.58	7.35	7.30	19.21	18.64	8.47	11.42	8.27	6.45	7.73	8.32	10.52	9.25	10.25	5.81	7.89	6.86	7.34
12	5.90	7.90	5.74	5.18	5.53	7.28	11.05	7.53	19.50	7.67	10.07	9.30	5.60	5.82	7.80	8.02	9.15	8.33	9.21	5.39	7.15	6.24	6.62
13	7.73	5.87	5.23	5.42	5.29	13.68	12.83	7.62	7.73	8.73	8.55	8.56	5.41	6.06	7.71	7.36	8.59	8.25	9.29	5.40	6.93	6.19	6.55
4	5.76	5.33	5.48	5.29	8.80	16.12	13.36	3.88	8.84	7.27	9.73	8.67	6.19	6.52	7.65	7.54	8.98	8.80	9.96	5.81	7.26	6.64	6.91
15	5.23	5.48	5.24	7.30	13.81	16.69	6.37	4.04	7.34	7.22	8.44	8.96	6.26	5.97	7.13	7.22	8.75	8.68	9.94	5.83	7.13	6.61	6.82
Ult.	81.2	81.9	82.0	77.5	73.4	72.0	70.1	76.1	79.2	75.0	78.4	80.4	77.2	79.4	83.1	84.8	87.9	86.6	89.1	76.8	82.6	79.7	79.6

ed values indicate actual experience.

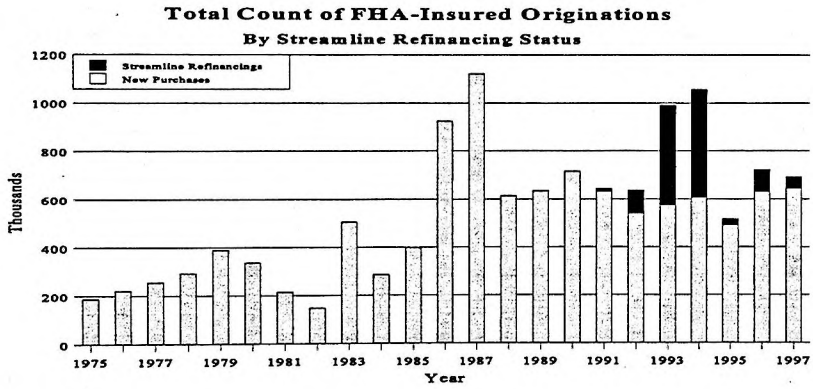
Section IV: Characteristics of the Fiscal Year 1997 Book of Business

This section describes the fiscal year (FY) 1997 book of business. The description includes the following: an analysis of the loans' origination volume and composition by mortgage type, the breakdown of purchase mortgages versus refinancings, and the distribution of loans among house price and loan-to-value (LTV) categories. In addition, this section compares the FY 1997 book to previous books and explains how the unique characteristics of the FY 1997 book are likely to influence future performance.

A. Volume of Mortgage Originations

In FY 1997, FHA wrote insurance on $60 billion in single family mortgages through the MMI Fund, bringing the fund's total unamortized insurance-in-force (IIF) to $401 billion. Exhibit IV-1 indicates the annual number of loan originations by FHA from FY 1975 to FY 1997, as well as the portion consisting of streamline refinancings (SRs).

Exhibit IV-1



Source: A-43 database, June 30, 1997 extract.
For partial year adjustment, the total originations in 1997 are scaled up by loan type-specific multipliers using actual endorsement volumes. For example, in the case of F30 endorsements, the endorsement multiplier is given by :

$$EM_{F30} = \frac{\text{Number of loan type-specific endorsements at the end of 1997}}{\text{Number of loan type-specific endorsements in the June 30, 1997 A-43 database}}$$

The applicable multipliers for different loan types are as below:

30-year FRM	1.55	15-year FRM	2.27
30-year Streamline Refinancne	1.74	15-year Streamline Refinance	1.47
ARM	1.60	GPM	1.00

As shown in Exhibit IV-1, the FY 1997 book of business was marginally smaller than the FY 1996 book. The decrease in mortgage originations during the most recent fiscal year can be attributed largely to a slight increase in interest rates from FY 1996 to FY 1997, which resulted in a substantial decrease in SRs and an 8 percent decrease in 30-year FRMs. This decline, however, was mostly recouped by a significant increase in origination of ARMs. Despite the higher interest rate, the positive economic environment (as demonstrated by continued household income growth) has increased the affordability of housing. In addition, the recovery of the housing market from the slow growth rate of the early 1990s has reduced the potential home purchaser's concern over loss in home equity. These favorable economic conditions have caused new purchase mortgages to increase slightly from the 1996 level. However, since the current interest rates have not declined as much as they did during FYs 1993 and 1994, even though new purchase mortgages have reached a level similar to that of the FY 1993-1994 period, the number of SRs is still far lower than it was during those years.

Although FHA insures loans in each of the fifty states, as well as U.S. territories such as Puerto Rico, more than half of FHA's total dollar volume in FY 1997 were originated in only ten states. Exhibit IV-2 illustrates the percent of FHA's total dollar volume originated in these ten states between FYs 1993 and 1997.

Exhibit IV-2

Percentage of FHA Dollar Volume Originated Between FY 1993 and FY 1997					
State	**1993**	**1994**	**1995**	**1996**	**1997**
California	11.63%	13.40%	15.07%	16.69%	15.97%
Colorado	5.32%	4.25%	3.32%	3.79%	3.88%
D.C.	3.45%	3.23%	3.61%	2.72%	1.66%
Florida	5.41%	6.23%	5.94%	5.42%	5.37%
Georgia	3.99%	3.62%	3.31%	3.17%	3.39%
Illinois	3.85%	4.11%	5.00%	4.80%	5.25%
New York	2.97%	3.28%	4.00%	4.09%	4.66%
Pennsylvania	2.01%	2.01%	2.43%	2.42%	2.69%
Tennessee	2.58%	2.67%	3.13%	2.80%	2.51%
Texas	8.36%	8.50%	6.33%	6.43%	6.40%
% of Total	**49.57%**	**51.30%**	**52.12%**	**52.33%**	**51.78%**

Source: A-43 database, June 30, 1997 extract.

As Exhibit IV-2 illustrates, since FY 1993, the proportion of FHA's endorsement volume coming from the ten states in which FHA does most of its business has increased slightly. Particularly striking is the fact that the percentage of FHA-insured loan volume originated in California has

increased by 4.34 percentage points since FY 1993, making almost one out of every six FY 1997 originations a California mortgage. This experience is similar to the private mortgage insurance industry, in which California loans accounted for about 14.7 percent in 1996. The heavy concentration indicates that the MMI Fund as well as the private mortgage insurance industry are highly sensitive to the economic conditions in California.

B. Originations by Mortgage Type

As Exhibit IV-3 indicates, 30-year FRMs have historically constituted the bulk of FHA's business. Graduated-payment mortgages (GPMs), which comprised over one-fourth of the business between FYs 1979 and 1981, when interest rates were very high, have decreased markedly and are currently a negligible portion of FHA's business. The 15-year Streamline Refinancings became increasingly large shares of new business from FYs 1992 to 1994 because the reduction in interest rates made them popular choices for refinancers who could switch to a 15-year term with a minimal, if any, increase in monthly payments. However, as the interest rates rise from their 1993 trough, the 15-year SR has fallen to a trivial proportion since FY 1995. Similarly, 15-year FRMs, which were once very popular between FY 1983 and FY 1987, continued their declining trend and remained low in FY 1997 as interest rates rose from their 1996 level.

In recent years, FHA has seen a surge in the number of adjustable-rate mortgage (ARM) originations. Prior to FY 1992, ARMs accounted for less than five percent of the MMI Fund's business. However, from FY 1992 to FY 1994 ARMs comprised 12 to 17 percent of all originations, and in FY 1995 comprised 29 percent of originations. In FY 1996 and FY 1997, ARMs comprised 25 and 34 percent of originations, respectively. When refinancings are excluded, ARM shares as percentage of total new purchase mortgage originations were 19 percent for 1992, 20 for 1993, 28 for 1994, 30 for 1995, 29 for 1996 and 36 for 1997. These levels are comparable to the ARM share of the conventional mortgage market. This reflects that the FHA ARM program is now more widely accepted by the public. Because the ARM interest rate is generally lower than the FRM interest rate, ARMs make housing more affordable, especially for those borrowers faced with income constraints.

The SR program has also experienced rapid growth since FY 1991, when it was first significantly used. In both FY 1993 and FY 1994, SRs constituted 40 percent of the MMIF's business. However, while the number of SRs in FY 1996 increased significantly from the FY 1995 level, it fell in FY 1997 and remains considerably lower than the 1992 to 1994 levels. This decline among SRs is due to the increase of interest rates from their 1995 level and because many borrowers had already refinanced during FYs 1992-1994 or, more recently, in FY 1996.

Exhibit IV-3

FHA-Insured Originations By Mortgage Type
(Percentage of FHA-Insured Mortgages by Dollar Volume)

Year	Purchases Mortgages and non-SRs				Streamline Refinancings	
	30-Year FRMs	15-Year FRMs	ARMS	GPMs	30-Year SRs	15-Year SRs
1975	99%	1%	n/a	n/a	n/a	n/a
1976	99%	1%	n/a	n/a	n/a	n/a
1977	99%	1%	n/a	0%	n/a	n/a
1978	86%	0%	n/a	14%	n/a	n/a
1979	64%	0%	n/a	36%	n/a	n/a
1980	65%	0%	n/a	35%	n/a	n/a
1981	73%	0%	n/a	27%	n/a	n/a
1982	77%	1%	n/a	22%	n/a	n/a
1983	82%	6%	n/a	12%	n/a	n/a
1984	82%	6%	0%	12%	n/a	n/a
1985	87%	7%	0%	6%	n/a	n/a
1986	89%	8%	1%	2%	n/a	n/a
1987	91%	7%	2%	1%	n/a	n/a
1988	90%	4%	5%	1%	0%	0%
1989	95%	3%	2%	1%	0%	0%
1990	95%	3%	1%	1%	0%	0%
1991	90%	3%	4%	1%	2%	0%
1992	66%	2%	16%	0%	12%	2%
1993	45%	2%	12%	0%	33%	8%
1994	42%	2%	17%	0%	31%	8%
1995	65%	1%	29%	0%	3%	1%
1996	61%	1%	25%	0%	11%	2%
1997	59%	1%	34%	0%	6%	1%

Source: A-43 database, June 30, 1997 extract.

C. Initial Loan-to-Value Distributions

Prior econometric studies of mortgage termination behavior have suggested that a borrower's equity position is a major determinant of default behavior. More specifically, the larger the equity position, the greater the incentive to avoid a default on the loan. The loan-to-value ratio (LTV) is a measure of borrower equity. Exhibit IV-4 shows the distribution of mortgage originations among initial LTV categories.

Exhibit IV-4

Distribution of Originations by Initial LTV Category (Percentage FHA-Insured Mortgages by Dollar Volume[a])

Book of Business	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investors[b]
1975	18%	1%	3%	8%	9%	9%	15%	32%	7%
1976	18%	1%	2%	6%	7%	9%	16%	35%	6%
1977	11%	1%	3%	7%	9%	12%	18%	34%	6%
1978	18%	1%	3%	6%	7%	10%	15%	35%	6%
1979	19%	1%	4%	9%	9%	16%	11%	25%	5%
1980	11%	2%	8%	14%	16%	8%	11%	21%	8%
1981	25%	2%	7%	16%	9%	5%	10%	16%	10%
1982	16%	4%	10%	16%	8%	6%	11%	16%	12%
1983	20%	5%	10%	13%	9%	6%	11%	16%	10%
1984	3%	4%	9%	9%	10%	8%	13%	29%	17%
1985	1%	4%	9%	11%	9%	8%	14%	26%	19%
1986	0%	4%	11%	13%	10%	8%	13%	25%	16%
1987	0%	4%	10%	13%	8%	7%	18%	26%	14%
1988	0%	2%	5%	9%	8%	9%	21%	38%	10%
1989	0%	1%	5%	8%	8%	9%	22%	39%	8%
1990	1%	1%	4%	8%	8%	9%	21%	39%	7%
1991	4%	1%	4%	12%	8%	10%	19%	40%	3%
1992	3%	1%	3%	13%	11%	16%	37%	12%	3%
1993	0%	1%	2%	12%	10%	14%	33%	25%	3%
1994	0%	1%	2%	11%	9%	14%	32%	27%	4%
1995	0%	1%	2%	10%	9%	14%	33%	27%	5%
1996	0%	1%	2%	10%	9%	15%	33%	25%	5%
1997	0%	1%	2%	11%	9%	15%	33%	24%	5%

Source: A-43 database, June 30, 1997 extract.
[a]Streamlined-Refinancing loans (SRs) are not included since they generally do not report LTV ratios.
[b]Includes investor loans and all loans for dwellings with two or more units.

As Exhibit IV-4 indicates, the LTV distribution of FY 1997 originations is very similar to the LTV distribution of FY 1996 originations. About 60 percent of the purchase mortgages originated in FY 1997 have LTV ratios of 95 percent or more, and over 80 percent have LTV ratios above 90 percent. Changes in the distribution between FYs 1990 and 1991 are partly due to a modification in the way FHA calculated the LTV ratio. Prior to FY 1991, FHA defined the value supporting the mortgage as the appraised value of the property plus closing costs. Beginning in FY 1991, closing costs were no longer considered a factor when determining a property's value. As a result, the LTV ratios of borrowers after FY 1991 who financed their

closing costs are correspondingly higher. We have attempted to adjust for this change in our data processing by increasing the average LTV of all borrowers in books prior to FY 1991 by the average amount of closing costs financed in those years. This adjustment permits comparisons between the LTV distributions from FYs 1975 to 1990 and the LTV distributions in FYs 1991 to 1997, although variations in closing costs and differences between origination dates and endorsement dates introduce a minor amount of measurement error in the FYs 1975 to 1990 distribution.

However, with the exception of the 97-100 percent LTV category, where volume was exceptionally low at 12 percent in FY 1992, volume in the high LTV categories was fairly constant within the FY 1992-1997 period.

D. Initial House Price Distributions

In accordance with the change in the FY 1995 and FY 1996 Actuarial Reviews, this year's Review uses relative house price categories to characterize loans rather than the loan size categories we had used in prior Reviews. The implementation of relative house price categories eliminates the upward bias which occurs when classifying loans in higher-cost areas using absolute loan size categories. The upper limits for categories one through seven are based on breakpoints determined by a percentage of the median house price in each of the forty-four largest metropolitan statistical areas (MSAs) and the fifty states. House price category eight represents all originations in areas with limits exceeding the FHA maximum limit, as well as loans with missing MSA or state identifiers. This category contains a variety of exceptions to the general limit, such as loans originated in Alaska, Hawaii, Guam, and the Virgin Islands; loans originated under special programs; and other special cases.

Exhibit IV-5 shows the percentage of new originations within each relative house price category. FHA experience indicates that loans of higher-priced houses tend to perform better in two respects than loans written on lower-priced houses in the same geographical area, all else being equal. Loans on higher priced houses claim at a lower rate, and in those cases where a claim occurs, the percentage loss is smaller. The loss rate is defined as the percentage of a claim amount not recovered through the sale of the conveyed property or mortgage note. Those houses whose prices fall at the upper end of the FHA loan size limit tend to be in the median house price range for their area. Since the market is relatively liquid and there are a relatively large number of these similar quality homes in the area, the house price volatility of these areas tends to be relatively small in comparison to the house price volatility of areas containing extremely low and high priced houses. With similar initial LTVs, the higher-priced houses tend to be associated with larger loan amounts. In addition, because a large proportion of claim costs are fixed and do not vary with regard to loan or property value, larger loans are generally accompanied by lower loss rates.

Exhibit IV-5

Distribution of Originations by Relative House Price Category
(Percentage of FHA-Insured Mortgages by Dollar Volume)

Book of Business	0-60% of Median House Price	60-70% of Median House Price	70-80% of Median House Price	80-95% of Median House Price	95-106% of Median House Price	106 to 122% of Median House Price	Greater than 122%	U.S. Territories*
1975	13%	11%	14%	23%	13%	12%	12%	1%
1976	17%	14%	16%	24%	12%	9%	7%	1%
1977	18%	15%	18%	24%	11%	9%	5%	1%
1978	15%	13%	17%	25%	12%	10%	7%	2%
1979	13%	13%	18%	24%	13%	10%	8%	1%
1980	10%	11%	15%	25%	14%	12%	12%	1%
1981	12%	12%	16%	25%	13%	11%	11%	1%
1982	12%	10%	14%	22%	12%	12%	17%	1%
1983	8%	8%	12%	22%	14%	14%	23%	0%
1984	8%	8%	11%	22%	14%	15%	21%	1%
1985	7%	7%	10%	20%	14%	17%	24%	1%
1986	6%	7%	10%	20%	15%	18%	24%	1%
1987	7%	8%	12%	20%	15%	18%	21%	1%
1988	12%	10%	12%	21%	14%	14%	15%	1%
1989	15%	10%	11%	19%	13%	13%	18%	1%
1990	14%	9%	11%	18%	13%	14%	19%	1%
1991	14%	10%	12%	19%	13%	14%	17%	1%
1992	14%	11%	14%	22%	14%	13%	11%	1%
1993	14%	12%	15%	23%	14%	12%	9%	1%
1994	16%	13%	15%	22%	12%	11%	9%	1%
1995	15%	12%	15%	23%	12%	12%	9%	2%
1996	12%	10%	12%	20%	14%	12%	19%	1%
1997	13%	10%	12%	20%	13%	13%	18%	1%

Source: A-43 database, June 30, 1997 extract.
*Includes loans originated in U.S. territories or that do not fall within the 94 regional categories.

The risk profile of FHA's recent originations has improved due partly to the changing loan size and to the direct positive relationship between better performance and loan size. We found from historical data that the average loan sizes of most mortgage types and house price categories have increased relative to their corresponding loan sizes reported in the FY 1996 Review. This change is mainly attributed to the increases in the loan limit from $155,250 to $160,950 at the beginning of 1997. This 3.7% increase is the result of the policy that links FHA's limit to changes in the Federal Housing Finance Board's house price index. The increase in average loan sizes may also provide insight into the varying risk characteristics among different mortgage types. As FHA

historical data has revealed, in a declining interest rate environment, ARMs claim rates tend to peak in the early years. This is also consistent with the fact that larger loans tend to have lower claim rates and ARMs loan sizes tend to be larger than those of FRMs. However, as interest rates are expected to increase gradually in the next few years, they introduce a rising payment burden to ARM borrowers and may lead to higher ARM claim rates. The econometric model estimates that this rising interest rate effect outweighs the loan size effect. As a result, future ARMs claim rates are estimated to be higher than those of the FRMs.

Exhibit IV-6 provides a detailed breakdown of average loan sizes by mortgage type and relative house price category. Loans in category eight do not follow the trend for average loan size since this category has a unique composition.

Exhibit IV-6

Average Loan Size by Mortgage Type and Relative House Price Category in FY 1997 ($)

Mortgage Type	House Price Category							
	1	2	3	4	5	6	7	8
30-Year Fixed Rate	55,220	68,773	76,919	86,359	92,580	98,455	117,383	72,096
30-Year Streamline	66,441	83,702	95,412	102,545	103,920	113,692	129,545	55,150
Adjustable Rate Mortgage	66,120	81,005	90,343	101,237	106,114	111,243	125,289	n/a
15-Year Fixed-Rate	38,687	55,622	61,786	70,873	79,576	85,226	100,071	55,673
15-Year Streamline	43,459	57,538	62,575	66,307	72,954	78,103	87,697	34,750
Graduated Payment	63,037	78,911	93,127	103,946	119,394	97,972	127,316	n/a

Source: A-43 database, June 30, 1997 extract.

E. Initial Contract Interest Rate

Research has shown that in the case of FRMs, a lower contract rate will generally result in fewer claims. For example, FHA loan originations for 30-year fixed-rate mortgages (FRMs) in FY 1994 had an average contract rate of 7.6 percent, the lowest in the last twenty years, which resulted in lower estimated conditional claim rates for this book relative to other books. Exhibit IV-7 displays the average contract rate by mortgage type since FY 1988. The average contract rate on 30-year FRMs rose slightly from 7.84 percent in FY 1996 to 8.01 percent in FY 1997,

indicating that 30-year FRMs are likely to experience slightly higher conditional claim rates in the near term.

However, mortgages with low contract rates are found to prepay more slowly. These slower prepayment rates indicate that mortgages are exposed to default risk for longer periods of time. Recent research has found that there is a strong substitution effect between prepayments and claims. Therefore, relative to the FY 1996 book of business, the expected higher prepayment rates of the FY 1997 book of business should tend to lower the cumulative claim rates. In summary, the FY 1997 book of business is likely to have higher conditional prepayment and claim rates in the near term. The cumulative prepayment and claim rate can be higher or lower than other books of business depending on the magnitude of the substitution effect. Our analysis has found the cumulative prepayment rate to be similar to and the cumulative claim rate to be higher than those of the FY 1996 book of business.

Exhibit IV-7

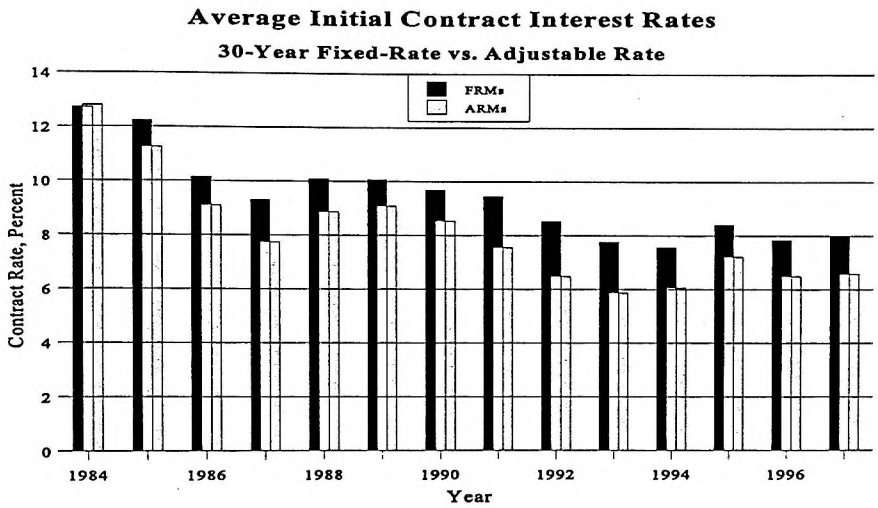
Average Contract Interest Rates by Loan Type and Aggregate

Year	F30s	S30s	ARMs	F15s	S15s	GPMs	Average
1988	10.11%	10.11%	8.88%	9.89%	9.89%	9.98%	10.05%
1989	10.08%	10.08%	9.08%	10.04%	10.04%	9.81%	10.07%
1990	9.72%	9.72%	8.54%	9.67%	9.67%	9.74%	9.71%
1991	9.47%	9.47%	7.56%	9.28%	9.28%	9.48%	9.40%
1992	8.55%	8.55%	6.47%	8.43%	8.43%	8.43%	8.26%
1993	7.91%	7.91%	5.95%	7.64%	7.64%	7.03%	7.60%
1994	7.57%	7.62%	6.06%	7.14%	7.43%	6.90%	7.36%
1995	8.39%	8.47%	7.18%	8.23%	8.74%	8.13%	8.10%
1996	7.84%	7.82%	6.49%	7.52%	7.69%	7.89%	7.53%
1997	8.01%	7.81%	6.57%	7.79%	8.06%	8.17%	7.57%

Source: A-43 database, June 30, 1997 extract.

In contrast to FRMs, higher initial contract interest rates on ARMs are not associated with higher prepayment rates. When rates fall, the contract rate adjusts, and thus the borrower does not have incentive to refinance, except in the case of binding interest rate caps. When compared with FY 1996 book of business, which has a higher average contract rate, the lower ARM contract rate of the FY 1997 book of business does not translate into lower conditional claim rates. This is because the ARM interest rate is always automatically adjusted to the market interest rate, which eliminates the incentive to keep a below-market rate loan during a rising interest rate environment.

Exhibit IV-8



Source: A-43 database, June 30, 1997 extract.

Section V: MMI Fund Sensitivities - Performance of the Fund under Various Scenarios

This section presents the results of several sensitivity analyses we performed as part of the fiscal year (FY) 1997 Actuarial Review of the MMI Fund. The purpose of these analyses is to test the sensitivity of our estimates of the Fund's value to changes in economic and other controlling assumptions. We ran sensitivity analyses on model assumptions that may have a potentially significant impact on the Fund's economic value. The analyses provide information on the robustness of our estimates and the extent to which our conclusions on the performance of the Fund might be incorrect due to inaccurate treatment of these issues. The sensitivity analyses performed assessed the effects of:

- alternative economic scenarios
- alternative interest rate scenarios
- alternative income and house price scenarios
- alternative default to claim lags
- alternative disposition lags
- the effectiveness of FHA's loss mitigation program
- low FY 1998 interest rate scenario

A. Alternative Economic Scenarios

For our base case estimate of the economic value of the Fund, we employed DRI's[1] base case forecasts of the average house price growth rate, the FHLMC commitment rate (which we use to estimate FHA's contract interest rate, as explained in Appendix E), and mean household income growth rate.

To test the sensitivity of the Fund's economic value to alternative scenarios for the U.S. economy, we make assumptions of the future interest rates, house price growth rates, and household income growth rates based on the two alternative forecasts produced by DRI: (1) a "boom-bust" forecast which assumes higher interest rates and higher growth rates for both mean household income and house price index over the next two years, followed by unfavorable economic conditions in the subsequent three years; and (2) a "pessimistic" forecast which assumes lower interest rates and lower growth rates in both mean household income and house prices. These two scenarios were constructed based on the alternative scenarios for the U.S. economy forecasted by DRI in November 1997. The terms "boom-bust" and "pessimistic" forecasts refer

[1] References to DRI forecasts refer to McGraw-Hill/DRI forecasts of U.S. annual national economic figures. Forecasts used in this review were released by DRI in October, 1997.

directly to the terms used in DRI's report. The assumed values of the economic variables used to produce each of these sensitivity scenarios are included in Exhibit V-1.

Exhibit V-1

Economic Assumptions for Sensitivity Analyses									
Fiscal Year	House Price Index Growth			FHA Effective Rate			Mean Household Income Growth		
	Base Case	Boom-Bust	Pessi-mistic	Base Case	Boom-Bust	Pessi-mistic	Base Case	Boom-Bust	Pessi-mistic
1997	8.02%	8.02%	8.02%	8.13%	8.13%	8.13%	2.22%	2.22%	2.22%
1998	7.52%	8.90%	-3.06%	8.48%	8.71%	7.56%	1.79%	2.29%	1.69%
1999	4.87%	7.56%	-1.07%	8.45%	10.66%	7.89%	0.82%	1.73%	0.59%
2000	4.57%	-7.25%	0.68%	8.25%	10.52%	7.73%	0.78%	1.52%	0.59%
2001	1.73%	-4.16%	2.57%	8.09%	8.35%	7.69%	0.47%	0.62%	0.36%
2002	1.34%	0.78%	2.17%	8.12%	7.14%	7.33%	0.25%	0.24%	0.21%

Exhibit V-2 depicts the estimated economic values of the Fund corresponding to the boom-bust, base case, and pessimistic scenarios. The estimated current economic value of the Fund varies by $2.420 billion between the scenarios, from a high of $11.258 billion for the base case scenario to a low of $8.838 billion for the pessimistic scenario. This exhibit also displays the impact of the three economic scenarios on the Fund's FYs 1997 through 2000 capital ratios. In all three scenarios the Fund can be expected to exceed the NAHA mandated capital ratio of 2.00 percent by FY 2000.

Exhibit V-2

Pessimistic Scenario ($ millions)					
Fiscal Year	Economic Value of the Fund[a]	Capital Ratio	Insurance in Force[a]	Economic Value of New Book of Business	Interest on Fund Balances
1997	$8,838	2.20%	$400,850	$438	n/a
1998	$9,731	2.35%	$414,489	$627	$265
1999	$10,768	2.49%	$432,437	$745	$292
2000	$12,014	2.67%	$450,619	$923	$323
Base Case Scenario ($ millions)					
Fiscal Year	Economic Value of the Fund[a]	Capital Ratio	Insurance in Force[a]	Economic Value of New Books of Business	Interest on Fund Balances
1997	$11,258	2.81%	$400,850	$1,156	n/a
1998	$12,627	2.95%	$427,327	$1,032	$338
1999	$14,052	3.08%	$455,779	$1,045	$379
2000	$16,684	3.21%	$488,106	$1,211	$422
Boom-bust Scenario ($ millions)					
Fiscal Year	Economic Value of the Fund[a]	Capital Ratio	Insurance in Force[a]	Economic Value of New Book of Business	Interest on Fund Balances
1997	$10,890	2.72%	$400,850	$1,033	n/a
1998	$11,968	2.79%	$429,147	$752	$327
1999	$12,632	2.70%	$468,250	$305	$359
2000	$13,814	2.72%	$508,593	$802	$379

[a]All values based on projected values for end of the corresponding FY.

B. Alternative Interest Rate Scenarios

Mortgage interest rates have proven to be a significant factor in the estimation of conditional claim and prepayment rates for all mortgage types. The pessimistic and boom-bust scenarios

described above measure the effect of different interest rate scenarios along with changes in other economic variables. In order to isolate the effects of more pronounced changes in interest rates, we have run six different interest rate scenarios in which only the interest rate assumptions input into the econometric models were modified. The six scenarios include: (1) a gradual increase, which assumes a uniform increase in interest rates of 0.5 percent per year for ten years, and then a return to original forecasted rates; (2) a rapid increase in interest rates of 1.0 percent a year for five years and then gradually decreasing to forecasted levels; (3) a temporary interest rate "shock," which assumes an immediate increase of 3.0 percent in interest rates, a constant rate for five years, and then a return to the original forecasted level; (4) a gradual decrease scenario, which assumes interest rates decrease by 0.5 percent a year for eight years and then return to predicted rates; (5) a rapid decrease in which interest rates decrease by 1.0 percent a year for four years and eventually return to forecasted levels; and (6) a "shock drop" scenario which assumes a decrease of 3.0 percent in the first year, a steady "low" state for five years, and then a return to predicted levels. Exhibit V-3 displays the six interest rate scenarios, as illustrated by the FHA effective rate, alongside the forecasted rates used in the base case scenario.

Exhibit V-3

Alternative Interest Rate Scenarios

Fiscal Year	FHA Effective Interest Rates						
	Base Case	Gradual Increase	Rapid Increase	Rate Shock	Gradual Decrease	Rapid Decrease	Shock Drop
1997	8.13%	8.13%	8.13%	8.13%	8.13%	8.13%	8.13%
1998	8.48%	8.63%	9.13%	11.13%	7.63%	7.13%	5.13%
1999	8.45%	9.13%	10.13%	11.13%	7.13%	6.13%	5.13%
2000	8.25%	9.63%	11.13%	11.13%	6.63%	5.13%	5.13%
2001	8.09%	10.13%	12.13%	11.13%	6.13%	4.13%	5.13%
2002	8.12%	10.63%	13.13%	11.13%	5.63%	5.13%	5.13%
2003	8.12%	11.13%	12.13%	10.13%	5.13%	6.13%	6.13%
2004	8.09%	11.63%	11.13%	9.13%	4.63%	7.13%	7.13%
2005	8.03%	12.13%	10.13%	8.13%	4.13%	8.03%	8.03%
2006	8.00%	12.63%	9.13%	8.00%	4.63%	8.00%	8.00%
2007	8.02%	13.13%	8.13%	8.02%	5.13%	8.02%	8.02%

It should be noted that these interest rate sensitivity analyses do not take into account the intercorrelation between interest rates and other economic variables. Specifically, interest rate movements normally occur in tandem with movements of other economic variables including house price and inflation. The sensitivity analyses reported here do not include these other effects, allowing us to isolate the effect of interest rate movements on the Fund.

When interest rates increase above original contract rates, conditional claim rates tend to decrease on fixed-rate mortgages (FRMs), because the household has an incentive to keep the

below market mortgage interest rate that it had locked in previously. However, conditional claim rates on adjustable-rate mortgages (ARMs) will tend to move in the opposite direction, since the monthly payments on ARMs will increase as interest rates increase. Although ARM interest rate changes are capped at one percent per year, an interest rate scenario in which interest rates are steadily higher over a number of years (as in the cases of the rapid increase and rate "shock") is likely to result in a substantial increase in ARM claims. Also, mortgages originated at high contract rates tend to have higher claim rates and particularly rapid prepayment rates, resulting in lower economic values. This is why scenarios in which interest rates increase tend to have lower estimated capital ratios in FY 2000.

One of the most notable observations from the interest rate sensitivity analyses is the tendency for the economic values of books of business originated prior to FY 1992 (but after FY 1983) to respond differently to interest rate changes than books of business originated after FY 1992 (excluding future originations). In particular, the economic value of books originated prior to FY 1992 tends to increase in response to interest rate decreases, while the economic value of books originated after FY 1992 tends to decrease under the same conditions. This may be explained by the change in the premium structure in FY 1991. Since the FYs 1984 to 1991 books do not pay annual premiums, and are entitled to little or no up-front premium refund (by FY 1998 none of these books will be eligible for refunds), the Fund benefits when prepayments from these books accelerate. This is because the Fund loses little or no revenue and avoids future claim costs. Thus, lower interest rates tend to increase the economic values of these books. However, books originated after FY 1992 do pay annual premiums, and the refunds FHA must pay on prepayments from these books are significantly greater because these books are less seasoned. Consequently, FHA tends to lose significant revenue and incur large expenses when recent books of business prepay rapidly, although this effect is partially offset by the reduction in future claims that accompanies large prepayments.

This balance between the pre- and post-FY 1992 books, combined with the differential effect that changing interest rates have on ARMs, new originations, and streamline refinancings (SRs) indicates that the MMI Fund is partially hedged against sudden interest rate changes. However, over the next few years, as post-FY 1992 books increasingly comprise the vast majority of outstanding insurance-in-force (IIF), this hedge will weaken somewhat. In particular, the Fund's existing business (loans originated on or before FY 1997) will be more susceptible to scenarios in which interest rates drop significantly for a short period of time.

Exhibit V-4 shows that the gradual increase in interest rates results in capital ratios which are higher than the base case in FY 1997 through 2000. Although higher interest rates reduce the volume of new endorsements relative to the base case, claim and prepayment rates are also reduced. The dominant effect is the reduction in claim and prepayment rates, leading to higher capital ratios, economic values, and IIF.

Exhibit V-4

Projected MMI Fund Performance with Gradual Increase ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,904	2.97%	$60,051	$400,850	$1,608	n/a
1998	$13,667	3.19%	$54,136	$428,293	$1,406	$357
1999	$15,619	3.39%	$57,500	$460,415	$1,542	$410
2000	$17,937	3.59%	$65,726	$500,073	$1,849	$469

The results from the rapid increase in interest rates show both the estimated FY 1997 and the FY 2000 capital ratios increasing. As in an environment of gradually increasing interest rates, claim and prepayment rates of existing books tend to decrease as market interest rates get higher. However, as shown in Exhibit V-3, interest rates start declining in FY 2002 in the rapid increase case. As a result, the benefit of the higher market interest rate diminishes when we approach FY 2002. On the other hand, the interest rates in the gradual increase case continue to increase until FY 2006, making the higher market interest rate effect more significant in the later years. Therefore, while the FYs 1997 to 1999 capital ratios are higher in the rapid increase case than in the gradual increase case, the FY 2000 capital ratio becomes lower. Exhibit V-5 displays the results from the rapid interest rate increase scenario.

Exhibit V-5

Projected MMI Fund Performance with Rapid Increase ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$12,136	3.03%	$60,051	$400,850	$1,499	n/a
1998	$13,952	3.24%	$53,622	$430,882	$1,452	$364
1999	$15,902	3.41%	$57,246	$466,937	$1,531	$419
2000	$18,108	3.54%	$65,614	$511,450	$1,729	$477

Exhibit V-6 shows the results of the rate shock scenario. In this case the FY 1997 capital ratio increases to 3.04 percent, the highest of all the interest rate increase cases. This effect occurs largely as a result of lower claim rates on fixed-rate mortgages and lower prepayment from the FY 1992 to 1997 books. In this scenario, the market interest rate stays at 11.13 percent from 1998 to 2002, and gradually decreases after 2002. This means that while the FY 1998 to 2000 books of business have high contract rates, they do not experience the benefits of low claim and prepayment rates that result from further increases in market interest rates. As a result, the growth in the capital ratio is significantly reduced in this scenario.

Exhibit V-6

Projected MMI Fund Performance with Rate Shock ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$12,166	3.04%	$60,051	$400,850	$1,476	n/a
1998	$13,851	3.17%	$53,335	$437,229	$1,320	$365
1999	$15,608	3.28%	$57,211	$476,168	$1,341	$416
2000	$17,567	3.37%	$65,614	$520,523	$1,490	$468

When interest rates decrease below the original contract rates, conditional claim rates on FRMs tend to increase. In contrast, the claim rates on ARMs will most likely decrease as the payment burden falls. Additionally, books of business originated with low contract interest rates tend to have higher economic values than books originated with high contract interest rates. To measure the effect of a falling interest rate environment, we analyzed the effect of decreasing interest rates on the value of the Fund using three scenarios. In the gradual decrease scenario, the Fund's estimated capital ratio was higher than the capital ratio estimated in the base case scenario in FYs 1999 and 2000.

Exhibit V-7

Projected MMI Fund Performance with Gradual Decrease ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$10,825	2.70%	$60,051	$400,850	$819	n/a
1998	$11,182	2.92%	$55,333	$404,731	$623	$324
1999	$12,778	3.41%	$63,480	$374,883	$612	$354
2000	$13,815	4.32%	$85,640	$319,441	$654	$383

Although the capital ratios in FYs 1997 and 1998 are lower than those in the scenarios with increasing interest rates, the impact of higher claim rates on FRMs appears to be mitigated by increased refinancing activity and the dramatic increases in estimated economic values of future books. Exhibit V-7 displays complete results from this analysis.

Exhibit V-8 displays the results from the rapid decrease scenario. These results indicate lower capital ratios for FYs 1997 to 2000 as compared to the base case scenario.

Exhibit V-8

Projected MMI Fund Performance with Rapid Decrease ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1996	$11,240	2.80%	$60,051	$400,850	$1,155	n/a
1998	$12,909	2.94%	$66,774	$439,675	$1,332	$337
1999	$14,782	3.04%	$76,294	$485,806	$1,486	$387
2000	$16,966	3.16%	$86,841	$536,213	$1,740	$443

The results from the shock drop scenario are similar to those from the rapid decrease scenario for FY 1997-2000. However, in FY 2000, the estimated capital ratio reaches 4.19 percent. Exhibit V-9 displays the results of the shock drop scenario.

Exhibit V-9

Projected MMI Fund Performance with Shock Drop ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,240	2.80%	$60,051	$400,850	$1,155	n/a
1998	$13,738	2.91%	$99,160	$471,938	$2,161	$337
1999	$15,732	3.03%	$79,141	$519,945	$1,582	$412
2000	$17,423	4.19%	$64,759	$545,770	$1,219	$472

C. Alternative Income and House Price Scenarios

Mean household income and the house price index both prove to be significant factors in the estimation of conditional claim and prepayment rates for all mortgage types. The pessimistic and boom-bust scenarios described above measure the effect of different mean household income and house price index scenarios along with changes in the interest rates. In order to isolate the effects of more pronounced changes in mean household income and the house price index, we have run our models under four different income and house price scenarios in which assumptions of only one input variable in the econometric models were changed. While these two variables would rarely move independent of each other, these four scenarios prove insightful in assessing the effects of such changes on the capital ratios of the fund. The four scenarios include: (1) a high income growth rate forecast which assumes higher mean household income growth rates than found in the base forecast through year 2002, (2) a low income growth rate forecast which assumes lower mean household income growth rates from the base forecast through year 2002, (3) a high house price growth rate forecast which assumes higher house price growth rates than

found in the base forecast through year 2002, and (4) a low house price growth rate forecast which assumes lower house price growth rates from the base forecast through year 2002. In all the four cases, we assume that after FY 2002, the growth rate returns to the base forecast level. The growth rates chosen represent the highest 5-consecutive-year growth and the lowest 5-consecutive-year growth over the last 37 years. Exhibit V-10 displays the four different mean household income and house price index scenarios.

Exhibit V-10

Alternative Mean Household Income and House Price Index Scenarios						
Fiscal Year	Mean Household Income			House Price Index		
	Base Case	High Income Growth Rate	Low Income Growth Rate	Base Case	High House Price Growth Rate	Low House Price Growth Rate
1997	2.22%	2.22%	2.22%	8.02%	8.02%	8.02%
1998	1.79%	3.47%	1.33%	7.51%	8.34%	2.46%
1999	0.82%	2.15%	-1.68%	4.87%	13.14%	-0.55%
2000	0.78%	4.73%	0.39%	4.57%	12.67%	-2.99%
2001	0.47%	4.06%	-0.15%	1.73%	15.00%	2.23%
2002	0.25%	4.49%	0.99%	1.34%	16.40%	3.12%

Exhibit V-11 represents the fund's performance during a high income growth rate over the next five years. The capital ratio in FY 1997 is 2.93 percent compared to 2.80 percent in the base case. In FY 2000, the estimated capital ratio reaches 3.34 percent compared to 3.21 percent in the base case.

Exhibit V-11

Projected MMI Fund Performance with High Income Growth ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,761	2.93%	$60,051	$400,850	$1,286	n/a
1998	$13,243	3.10%	$54,618	$427,578	$1,129	$353
1999	$14,817	3.23%	$61,139	$459,069	$1,177	$397
2000	$16,673	3.34%	$74,539	$498,836	$1,412	$445

Exhibit V-12 displays the Fund's performance during low income growth rate over the next five years. The capital ratio in FY 1997 is 2.74 percent. In FY 2000 the estimated capital ratio, which falls from the base case 3.21 percent to 3.12 percent, remains above the mandated 2.00 percent threshold.

Exhibit V-12

Projected MMI Fund Performance with Low Income Growth ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$10,997	2.74%	$60,051	$400,850	$1,095	n/a
1998	$12,316	2.88%	$54,377	$427,327	$989	$330
1999	$13,668	3.00%	$58,174	$455,742	$983	$369
2000	$15,235	3.12%	$67,122	$487,921	$1,157	$410

The results from the high house price scenario indicate that the capital ratio increases at a much faster rate than under the base case, reaching 3.83 percent in FY 2000. Exhibit V-13 displays the results of the high house price scenario.

Exhibit V-13

Projected MMI Fund Performance with High House Price Growth ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$12,561	3.13%	$60,051	$400,850	$1,535	n/a
1998	$14,349	3.37%	$52,901	$425,800	$1,411	$377
1999	$16,210	3.60%	$54,530	$450,712	$1,431	$430
2000	$18,233	3.83%	$59,555	$475,869	$1,536	$486

Exhibit V-14 displays the results of the low house price scenario. The FY 2000 capital ratio, 2.77%, while lower than the base case 3.21 percent, remains above the mandated 2.00 percent.

Exhibit V-14

Projected MMI Fund Performance with Low House Price Growth ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$9,728	2.43%	$60,051	$400,850	$725	n/a
1998	$10,733	2.51%	$54,315	$427,337	$713	$292
1999	$11,895	2.61%	$58,083	$455,627	$840	$322
2000	$13,508	2.77%	$66,943	$487,360	$1,256	$357

These four scenarios provide an examination of the isolated effects of such variables as house price and income on the capital ratio of the fund. The FY 2000 capital ratio under these scenarios ranges from the high 3.83 percent under the high house price scenario to the low 2.77 under the low house price scenario. It should be noted that in all four scenarios the capital ratio remains above the mandated 2.00 percent.

D. Alternative Default-to-Claim Lags

The average time interval between default and claim is an important factor in our loss rate model. In this Review, the average default-to-claim lag was assumed to be 15.27 months for FY 1997, 14.43 months for FY 1998, and 14.55 for FY 1999 and forward books of business. The average default-to-claim lags in the past two decades ranged from nine months to over 15 months. Longer default-to-claim lags not only increase the unearned interest that FHA pays to the lenders but also increase the seriousness of the physical deterioration of the housing on which the defaulted mortgage was written. Recent research has shown that the loss severity of mortgage defaults is very sensitive to the default to claim lag. During 1995, Fannie Mae required its lenders to speed up the foreclosure process in order to shorten the duration of default-to-claim lag. We tested for the sensitivity of the Fund to this lag. Exhibit V-15 shows that the FY 1997 economic value would increase by $810 million if the average claim lag were reduced by a quarter to 11 months. The FY 1997 capital ratio would increase by 0.20 percentage points.

Exhibit V-15

Projected MMI Fund Performance with 11 Month Default to Claim Lag ($ millions)

Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$12,068	3.01%	$60,051	$400,850	$1,324	n/a
1998	$13,612	3.19%	$54,377	$427,327	$1,182	$362
1999	$15,237	3.34%	$58,175	$455,779	$1,217	$408
2000	$17,105	3.50%	$67,130	$488,106	$1,411	$457

E. Alternative Claim-to-Disposition Lags

The claim-to-disposition lag has also been found to significantly affect loss rates. In recent years, FHA has attempted to shorten this time lag by applying different methods such as asset sales. The average claim to disposition lag of conveyed properties has declined from about eight months to less than four months. In this Review, we assumed the average claim-to-disposition lag to be about four months. We tested for the sensitivity of the Fund to this lag by reducing the

claim-to-disposition lag to three months. Exhibit V-16 shows that if FHA were able to continue to reduce the claim-to-disposition lag to three months, the economic value of the Fund would increase by $1.0 billion in FY 2000, and the FY 2000 capital ratio would increase by 0.22 percentage points.

Exhibit V-16

Projected MMI Fund Performance with Three Month Claim to Disposition Lag ($ millions)

Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,858	2.96%	$60,050	$400,850	$1,285	n/a
1998	$13,358	3.13%	$54,377	$427,327	$1,144	$356
1999	$14,934	3.28%	$58,175	$455,779	$1,174	$400
2000	$16,745	3.43%	$67,130	$488,106	$1,364	$448

F. Effect of Increases in the Use of Loss Mitigation Techniques

The same legislation that terminated the Assignment Program authorized FHA to implement a variety of loss mitigation techniques, including special forbearance, mortgage assumptions by lenders, pre-foreclosure sales, deed-in-lieu-of-foreclosure transactions, partial claim payments, and loan modifications. These loss mitigation techniques will be alternatives to foreclosure and property conveyance. Due to difficulties involved in estimating the ultimate effect of many of these loss mitigation techniques, we have only captured the potential effects of the expanded use of pre-foreclosure sales on the Fund.

In our analysis of FHA's data on the pre-foreclosure sales program, we estimated that the average loss as a percent of total claim payments for a pre-foreclosure sale was 25 percent, substantially lower than the loss rate for properties conveyed over the same time period. During FY 1997, FHA resolved 7.23 percent of total claim. We assume that FHA will successfully resolve ten percent of the defaults every year in the future, a much more conservative assumption than FHA's estimate of 24 percent. Exhibit V-17 provides estimates of the Fund's economic value and capital ratio from FY 1997 through FY 2000 if FHA were to resolve 20 percent of the defaults by pre-foreclosure sales or other loss mitigation methods. We estimated that the economic value of the Fund in FY 1997 would be $65 million higher if FHA resolved 20 percent of defaults with loss mitigation techniques. Furthermore, the capital ratio would increase by 0.01 percentage points in FY 1997 and 0.03 percentage points in FY 2000.

Exhibit V-17

Projected MMI Fund Performance with 20 Percent Loss Mitigation ($ millions)

Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,323	2.82%	$60,050	$400,850	$1,174	n/a
1998	$12,711	2.97%	$54,377	$427,327	$1,048	$340
1999	$14,156	3.11%	$58,175	$455,779	$1,064	$381
2000	$15,813	3.24%	$67,130	$488,106	$1,232	$425

G. Low FY 1998 Interest Rate Scenario

As this report is released, the interest rate environment is heading in a different direction than the one predicted in DRI's long-term forecast in October 1997. The most active quoted FHA rate in the primary market during the first four months of FY 1998 averaged 7.375 percent and the effective rate for the same period averaged 7.405 percent. Both are significantly lower than the DRI forecasts and are near their lowest levels since the early 1970's. This is a result of the significant decline of the long term interest rate in the capital market. Correspondingly, the MBA refinancing index reached 1842.9 and 3115.8 for the weeks ending January 17 and 24 respectively. The number of refinancing applications during the week ending January 24 is almost double that of the 1993 refinance wave. Many mortgage brokers project that the refinance volume could be as high as that of FY 1993, if the mortgage rates remain low through most of FY 1998.

These conditions are of recent occurrence, and have not persisted long enough to reasonably conclude on the likelihood of their continuance. However, this situation is quite different from the DRI forecast upon which we have completed this year's Actuarial Review. We have completed sensitivity analyses, assuming that the current interest rate situation persists for the remainder of FY 1998. If this were to happen, we estimate that the effect on the Fund would be small. This result occurs because the effect of such rapid prepayments on the total economic value of the book is muted by the fact that most of the economic value of the book is collected through the upfront premium, which is not affected by rapid prepayments.

Exhibit V-18

Projected MMI Fund Performance Assuming Low FY 1998 Interest Rates ($ millions)						
Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorse-ments	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,161	2.78%	$60,051	$400,850	$1,117	n/a
1998	$12,515	3.02%	$57,587	$414,435	$1,019	$335
1999	$13,918	3.14%	$58,097	$443,556	$1,027	$375
2000	$15,530	3.26%	$67,041	$476,816	$1,195	$418

Section VI: Performance of Future Books

This section describes the projected performance of future books of business for FYs 1998 through 2000 and presents estimates of their contribution to the Fund's future economic value and capital ratio. This section also discusses the projected volume and distribution of these future books of business.

A. Economic Value and Capital Ratios for Future Books

The projected future economic values and capital ratios of the entire Fund through FY 2000 are shown below in Exhibit VI-1. These economic values are calculated using both our projections of future termination rates and our projections of the volume and distribution of future books.

Exhibit VI-1

Projected MMI Fund Performance for FYs 1998 to 2000 ($ millions)					
Fiscal Year	Economic Value of New Book of Business[a]	Interest on Fund Balances	Economic Value of Fund	Capital Ratio of Fund	Total Insurance-in-Force
1998	$1,032	$338	$12,627	2.95%	$427,327
1999	$1,045	$379	$14,052	3.08%	$455,779
2000	$1,211	$422	$15,684	3.21%	$488,106

[a]All values are as of the end of each fiscal year. The economic value for future years (FYs 1998 to 2000) is equal to the economic value of the Fund at the end of the previous year, plus the interest earned on previous business, plus the economic value of the new book of business.

The FY 2000 book of business has a slightly higher estimated economic value than the other years in the period of analysis due primarily to the larger projected endorsement volume when compared to the earlier years. Based on DRI economic projections, used growth rates for household income and house prices are predicted to decline starting in 1998 and 1999, respectively. Since the FY 1999 book of business will be exposed to the longest period of the economic slowdown projected to occur between 1999 and the early 2000s, this book of business is likely to experience higher claim rates during the first few policy years. Since the growth in house prices is expected to surpass the growth in household income between 1998 and 1999, houses will become relatively less affordable for first time home buyers. This may cause more new purchase mortgage borrowers to shift into the ARM market. Based on FHA experience, ARMs tend to have higher claim rates during the earlier policy years. The higher ARM share of

the FY 1999 book of business also contributes to the book's lower estimated economic value. Note, however, that these estimates are contingent upon the accuracy of the DRI economic forecasts.

The capital ratio of the Fund is based on the weighted average of the capital ratios of each book of business plus the effect of interest the Fund earns on its current balance. Since, by construction, the *ex ante* economic value of each book remains constant in every policy year (*i.e.*, the FY 1997 book will have the same economic value stated in 1997 dollars in FY 1997 as it does in FY 2026), and since the insurance-in-force (IIF) decreases due to prepayments and claims, the capital ratio for an individual book (calculated as the economic value of that book divided by the outstanding unamortized IIF) will increase over time as long as the economic value of the book is positive. Thus, the capital ratio of an individual book of business will tend to increase over time. The overall capital ratio for the Fund, which is the weighted average of all books, will tend to be significantly higher than the initial capital ratio on the most recent book of business since the capital ratios on the older books of business will push the average upwards.

The Fund's capital ratio reflects overall Fund performance and does not reflect the relative performance of different books of business. Consequently, we have developed two measures of the financial performance of a book of business that provide more detailed indications of the overall quality and profitability of future business. The first of these two measures, denoted as the "initial" capital ratio of a given book, represents the present value of profits per dollar of insurance originated (excluding refinancings). The second measure, the "converging" capital ratio, signifies the capital ratio that the Fund would eventually approach if all future originations were identical to the book of business under consideration. Refinancings are excluded since these loans will involve reductions in the IIF in previous books and thus any gain in the current book's economic value and IIF will be offset by a reduction in a previous book. We calculate these two measures of financial performance based on the FY 2000 book of business in order to reduce the effects of changes in short-term economic forecasts from our estimates.

Last year, we estimated that the initial capital ratio for the FY 2000 book of business would be 2.58 percent and that the converging capital ratio would be 6.27 percent. This year, we estimate the initial capital ratio of the FY 2000 book of business to be 1.85 percent, and the converging capital ratio to be 4.75 percent. This decrease in the converging capital ratio is largely driven by higher claim rates as a consequence of the weaker economic forecast for the early 2000s, rather than the continued deceleration in prepayment rates under the scenario. Nonetheless, it is evident that the Fund's recent performance has remained stable and that the underlying quality of the new business being originated is sound relative to the current premium and refund schedules. Exhibit VI-2 illustrates the capital ratios estimated for the FY 2000 book of business in the Reviews for FYs 1996 and 1997, respectively, as of the end of each policy year.

Exhibit VI-2

Estimated Capital Ratio for the FY 2000 Book of Business ($ millions)				
Policy Year	FY 1996 Actuarial Review[a]		FY 1997 Actuarial Review[a]	
	Insurance-in-Force	Capital Ratio	Insurance-in-Force	Capital Ratio
1	$43,387	2.58%	$65,600	1.85%
2	$43,271	2.59%	$65,418	1.85%
3	$42,027	2.67%	$63,441	1.91%
4	$39,515	2.84%	$59,239	2.04%
5	$36,497	3.07%	$53,903	2.25%
6	$33,226	3.37%	$48,651	2.49%
7	$30,325	3.69%	$43,870	2.76%
8	$27,243	4.11%	$39,011	3.10%
9	$24,332	4.60%	$34,519	3.51%
10	$21,977	5.10%	$30,928	3.91%
11	$19,963	5.61%	$27,784	4.36%
12	$18,238	6.14%	$25,092	4.82%
13	$16,684	6.72%	$22,877	5.29%
14	$15,300	7.32%	$20,894	5.79%
15	$14,006	8.00%	$18,993	6.37%

[a]Insurance-in-force numbers and capital ratios do not include refinancings.

B. Volume and Distribution of Future Books

In projecting the volume and composition of future books of business, we separately estimate purchase money mortgage originations and refinancings. Forecasts of future purchase money mortgage originations are derived from a series of econometric models. These econometric models assume specific autocorrelation structures and are estimated based upon macroeconomic and policy variables. This is different from the model used in previous years, which is a combination of micro and macro approaches. These models have produced higher estimates of future originations than last year's Review partially because of the historically low

unemployment rate and the decline in the interest rate forecast from last year's MMI Review. These factors tend to increase housing affordability for marginal and first time home buyers. Appendix F describes these models in detail. Our projections of future refinancings are based on both the estimated volume of prepayments and the future house price growth rates, as well as the difference in FHA and conventional mortgage insurance premiums. The model used to forecast future refinancing volumes is discussed in Section VII. Exhibit VI-3 presents the projected volumes of future books of business.

Exhibit VI-3

Volume of Future Originations for All Mortgage Types ($ Millions)			
Book of Business	**Purchase Mortgages**	**Streamline Refinancings**	**Total**
1998	$53,323	$1,054	$54,377
1999	$57,194	$981	$58,175
2000	$65,600	$1,529	$67,129

VII. Summary of Methodology

This section presents a brief overview of our modeling approach. It also highlights the differences between the FY 1996 models and FY 1997 models. Complete descriptions of the current models are provided in the technical appendices.

A. Econometric Models of Loan Termination

Most of the Fund's risk arises from potential future adverse performance of the insured loan portfolio. Changes in estimated claim and prepayment rates can dramatically affect the Fund's condition, since future claim and prepayment rates, along with future loan volume and composition, loss rates, and future economic conditions, will determine the Fund's future cash flows. The future cash flows include inflows from insurance premiums and loss recoveries, and outflows for claim payments, refunds and Fund administration. Projections of these future cash flows are discounted to provide estimates of the Fund's current and future net present values.

We have produced claim estimates using econometric models which are based on the hypothesis that a borrower's equity position is a significant determinant of claim behavior. The equity position varies with factors such as house price appreciation rates and changes in interest rates. To control for the possible disparity in house price appreciation rates across regions of the country, a regional house price dispersion measure is also included in the model.

Prepayments are primarily due to household mobility and changes in interest rates. A borrower's equity growth position also influences the prepayment decision, because the likelihood that a borrower will sell his/her home to "trade up" increases as the wealth of the borrower increases.

We developed our models by performing regression analyses on data from FHA's A-43 database and by estimating economic relationships for specific categories of house price, LTV, and loan origination years. The forecasts based on these models depend upon projections of the following factors:

- house price appreciation rates
- interest rates
- house price dispersion measures
- household income growth rates

Therefore, the results of this analysis are sensitive to changes in these assumptions.

The models used for this year's Review follow conceptually from those used in last year's Review. We continue to estimate five different sets of econometric models to accommodate the unique features of the following loan types:

- 30-year fixed-rate mortgages (FRMs)
- 30-year streamline refinancings (SRs)
- adjustable-rate mortgages (ARMs)
- 15-year FRMs
- 15-year SRs

Since there is only a small number of graduated-payment mortgages (GPMs), we have not developed a distinct model to estimate conditional claim and prepayment rates associated with these loans. The rates are calculated by applying the forecasted conditional claim and prepayment rates estimated in the 30-year FRM econometric model to the future policy years of each book of GPM business.

B. Loss Rate Estimation Model

The loss rate model (see Appendix D) is based on estimates of three key components of the loss rate: holding costs, foreclosure costs, and change in (or loss on) asset value. These three factors and the foregone interest sum to the dollar amount of loss. Each of these three components is estimated as a percentage of remaining principal balance and, when summed and combined with foregone interest income, result in an estimate of loss as a percentage of remaining principal balance.

In order to examine the trends in loss rates and to enable the results from the loss rate model to be applied directly to the cash flow model, loss rates were estimated as a function of relative house price, LTV, and loan type categories. Thus to obtain forecasted loss rates by these cell components, the coefficients from the previous three regressions for holding cost, foreclosure cost, and loss on asset value are multiplied by future values of independent variables such as disposition lags and contract rates. This product plus the future foregone interest (which can be calculated directly) yield the future predicted loss rate by cell.

C. Cash Flow Analysis

Once claim and prepayment rates are estimated by the econometric models, we estimate future cash flows and discount them to determine the present value of future cash flows. The cash flow model converts claim and prepayment rates, as well as other assumptions about discount rates, administrative costs, premium refunds, recovery rates, and timing, into dollar values, and

calculates end-of-year cash balances and insurance-in-force. The model then discounts the future cash flows to the end of FY 1997 to determine the resources the Fund would currently need in order to meet its financial obligations through the scheduled maturity of the FY 1997 book of business.

D. Technical Refinements

1. New Demand Analysis Model

The demand forecasts used in the FY 1995 and FY 1996 Review were based on a microsimulation model as well as a macroeconomic time series model. The macroeconomic time series model produced estimates of future total market purchase originations. The microsimulation model first divided the total market volume into conventional and FHA loans and then distributed FHA's volume among the different loan type, LTV, and relative house price categories. The previous demand model was estimated using data up to FY 1994 for the macroeconomic model and up to FY 1993 for the microsimulation model.

Given the rapidly changing economy and the high sensitivity of FHA's business to economic conditions, it is necessary to update the demand model each year with new data. Because the American Housing Survey and the Survey of Income and Program Participation, from which data were used in the previous demand model, are not conducted every year and the release of the survey outcomes are normally 2-3 years after the survey reference period, the estimates from the microsimulation model do not necessarily reflect the most recent mortgage market activities.

In the FY 1997 Review, Price Waterhouse developed a new macroeconomic time series Demand Analysis model to enhance the accuracy of the estimates for FHA's future demand. Since the new demand model uses only the macroeconomic time series data, it is free from the sampling error associated with a microsimulation model. In addition, the macroeconomic time series model is designed in such a way that the categorization of loans matches that of the MMI Review.

The new demand model comprises five modules: the FHA purchase volume module, the loan type distribution module, the LTV distribution module, the loan size distribution module, and the refinancing mortgage origination module. The first four modules are newly constructed this year to project FHA's purchase volume and its distribution among the categories characterized by loan type, LTV and relative house price. The refinancing mortgage origination module, originally developed for FY 1995 Review, projects FHA's recapture rates of the refinancing loans.

2. New Methodology for Projecting House Price Dispersion

In the previous Review, the future house price dispersion was assumed to follow a pattern that increases during the first 12 policy years and then decreases at a constant rate. For the 1997 Review, Price Waterhouse has developed a method that uses a regression model to project future house price dispersion.

To project house price dispersion, the average of the dispersion was taken for each policy year from different origination years to obtain a time series dispersion index. With the earlier origination year in the A-43 data set being 1975, the time series contains 23 observations, one for each policy year. These observations, excluding the last five observations, are then used in an autoregressive time series model to project the dispersion for the remaining policy years (policy years 19 to 30). The house price dispersions for the future policy years of each book of business are estimated with the assumption that the change from one policy year to the next is the same as that in the time series of average dispersion.

3. Partial Year Adjustment Method

In FY 1996, OMB required that all Federal agencies meet an accelerated timetable for completion of all financial audits. Given the new time requirement, it was not possible to conduct the Review based on the FHA data as of the end of the fiscal year, as had been the practice in previous Reviews. Instead, since FY 1996, the Actuarial Review was completed based on a combination of a loan level data cut as of June 30 and updated aggregated information as of December 31. With respect to this partial year loan level data set, we have developed an adjusted twelve-month approach that has the following four advantages. First, the approach allows us to start working by July 1997 to meet the accelerated schedule and make timely delivery of the Review. Second, the accuracy and reliability of the Review is maintained in high quality. Third, the results of the Review are consistent with the financial statements. Fourth, this year's Review is directly comparable to the previous and subsequent Reviews.

For the FY 1996 Review, we estimated three scaling factors for originations, claims, and prepayments, respectively. The scaling factors multiplied by the corresponding origination, claim, and prepayment volume yield estimates of the activities for the whole fiscal year, which are then used in the econometric and cash flow models.

One deficiency of the partial year adjustment method applied in the FY 1996 Review is that endorsements and terminations of different loan types may grow at different speeds through the last quarter of a fiscal year. For example, during the second half of FY 1996, the ARM claim

rate increased more rapidly than the FRM claim rate during the same period. Because there was only one claim rate adjustment factor used for all types of loans, this uneven speed of change among loan types (particularly between ARMs and 30-year FRMs) led to an underestimate of the claim rate for ARMs and a slight overestimate of the claim rate for 30-year FRMs in FY 1996. The FY 1997 preliminary data confirm the continuation of the same pattern, i.e. the ARMs claim rate outgrows the 30-year FRM claim rate, during the second half of FY 1997. It is important to modify the Adjusted Twelve Month Approach to accommodate this situation.

The modification we made for the FY 1997 Review is to set different adjustment factors for different loan types. First, based on the June data cut and a September aggregated data update, we gathered additional information on the change in claim rates recorded during the last quarter of FY 1997. These two data sets were used to derive multipliers segregated by loan type. For example, the 30-year FRM claim multiplier is derived by dividing the number of total 30-year FRM claims in the September 30 data update by the number of total 30-year FRM claims in the June 30 data cut. The prepayment and origination multipliers for 30-year FRM loans are calculated similarly. The estimation of the three scaling multipliers is repeated for each of the six loan types. Finally, these loan type specific adjustment factors are adjusted one more time such that the total fiscal year origination, claim, and prepayment counts used in the econometric model matches the aggregated number across all loan types in the year-end financial statements.

VIII. Conclusion -- Compliance with the National Affordable Housing Act

According to our estimates based on the base case economic scenario, as of the end of FY 1997 the MMI Fund had an economic value of $11.258 billion and unamortized insurance-in-force of $400.850 billion, resulting in a capital ratio of 2.81 percent. Furthermore, we project that by FY 2000 the capital ratio will increase to 3.21 percent. Therefore, we estimate that the Fund has exceeded the FY 2000 target of 2.00 percent during this past year based on our base case economic scenario. Estimates based on alternative economic scenarios are provided in Section V.

Total FHA originations were slightly lower in FY 1997 than experienced in FY 1996 due to the slow down in refinancing activities. Current economic conditions and forecasts are likely to result in continued strengthening of the Fund. As older loans move out of the Fund, particularly those for which only small refund payments are due, the Fund's exposure to potential claims is reduced. In addition, the streamline refinancing program continues to reduce the effect of adverse selection by increasing FHA's ability to recapture relatively low-risk borrowers that might otherwise have left the Fund. Our forecasts also indicate that future books of business will continue to add positive value to the Fund, resulting in the Fund exceeding its FY 2000 capital ratio requirement.

Appendix A: Econometric Analysis of Fixed-Rate Mortgages

Price Waterhouse has developed econometric models to estimate the statistical relationships between termination rates and economic and policy variables for loans insured by the MMI Fund and originated between fiscal years (FYs) 1975 and 1997. Together with assumptions regarding future economic conditions, these estimated relationships are used to produce forecasts of future loan performance for both existing and future books of business. When combined with information regarding the income and expenses associated with different loan performance estimates, such forecasts enable us to simulate the Fund's current and future cash flows. The Fund's economic value and the resulting capital ratio are then calculated based on the present value of these cash flows and the Fund's current capital resources as estimated in the annual financial audit.

In Appendix A, we first present a full description of the 30-year fixed-rate mortgage (FRM) models. We describe the theory and approach underlying the econometric models used to explain the observed historical claim and prepayment rates, provide descriptions of the models' specifications, and review their goodness-of-fit. The last section of the appendix describes the estimation technique applied to 15-year FRMs.

While the MMI Review contains separate estimations of econometric models for loans other than 30-year FRMs, the latter remain the most important loan type both in origination volume and potential effect upon the MMI Fund. Furthermore, the models used to estimate claim and prepayment rates for 30-year FRMs form the basis for many of the models of alternative loan types. In particular, the estimation technique and the variable definitions discussed below are repeatedly referenced in later appendices.

I. Data Sources and Sample Definition

Historical loan performance data are taken from the Federal Housing Administration's (FHA's) A-43 database. The A-43 contains comprehensive individual loan records on all FHA-insured mortgage originations, including information on loan-to-value (LTV) ratio, date of origination, principal balance, loan type, interest rate, termination date (if applicable), and status.[1] Price Waterhouse requested and received an extract of the A-43 database covering FYs 1975 to 1997.

Historical economic data are taken from private and US Government sources, including the Bureau of the Census and DRI/McGraw-Hill. Data on the share of the mortgage market composed of adjustable-rate mortgages (ARMs) is taken from the A-43 database (for the FHA

[1] The status variable is coded "A" for active loans, "C" for loans that have claimed, and "T" for loans that have terminated (prepaid).

market) and from information provided by the Mortgage Bankers' Association (for the conventional market).

Price Waterhouse has attempted to separate those FHA-insured loans made as part of the Investor Program. However, the A-43 database does not explicitly identify investor loans. Consequently, for the purposes of our analysis we identify all loans with LTV ratios of approximately 85 percent (after taking into account closing costs and upfront premiums) as investor loans. To this sub-sample, we add those loans with two or more living units. FHA discontinued its Investor Program in FY 1991; however, we have continued to place multi-unit properties in the Investor LTV category.

Actuarial Reviews completed prior to FY 1994 had grouped streamline refinancings (SRs) into the "No Appraisal" LTV category and analyzed them through the general 30-year FRM model. However, as experience with the SR program has accumulated, it has become more appropriate to study them separately. Therefore, in the last four reviews, we have removed all loans identified as SRs from the main FRM analysis.[2] Hence, while in past reviews LTV category 1 was considered synonymous with SRs, it is now considered a miscellaneous category intended to account for the remaining loans with anomalous or non-conforming LTV ratios after the removal of the SRs.

II. 30-Year Fixed-Rate Mortgages

The 30-year FRM econometric models are similar to those used in prior years' reviews. Our estimation technique remains identical to last year's review, including the dependent variable transformation and the correction for first-order serial correlation (see below for details).

Although decisions regarding mortgage obligations occur at the individual household level, our models do not use individual loan records as units of observation. Instead, our claim and prepayment models are designed to explain and forecast termination rates for groups (or cells) of similar loans. Our cells are defined by four dimensions:

- amortization year (the fiscal year in which the first mortgage payment is made)
- policy year
- initial house price category
- initial LTV.

Loans within the same cell are presumed to be homogeneous. Since claim and prepayment decisions are categorical, our models are specified as types of cell-based or grouped logistic

[2] See Appendix C for a discussion of how SRs are identified.

models and are estimated using Ordinary Least Squares (OLS) techniques. A separate regression is estimated for each LTV category.[3]

A. Claim Model Specification[4]

Consistent with the FY 1995 Review, we assume that, in a given policy year, a borrower may take one of three actions:

- continue making timely mortgage payments
- prepay (typically through refinancing or sale)
- default.

We begin our analysis with the default option, focusing on claim rates rather than actual delinquency or default rates (either of which may include non-claim cases) because our objective is to estimate the financial impact of claims on the MMI Fund. In the next part of this appendix, we discuss our prepayment model.

Our claim model is specified as follows (a separate equation is estimated for each of our nine LTV categories):

$$F30CCRx_{i,y,t} = \sum_{l=1}^{13} \alpha_l P_{l,t} + \sum_{m=1}^{8} \gamma_m (HPC_{m,t} \cdot EMx_{y,t-1}) + \sum_{n=1}^{10} \lambda_n EFFINT_{n,y} + \beta_1 PAYMENT_{y,t} + \beta_2 HPDISP_{y,t-1} + \beta_3 EQ82\_86_y + \beta_4 EQPOST86_y + \beta_5 CMPPAY_{y,t} + \varepsilon_{i,y,t} \quad (1)$$

where

$F30CCRx_{i,y,t}$ ≡ the Cox transformed conditional claim rate for 30-year FRMs in

[3] Logistic models estimated using Maximum-Likelihood (ML) techniques and designed to explain individual household behavior would have certain advantages in explaining historical termination patterns. However, much of the data used in this model, such as house price appreciation trends and household income growth, are available only in aggregate form.

[4] Our claim model specification is based on work found in C. Foster and R. Van Order, "FHA Terminations: A Prelude to Rational Mortgage Pricing," *AREUEA Journal*, Vol 13(3) 1985, pp. 273-91; C. Foster and R. Van Order, "An Option-Based Model of Mortgage Default," *Housing Finance Review*, Oct. 1984, Vol 3(4), pp. 351-72. See also P. Hendershott and W. Schultz, "Equity and Non-equity Determinants of FHA Single Family Mortgage Foreclosures in the 1980s," *AREUEA Journal*, Vol 21(4) 1993, pp. 405-430.

LTV category x, of house price category I, originated in fiscal year y, and observed in policy year t,

$P_{l,t}$ ≡ thirteen policy year variables constructed so that $P_{l,t} = 1$ when policy year (t) = l and $P_{l,t} = 0$ otherwise,[5]

$HPC_{m,I}$ ≡ eight house price category variables constructed so that $HPC_{m,I} = 1$ when house price category (I) = m and $HPC_{m,I} = 0$ otherwise,

$EMx_{y,t-1}$ ≡ market value of equity index (lagged one year) for loans of LTV category x, originated in fiscal year y and observed in policy year t-1,

$EFFINT_{n,y}$ ≡ ten time-sensitive effective interest rate variables that take the average value of the effective interest rate for loans originated in fiscal year y when policy year (t) falls within time period n, and take the value zero otherwise,

$PAYMENT_{y,t}$ ≡ payment burden variable for loans originated in fiscal year y and observed in policy year t,

$HPDISP_{y,t-1}$ ≡ house price dispersion index for loans originated in fiscal year y and observed in policy year t-1 (lagged one year),

$EQ82\_86_y$ ≡ first "underwriting" variable constructed so that $EQ82\_86_y = 1$ for loans originated during the period FY 1982-86 (*i.e.*, $82 \le y \le 86$) and equals zero otherwise,

$EQPOST86_y$ ≡ second "underwriting" variable constructed so that $EQPOST86_y = 1$ for loans originated in FY 1987 or later (*i.e.*, $87 \le y$) and equals zero otherwise,

$CMPPAY_{y,t}$ ≡ cumulative prepayment variable for loans originated in fiscal year y, and observed in policy year t.

$\alpha, \beta, \lambda, \gamma$ ≡ Constants

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[5] In the case of the thirteenth policy year dummy variable, $P_{13,t} = 1$ when policy year (t) ≥ 13 and $P_{13,t} = 0$ otherwise.

ϵ ≡ Error term.

The independent variables can be grouped under four main types:

- equity variables
- burden of payment variables
- adverse selection variables
- policy year variables.

Below, we discuss each of the variable types, detailing the underlying theory of our regressors and outlining their construction. However, we begin with a description of the dependent variable $F30CCRx_{i,y,t}$.

1. Conditional Claim Rate

Our dependent variable is a modification of the common logistic transformation, $\ln(\rho/1-\rho)$ where ρ is the probability that a particular event will occur (in the present case, that a borrower default will result in a claim). In our cell-based model, the probability that a mortgage will end in a claim is best measured by the observed claim rate within a cell. However, the expression $\ln(\rho/1-\rho)$ is undefined in instances with zero claim observations.

To correct for this problem, we employ a logistic transformation developed by Cox.[6] The structure of the Cox transformation variable is given by

$$F30CCRx_{i,y,t} = \ln\left(\frac{claim\ count_{i,y,t} + \frac{1}{2}}{survivor\ count_{i,y,t} - claim\ count_{i,y,t} + \frac{1}{2}}\right). \quad (2)$$

where $claim\ count_{i,y,t}$ refers to the number of loans of LTV category x, of relative house price category I, originated in fiscal year y, that claim in policy year t. $Survivor\ count_{i,y,t}$, similarly indexed, refers to the number of loans which survived into year t.[7] The addition of the constant ½ eliminates the problem of zero observations. The variable $F30CCRx_{i,y,t}$ is a conditional claim rate: thus, it is a measure of how many loans claim in policy year t, conditioned on the fact that they survived into policy year t.

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[6] D. R. Cox, *The Analysis of Binary Data*, Spottiswoode, Ballantyne, & Co., Ltd., London and Colchester, 1970, pp. 30-42.

[7] In the first policy year, when $t = 1$, the survivor count is synonymous with the initial origination volume.

2. Equity Variables

Net equity is meant to reflect the monetary value of a borrower's stake in a property. It is formally defined as the market value of the home less the outstanding mortgage obligations. Borrower equity has demonstrated itself to be the most important indicator of loan performance, as the decision to default will often follow an accumulation of negative equity. The treatment of the role of negative equity is based on the implicit put-option embedded within a standard mortgage. In many cases, this option effectively enables a homeowner to "sell" a house back to the lender for the remaining mortgage balance by simply walking away from the property. If homeowners were to maximize wealth at all times, they might default on their mortgages whenever the resale values of their homes fell below their remaining balances, *i.e.*, whenever they experienced negative equity (assuming there are no transaction costs). However, defaulting on a mortgage carries economic costs such as moving expenses and a negative credit report. It also carries intangible yet non-trivial psychological costs. Moreover, equity need not be negative to increase the likelihood of defaults and claims. While an increase in home owner mobility usually leads to higher prepayment rates, if the events that precipitate greater mobility, such as divorce or job loss, also produce significant changes in household income, higher levels of claim tend to result. When borrowers experiencing these mobility-induced events have little or no equity, they may be unable to sell their properties for a profit and may have insufficient income to meet mortgage payments, resulting in higher claim rates.

Net household equity enters the claim model directly through the market equity index, $EMx_{y,t-1}$ and the "quality" of equity enters through the two underwriting variables that reflect time periods in which equity estimates, due to poor underwriting and inaccurate appraisals, will be more or less subject to bias. The variables $HPDISP_{y,t}$ captures the dispersion of housing market trends among different geographical areas which shape the distribution of $EMx_{y,t-1}$.

I. Market Equity Index[8]

Price Waterhouse's equity index is defined as

$$EMx_{y,t} = 1 + \frac{Mx_y(a_{y,t} - MV1\$_{y,t,T})}{Px_y \prod_{l=y}^{t}(1 + r_l - \delta)} \qquad (3)$$

[8] Similar indices of equity appear in Foster and Van Order," *op. cit.*, and in R. L. Cooperstein, *et al.*, "Modeling Mortgage Terminations in Turbulent Times," *AREUEA Journal*, Vol 19(4), 1991, pp. 473-94.

where $EMx_{y,t}$ is as defined above and

Mx_y	≡	the average total originated amount[9] for loans of LTV category x, originated in fiscal year y, based on a one dollar mortgage,
$a_{y,t}$	≡	the value of the premium refund owed to loans originated in fiscal year y and prepaying in policy year t, expressed as a percent of the total loan amount,
$MV1\$_{y,t,T}$[10]	≡	the value in policy year t of future mortgage payments plus the future prepayment amount of a one dollar mortgage originated in fiscal year y, assuming prepayment in policy year T,[11] all discounted at the prevailing mortgage interest rate,[12]
Px_y	≡	the purchase price of a one dollar property for loans of LTV category x, originated in fiscal year y,
r_l	≡	the national appreciation rate of residential property between years l-1 and l, as measured in the annual rate of growth in the national average house price between the same years, and
δ	≡	rate of depreciation for residential property, set at 0.01.

Thus, our market equity variables captures many of the important determinants of loan performance, including the initial LTV (Mx_y/Px_y) and house price appreciation.

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[9] "Total originated amount" includes the mortgage principal as well as any financed closing costs and upfront premiums. We have estimated financed closing costs to be 2.30% of the principal amount. Financed upfront premiums have varied in the past, from zero (prior to 1984) to 3.80% (from 1984 to the passage of NAHA in 1990) to 3.00% (from NAHA to the present). In the future, we have set financed upfront premiums at 2.25%.

[10] This variable itself has a fairly complicated construction. See Foster and Van Order, "An Option-Based Model of Mortgage Default," *op. cit.*, p. 361 for its precise specification.

[11] Our computations of a mortgage's market value assume, based on historical evidence, that a mortgage will always prepay after policy year T, 40 percent of its remaining life. See Foster and Van Order, "An Option-Based Model of Mortgage Default," *op. cit.*

[12] In our analysis, we use the forecasted values of the FHA effective interest rate as the prevailing market rate.

Because borrowers always have the option of prepaying their mortgages by paying the outstanding principal balance (*i.e.*, the book value of the mortgage $BV1\$_{y,t,7}$), the value of their future payment liabilities (represented by $MV1\$_{y,t,7}$) is constrained to be less than 1.05 times the book value. Analysis of the performance data suggests that any difference greater than 1.05 will usually lead borrowers to refinance rather than default.

The effect of $EMx_{y,t}$ is expected to vary in magnitude depending on the actual dollar size of the loan and the relative price of the home. Home owners with larger loans and higher priced houses are less likely to default because the "option value" of their mortgages increases with their house prices. This is because the default option effectively limits a borrower's potential loss on the property (assuming claim costs do not vary with house price). However, if house prices begin to increase, the potential capital gain to a home owner is greater for a larger loan. Thus, the effect of $EMx_{y,t}$ is expected to be greater for loans in high-loan size or high-price categories.

In the FY 1997 Actuarial Review, we continued to group loans by the relative size of the underlying house as opposed to the size of the loan in real dollars. The relative size is determined by reference to the median house price in the metropolitan statistical area (MSA) or state in which the loan was originated. This method enables our models to capture differences in loan performance between "small" and "large" houses and between similarly priced homes in high- and low-cost areas. Since these relative house price categories are highly correlated with loan size, a house with a large relative price will also be highly likely to have a large loan. Consequently, the effects that loan size might be expected to have on loan performance are largely captured by the effects of relative house price.

A second reason that loan size, or house price, may affect claim rates is that certain transactions costs associated with prepayment do not vary with house price (such as the time and personal expense involved in selling a house). For example, if selling a property incurs costs of $500, regardless of loan size, then a borrower with a $100,000 loan and $2000 in equity may have an incentive to sell and prepay (rather than default) while a home owner with a $20,000 loan and $400 in equity might not (despite having the same relative equity level). To account for both of these phenomena, $EMx_{y,t}$ is interacted with the eight loan size variables, $HPC_{m,t}$.

An alternative explanation for the varying effect of $EMx_{y,t}$ is that house price is correlated with borrower characteristics, such as income and wealth, that are likely to affect the probability of claim. This is the primary reason for classifying houses based on the price relative to the local market.

ii. Underwriting Variables

Loans originated in FYs 1982 through 1986 are more likely to have been subject to a variety of underwriting practices, including interest rate buy-downs and aggresive seller-financing, that result in inflated appraisal or sale amounts. Thus, equity measures constructed for such loans may have been diluted in ways for which we cannot directly account. By contrast, the post-1986 period is marked by more thorough FHA lender monitoring (as evidenced by the greater number of referrals to and sanctions by the Lender Review Board) and greater conservatism in lending practices. As a consequence, the estimated equity levels for loans originated during this period display a stronger negative correlation with claim rates. The two underwriting variables capture this effect.

iii. House Price Dispersion Index

When average property values are rising so that widespread borrower default is not likely, there may still be some borrowers who are at risk if their regional housing market is experiencing falling prices. It is the borrowers in the lower tail of the national house price appreciation distribution (those that experience persistent low or negative rates of house price appreciation) which are at the greatest risk of defaulting and producing claims. Assuming that increased aggregate volatility in house price movements occurs during periods in which there is an increase in properties with poor appreciation rates (*i.e.*, as the variance of the distribution increases, the density mass below zero equity becomes larger), a measure of house price dispersion should indicate the existence of weak regional housing markets where there are likely to be large populations of "at-risk" households.

Price Waterhouse constructed a house price dispersion index $HPDISP_{y,}$, using the national constant quality house price index (CQHPI) provided by the Bureau of the Census and the 51 state house price indices (including Washington, D.C.) provided by Fannie Mae/Freddie Mac. For each origination year y, the national and state house price indices were re-scaled so that they equaled 1.00 in the origination year. We then computed the standard deviation of the re-scaled state indices for each origination year y and policy year t. This value was divided by the rescaled national index to create a measure of relative dispersion in house price appreciation. Deflating by the national index adjusts for the general upward trend in house prices. That is, the index is computed as:

$$HPDISP_{y,t} = \frac{[\sum_{r=1}^{51}(CQDEF_{r,y,t} - \frac{1}{51}\sum_{r=1}^{51} CQDEF_{r,y,t})^2]^{0.5}}{CQDEF_{y,t}} \quad (4)$$

where $CQDEF$ is the CQHPI in policy year t divided by the CQHPI in policy year one.

We project future dispersion based on an autoregressive model that is estimated using historical house price data. First, the dispersion for each policy year across different origination years was averaged to obtain a time series dispersion index. With the earlier origination year in the A-43 data set being 1975, the time series contains 23 observations, one for each policy year. These observations, excluding the last five observations, are then used in an autoregressive time series model to project the dispersion for the remaining policy years (policy years from 19 to 30). The house price dispersions for the future policy years of each book of business are estimated assuming the change from one policy year to the next is the same as that in the time series of average dispersion.

3. Payment Burden Variables

While equity is an important determinant of claim risk, cash flow considerations also play a substantial role in a household's mortgage payment decisions. As mortgage servicing costs absorb a larger fraction of a household's income, the risk of default and eventual claim increases. If a low-income household with limited or negative equity experiences an unexpected drop in income, the household's ability to make mortgage payments will be correspondingly restricted. Furthermore, the low level of equity may prevent the sale of the home. Under such a scenario, we would expect borrowers with high LTV loans to be more susceptible to liquidity-driven claims.

Price Waterhouse has decomposed last year's burden of payment variable to produce the ten $EFFINT_{n,y}$ variables and $PAYMENT_{y,t}$. The $EFFINT_{n,y}$ variables capture the initial payment burden by assuming the value of the effective interest rate at origination. Loans originated with higher interest rates, all else held constant, face higher monthly mortgage payments and thus are more exposed to cash flow pressures. The initial loan size also plays a considerable role in determining the burden of payment. However, house price categories already enter the equation as equity interactions (see above).

Since the mortgage payment is fixed in nominal terms for the life of a mortgage, the fraction of household income necessary to service the loan is likely to decrease as nominal household income increases with inflation and household productivity gains. Thus, as a mortgage seasons, the initial monthly payment burden becomes less influential in determining borrower behavior. This effect is captured by specifying ten $EFFINT_{n,y}$ variables which take the value of the effective interest rate in year y if the loan is observed when policy year (t) falls into the range of time period n and are set to zero otherwise. Essentially, the effective interest rate has been interacted with ten dummy variables that indicate the time over which the mortgage has seasoned. Exhibit A-1 defines the time periods used in constructing the $EFFINT_{n,y}$ variables. By making the later time periods longer, we are able to represent not just the fact that the influence

of effective interest rate tends to die out, but that it does so at a declining rate. In so defining the effective interest rate variables, we are allowing the effect of the initial payment burden to "burn out" over time.

The $EFFINT_{n,y}$ variables also indirectly capture relative changes in the composition of non-equity borrower risk characteristics in each book of business. Higher effective interest rates will, on average, result in fewer mortgages originations, and they will tend to increase FHA's share of the market, since the conventional market's more restrictive debt-to-income ratio requirements are more likely to bind when interest rates are high (conventional lenders have also been reported to more rigorously enforce all underwriting criteria when interest rates are high). Since, at the margin, high risk borrowers will be less likely to be deterred from originating a mortgage in a high-interest rate environment, we might expect that an FHA-insured cohort with a higher effective interest rate will contain a greater density of high-risk borrowers than an FHA-insured cohort with a low effective interest rate.

Exhibit A-1

Definition of $EFFINT_{n,y}$ Time Periods	
Time Period *n*	**Policy Years Covered**
1	1
2	2
3	3
4	4
5	5
6	6-7
7	8-9
8	10-11
9	12-13
10	14 +

As the loan seasons, the variable $PAYMENT_{y,t}$ tracks the subsequent payment burden. $PAYMENT_{y,t}$ is defined as follows:

$$PAYMENT_{y,t} = \frac{DTIR}{\prod_{i=y}^{t}(1 + \Delta MHINC_i)} \quad (5)$$

with $\Delta MHINC_i$ defined as the change in mean household income between the years I and I-1 and $DTIR$ as the initial debt-to-income ratio for a cohort of borrowers. FHA data indicate that the average FHA-insured household allocates approximately 23 percent of its income to meeting its mortgage obligations; we have set $DTIR$ to 0.23.for all borrowers. As better data on FHA debt-to-income ratios for specific borrowers become available, we will adjust the starting value of this variable for specific populations. The denominator of this term increases with mean household income so that $PAYMENT_{y,t}$ declines over time.

4. Adverse Selection Variable

During the life of a book of business, its composition shifts as individual loans default or prepay out of the MMI Fund. In particular, Price Waterhouse recognizes that the population of loans which prepay may differ significantly from the population of borrowers that remain within the Fund. Loans which refinance out of the Fund do so to avoid paying a mortgage insurance premium or to pay a lower one through a private mortgage insurer (PMI). However, in order to do so, such loans are generally required to meet more restrictive qualification standards. Thus, we expect that loans which refinance out of the Fund and therefore meet such standards, will, on average, have higher equity levels, higher incomes, and better credit histories than the population which remains within the MMI Fund. As a book of business matures and the better risk loans refinance out of the Fund, we therefore expect that the overall quality of the book will degrade as a function of refinancing activity. We refer to this phenomenon as "adverse selection."

We have constructed the cumulative prepayment rate variable in order to measure the relative level of refinancing activity experienced by a given loan cohort. The rate captures the degree to which actual refinancing activity exceeds the level that would have occurred had there been no interest rate movements in the period in question.

The values for the cumulative prepayment variable are calculated using a three-step process. First, the conditional prepayment rate model (discussed in more detail below) is estimated. Using the coefficients from the estimated model, we then predict by origination year y and policy year t what prepayment rates would have been had all interest rate variables been kept at constant values. By removing interest rate fluctuations from our model, we are estimating what the

mobility-induced conditional prepayment rates were. From the actual and the mobility-induced conditional rates, we compute estimated cumulative prepayment rates, $ACT\_CMPR_{y,t}$ and $MOB\_CMPR_{y,t}$. Our cumulative prepayment variable is finally defined as

$$CMPPAY_{y,t} = \frac{(1 - ACT\_CMPR_{y,t})}{(1 - MOB\_CMPR_{y,t})} \quad (6)$$

The lower the value of the cumulative prepayment variable, the more likely it is that the cohort in question has been affected by high levels of refinancing activity.

5. Policy Year Variables

Many of the variables in our 30-year FRM claim model are time sensitive and follow discernible trends across time. There remain, however, important yet unobservable determinants of borrower behavior which also change with time measured from endorsement year. Our thirteen policy year dummy variables are intended to represent such intangibles.

In particular, during the first year of a mortgage's life, the likelihood of a claim payment is quite low (if claim seemed imminent within a year, the loan likely would not have been extended). After the first year, default rates steadily increase until they reach a peak around the fourth or fifth policy year. As the mortgage seasons, the probability of claim then decreases. Over time, home owners may develop non-trivial attachments to their properties which lessen the likelihood of default. The policy year variables are intended to capture these and other time-related effects.

B. Claim Model Results

Our claim model coefficient estimates are presented in Exhibit A-2. The results conform to our expectations. Furthermore, based on the values of adjusted-R^2, the models explain a high proportion of the variance in our data.

The negative coefficients of the house price/equity interactions indicate that, as we expected, increases in equity reduce the probability of claim termination within an LTV category. Moreover, the coefficients in Exhibit A-2 indicate that equity exerts a stronger influence in reducing propensity to claim as relative house price increases. This effect was anticipated above. $PAYMENT_{y,t}$ has the expected sign for all but two LTV categories, indicating that as the payment burden increases, so does the likelihood of default. The positive coefficients for $HPDISP_{y,t-1}$ conform with our intuition regarding the volatility of house prices. As the variance of the house price distribution increases, we observe larger levels of claims.

The coefficients of the underwriting variables $EQ82\_86_y$ and $EQPOST86_y$ indicate that for low-LTV borrowers, the quality of underwriting standards did not produce a substantial effect, as indicated by the same signs and/or similar values of the coefficients of the two variables for LTV ratios below 80 percent. For high-LTV borrowers, however, the change in underwriting standards had a noticeable effect. In particular, the positive coefficient values (in some cases, less negative values) for $EQ82\_86_y$ demonstrate that riskier loans tended to be originated during the period between FYs 1982 and 1986. The ten $EFFINT_{n,y}$ variables also behave as expected. After reaching a peak around time period $n = 2$ or $n = 3$, the influence of the effective interest begins to wane.

Finally, the coefficients of $CMPPAY_{y,t}$ carry the expected sign. As the cumulative rate of prepayment increases, the variable $CMPPAY_{y,t}$ becomes smaller (see eq. (6)). The negative coefficients therefore indicate that higher cumulative prepayment rates lead to a greater likelihood of claim termination. Moreover, the effect of $CMPPAY_{y,t}$ decreases for higher-LTV classes where the potential for adverse selection is more remote since fewer of these borrowers will qualify to refinance out of the Fund.

Exhibit A-2

Regression Results for 30-Year FRM Conditional Claim Rate Model by LTV Category
(t-statistics in parentheses)

Variable	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor*
$P_{1,t}$	-3.3090 (-5.9181)	-0.8087 (-1.0682)	-6.4101 (-10.7732)	-9.2010 (-19.7188)	-9.9858 (-20.7913)	-12.4448 (-24.8898)	-14.9722 (-32.2072)	-13.0714 (-30.9745)	-7.1659 (-14.0209)
$P_{2,t}$	-6.8861 (-7.3809)	-2.2803 (-1.4637)	-13.2547 (-10.4028)	-9.4184 (-9.7370)	-9.7828 (-9.8959)	-10.4871 (-10.5343)	-11.0431 (-11.8997)	-12.0886 (-14.4414)	-13.1047 (-12.5005)
$P_{3,t}$	-8.7078 (-9.0273)	-0.3993 (-0.2432)	-10.7322 (-8.0050)	-7.5001 (-7.5474)	-7.0783 (-7.0384)	-8.0381 (-8.0036)	-8.9026 (-9.5624)	-10.2572 (-12.1868)	-9.9576 (-9.0616)
$P_{4,t}$	-8.2909 (-7.9338)	1.3956 (0.8070)	-9.8789 (-7.0308)	-5.7071 (-5.5674)	-5.6826 (-5.4965)	-6.3935 (-6.2381)	-7.3692 (-7.7934)	-9.3330 (-10.8935)	-8.3235 (-7.1833)
$P_{5,t}$	-7.8376 -(6.7781)	3.2101 (1.7652)	-9.7309 (-6.5562)	-5.1287 (-4.7651)	-5.4302 (-4.9812)	-6.0816 (-5.6776)	-6.8322 (-6.9462)	-9.1788 (-10.1309)	-8.2256 (-6.6300)
$P_{6,t}$	-7.2191 (-6.0007)	2.3012 (1.2028)	-11.1139 (-7.0018)	-6.4479 (-5.3592)	-6.7694 (-5.4904)	-7.2865 (-5.9195)	-8.1855 (-7.2149)	-9.6412 (-9.5775)	-8.7447 (-6.5964)
$P_{7,t}$	-7.1277 (-5.9291)	2.2206 (1.1644)	-11.2906 (-7.1329)	-6.6302 (-5.5161)	-6.8884 (-5.5877)	-7.3734 (-5.9843)	-8.3439 (-7.3531)	-9.7718 (-9.7424)	-8.9269 (-6.7546)
$P_{8,t}$	-5.5932 (-4.4270)	1.3339 (0.6733)	-9.1552 (-5.4800)	-7.6129 (-5.6958)	-7.5509 (-5.5600)	-7.0017 (-5.0416)	-8.4725 (-6.6632)	-9.1363 (-8.5805)	-6.5499 (-4.7904)
$P_{9,t}$	-5.5617 (-4.4165)	1.4302 (0.7243)	-9.1975 (-5.5284)	-7.6217 (-5.7250)	-7.4881 (-5.5411)	-7.0393 (-5.0953)	-8.5091 (-6.7279)	-9.1481 (-8.6445)	-6.5744 (-4.8257)
$P_{10,t}$	-5.2631 (-4.3126)	3.4700 (1.7956)	-8.6612 (-5.3350)	-7.0426 (-5.4230)	-8.3278 (-6.3835)	-9.1497 (-6.8708)	-9.4741 (-7.8047)	-10.4978 (-10.4360)	-6.8343 (-5.1587)
$P_{11,t}$	-5.2353 (-4.2957)	3.3045 (1.7179)	-8.6417 (-5.3508)	-7.0957 (-5.4898)	-8.3299 (-6.4169)	-9.0041 (-6.7922)	-9.4720 (-7.8408)	-10.4409 (-10.4432)	-6.7624 (-5.1265)
$P_{12,t}$	-4.2400 (-3.7021)	5.5230 (3.0793)	-8.1509 (-5.5264)	-6.7102 (-5.9274)	-6.8571 (-6.0343)	-7.9202 (-6.8817)	-10.3671 (-9.9917)	-10.2171 (-11.8863)	-8.0448 (-6.7499)
$P_{13,t}$	-4.2204 (-3.6933)	5.7668 (3.2185)	-8.2532 (-5.6006)	-6.8805 (-6.1021)	-6.9961 (-6.1784)	-8.1195 (-7.0904)	-10.4911 (-10.1756)	-10.2698 (-12.0227)	-8.2270 (-6.9164)
$HPC_{1,t}$ * $EMx_{y,t-1}$	-1.8319 (-7.1061)	-2.8361 (-5.9446)	-0.1643 (-0.5897)	-1.7379 (-8.7733)	-2.2224 (-11.6491)	-1.8254 (-9.6655)	-1.4905 (-9.1208)	-2.0462 (-15.3808)	-1.2864 (-6.9232)
$HPC_{2,t}$ * $EMx_{y,t-1}$	-2.9600 (-11.1709)	-2.9966 (-6.2796)	-0.3801 (-1.3320)	-2.2230 (-10.6771)	-2.9687 (-14.5345)	-2.6675 (-13.1966)	-2.3043 (-13.1386)	-3.0026 (-21.1503)	-1.9086 (-9.6408)
$HPC_{3,t}$ * $EMx_{y,t-1}$	-3.3196 (-12.4651)	-3.3927 (-7.2125)	-0.6833 (-2.4779)	-2.7312 (-13.7548)	-3.4192 (-17.9820)	-2.9790 (-15.8513)	-2.5957 (-15.4836)	-3.2787 (-23.2381)	-2.0510 (-10.5780)
$HPC_{4,t}$ * $EMx_{y,t-1}$	-3.8891 (-14.7336)	-4.2396 (-9.1676)	-1.1468 (-4.3593)	-3.2018 (-17.3893)	-3.7968 (-21.7096)	-3.6289 (-21.2055)	-3.1767 (-20.4209)	-3.7416 (-27.3961)	-2.3057 (-12.5015)

$HPC_{5,t}$ * $EMx_{y,t-1}$	-4.2881 (-15.7395)	-4.1810 (-9.0220)	-1.2748 (-4.7912)	-83.4040 (-17.9441)	-4.1074 (-22.7191)	-3.8023 (-21.3064)	-3.6363 (-21.9373)	-4.0490 (-26.5594)	-2.5393 (-13.2638)
$HPC_{6,t}$ * $EMx_{y,t-1}$	-4.4500 (-16.2419)	-4.4757 (-9.7397)	-1.6163 (-6.2159)	-3.6710 (-20.0236)	-4.5113 (-25.9116)	-4.1500 (-24.1043)	-3.7024 (-22.4473)	-4.1595 (-26.5364)	-2.6130 (-13.9641)
$HPC_{7,t}$ * $EMx_{y,t-1}$	-4.6662 (-17.1956)	-4.0901 (-9.0138)	-2.2932 (-9.1401)	-4.2252 (-24.3764)	-4.7860 (-29.0083)	-4.2804 (-26.0801)	-3.8706 (-23.9403)	-4.3582 (-26.8237)	-3.1802 (-18.2525)
$HPC_{8,t}$ * $EMx_{y,t-1}$	-3.8734 (-11.3363)	-4.2764 (-9.0702)	-2.3536 (-7.8326)	-3.4638 (-11.8831)	-3.8619 (-11.4398)	-2.4285 (-6.3661)	-2.9656 (-7.4473)	-4.2079 (-14.2314)	-3.3434 (-12.7935)
$PAYMENT_{y,t}$	12.2475 (3.4647)	-4.627 (-0.8432)	13.896 (2.9799)	1.4884 (0.4019)	-0.1396 (-0.0374)	3.2387 (0.8494)	2.2977 (0.6437)	7.425 (2.3973)	13.0593 (3.5133)
$HPDISP_{y,t-1}$	7.2619 (14.0205)	4.4670 (5.6345)	7.8416 (12.0515)	6.0279 (11.6427)	5.6452 (10.8977)	5.8372 (11.0358)	6.2610 (12.5337)	7.0769 (17.2729)	6.5354 (13.5023)
$EQ82\_86_y$	-0.2393 (-4.1541)	-1.0533 (-14.5542)	0.0234 (0.3953)	0.2976 (6.1661)	0.3303 (6.7816)	0.2133 (4.2165)	0.4028 (8.4764)	0.0916 (2.4555)	0.3833 (8.4788)
$EQPOST86_y$	-0.1552 (-1.7007)	-1.0601 (-13.0204)	0.1328 (2.0234)	-0.0013 (-0.0244)	-0.2485 (-4.8507)	-0.2317 (-4.4983)	-0.1752 (-3.6611)	-0.5488 (-13.8513)	-0.1008 (-2.0223)
$EFFINT_{1,y}$	-0.7119 (-3.2538)	-0.9122 (-3.4857)	-0.1270 (-0.5653)	0.8662 (4.9498)	1.0731 (5.8034)	2.3368 (12.4078)	3.0150 (17.5259)	2.4032 (14.0575)	0.4492 (2.4490)
$EFFINT_{2,y}$	0.6856 (3.1370)	0.8779 (3.3407)	2.3224 (10.2531)	2.0455 (11.6220)	2.2278 (11.9948)	2.4725 (13.0663)	2.5102 (14.4952)	2.6529 (15.3564)	2.9719 (16.0045)
$EFFINT_{3,y}$	1.7524 (7.8508)	0.4054 (1.4410)	1.6399 (6.7847)	1.7052 (9.1486)	1.5566 (7.9646)	1.8915 (9.5110)	2.0306 (11.1520)	2.2448 (12.3527)	2.0863 (10.6053)
$EFFINT_{4,y}$	1.5822 (6.4884)	-0.2521 (-0.8030)	1.3409 (4.9933)	1.0370 (5.0898)	1.0851 (5.1004)	1.3063 (6.0573)	1.4510 (7.3581)	1.8916 (9.6036)	1.4541 (6.6431)
$EFFINT_{5,y}$	1.4265 (5.2794)	-1.0651 (-2.9410)	1.2268 (3.9634)	0.7846 (3.3916)	0.9996 (4.1755)	1.1882 (4.9389)	1.2148 (5.5446)	1.7883 (8.1778)	1.3637 (5.4410)
$EFFINT_{6,y}$	1.1708 (4.6502)	-0.6927 (-1.8536)	1.7428 (5.4255)	1.3179 (5.1673)	1.5425 (5.9197)	1.6870 (6.2656)	1.7655 (7.1735)	1.9297 (8.7798)	1.5343 (6.0615)
$EFFINT_{7,y}$	0.5126 (1.7122)	-0.3793 (-0.8420)	0.8306 (2.1048)	1.7055 (5.0517)	1.7875 (5.2684)	1.5052 (4.1964)	1.7953 (5.5257)	1.6138 (6.0284)	0.4847 (1.6171)
$EFFINT_{8,y}$	0.3831 (1.2550)	-1.1874 (-2.5411)	0.6044 (1.4664)	1.4854 (4.1931)	2.1276 (6.0638)	2.3703 (6.3755)	2.1822 (6.5263)	2.1716 (7.8920)	0.5981 (1.9337)
$EFFINT_{9,y}$	0.0038 (0.0144)	-2.0584 (-5.5384)	0.3829 (1.1898)	1.2875 (4.9165)	1.5053 (5.8501)	1.9136 (7.0906)	2.5128 (10.6100)	2.0366 (10.4085)	1.0864 (4.6697)
$EFFINT_{10,y}$	-0.0011 (-0.0041)	-2.0383 (-5.3875)	0.4500 (1.3755)	1.3329 (5.0269)	1.5284 (5.8807)	1.9135 (7.0175)	2.4557 (10.1958)	2.0035 (10.0513)	1.1706 (4.9625)
$CMPPAY_{y,t}$	-2.3579 (-9.1921)	-2.6062 (-11.4813)	-1.7905 (-8.4372)	-1.4860 (-6.9756)	-0.9881 (-4.4301)	-1.6314 (-6.2175)	-0.8561 (-3.4948)	-0.7096 (-4.5449)	-2.2031 (-8.6472)

Summary of Regression Statistics									
Adjusted-R^2	0.965	0.969	0.973	0.981	0.978	0.980	0.983	0.981	0.977
F-statistic	1705.943	1890.006	2226.597	3154.391	2717.687	3049.925	3594.828	3112.578	2607.138

*Investor loans and loans for dwellings with two or more units.

C. Prepayment Model Specification

Price Waterhouse's prepayment model is specified as follows (as with the claim model, a separate equation is estimated for each of our nine LTV categories):

$$F30CPRx_{i,y,t} = \sum_{l=1}^{13} \alpha_l P_{l,t} + \sum_{m=1}^{8} \gamma_m (HPC_{m,i} \cdot EBx_{y,t-1}) + \sum_{n=1}^{10} \lambda_n EFFINT_{n,y} + \beta_1 MA\_RATE_t + \beta_2 PVDIFPOS_{y,t} + \beta_3 PVDIFNEG_{y,t} + \beta_4 INTRA\_INT_t + \beta_5 ARMSHR_y + \varepsilon_{i,y,t} \quad (7)$$

where

$F30CPRx_{i,y,t}$ ≡ the Cox transformed conditional prepayment rate for 30-year FRMs in LTV category x, of house price i, originated in fiscal year y, and observed in policy year t,

$EBx_{y,t-1}$ ≡ book equity index for loans of LTV category x, originated in fiscal year y, and observed in policy year t-1 (lagged one year),

MA_RATE_t ≡ the ratio of the average FHA contract rate during the last six years to the current FHA contract rate, constrained to a minimum value of one,

$PVDIFPOS_{y,t}$ ≡ the discounted present value of the gain from refinancing at a lower interest rate in policy year t a loan originated in fiscal year y,

$PVDIFNEG_{y,t}$ ≡ the discounted present value of the loss from refinancing at a higher interest rate in policy year t a loan originated in fiscal year y

(the calculation of $PVDIFNEG_{y,t}$ is identical to the calculation of $PVDIFPOS_{y,t}$),

$INTRA\_INT_t$ ≡ an intra-year interest rate variable designed to track intra-year movements in the FHA contract rate, defined as the ratio of the average of the three lowest monthly interest rates in policy year t to the average for all of policy year t, and

$ARMSHR_y$ ≡ the share of the mortgage market in fiscal year y that is composed of ARMs.

$F30CPRx_{i,y,t}$ is analogous to the claim model dependent variable, including the Cox transformation. Independent variables in eq. (7) that are not described above are identical in definition and purpose to those used in the claim model.

Prepayment decisions are generally motivated by one of two factors:

- the necessity or desire to move (due to job loss, divorce, increased wealth, etc.)
- interest rate fluctuations (allowing borrowers to refinance at a lower rate and thus lower their payment burdens)

Variables related to both of these factors are detailed below.

1. Mobility Variables

i. Book Equity

A borrower who is forced to move may either default or prepay. As with the claim model, borrower equity is an important determinant of behavior in such situations. However, since refinancing is no longer an option, the market value of the mortgage $MV1\$_{y,t,7}$ is replaced by $BV1\$_{y,t,7}$, the book value. The resulting variable is referred to as book equity and is formally defined as

$$EBx_{y,t} = 0.94 + \frac{Mx_y(a_{y,t} - BV1\$_{y,t,T})}{Px_y \prod_{l=y}^{t}(1 + r_l - \delta)} \quad (8)$$

with $BV1\$_{y,t,T}$ equal to the book value of the mortgage (*i.e.*, the remaining principal balance on a one dollar mortgage) and all other terms as previously defined. The first term in eq. (3) is replaced with 0.94 to account for transaction costs specifically associated with prepayment, such as costs incurred selling the property.

Consistent with the claim model, the prepayment equity variables are interacted with house price dummy variables $HPC_{m,i}$. The rationale is identical to that expressed above (see, in particular, the discussion of transaction costs in subsection B.1.b.i).

ii. ARM Share[13]

We expect that a borrower will choose the mortgage instrument which best meets the needs of his situation. In particular, we expect that a borrower who anticipates a change of residence and prepayment in the near future will be more likely to take advantage of the lower initial interest rate offered by an ARM. Thus, as the proportion of the mortgage market composed of ARMs grows, we hypothesize that the more mobile home owners will be drawn from the 30-year FRM pool and into the ARM market. The variable $ARMSHR_y$ captures this effect. We expect that as this variable increases, mobility-induced prepayments in the 30-year FRM model will decline.

2. Interest Rate Variables

i. PVDIFxxx$_{y,t}$ *Variables*

The $PVDIFxxx_{y,t}$ variables represent estimates of the present value of the difference in mortgage servicing costs under the current interest rate in year t versus the original mortgage contract rate of a loan originated in year y, net of closing costs. $PVDIFPOS_{y,t}$ represents the potential savings available by refinancing at a lower rate while $PVDIFNEG_{y,t}$ represents the losses associated with

[13] Our inclusion of the "ARM share" variable is based on a discussion in C. Foster and R. Van Order, "Estimating Prepayments," *Secondary Mortgage Markets*, Winter 1990/1, pp. 24-26.

refinancing at a higher rate. We have included two distinct variables to measure gains and losses because their effects should be dissimilar. $PVDIFPOS_{y,t}$ captures the incentive to prepay and refinance the same property. On the other hand, if a borrower anticipates a loss if he refinances, then the effect of $PVDIFNEG_{y,t}$ should be smaller and the borrower will not incur the hassle of refinancing only to obtain a higher monthly payment. In fact, $PVDIFNEG_{y,t}$ actually measures the disincentive to prepay and change residences. As such, it is similar to the mobility variables discussed above while $PVDIFPOS_{y,t}$ is a pure interest rate variable.

ii. Burnout

The predisposition to prepay will vary between individual borrowers in ways which no model, regardless of its sophistication, can completely predict. When interest rates fall below the initial coupon rate for the first time, the borrowers with the highest predisposition to prepay will do so. It follows that the remaining population has a lower average predispostion to prepay and will be less responsive to interest rate fluctuations in later periods. This effect, know in the literature as "burnout,"[14] is captured by the variable MA_RATE_t, the ratio of the average FHA contract rate in the six years prior to t to the current FHA contract rate in year t. If interest rates have been relatively low in the recent past, we expect that books of business may have been "burnt-out."

iii. Intra-year Interest Rate Movements

Intra-year fluctuations in interest rates are no less valid incentives to prepay than longer-term trends. However, such short-term changes can be obscured by a single interest rate variable specified for a given fiscal year. Therefore, we have included the variable $INTRA\_INT_t$ to represent intra-year volatility in interest rates.

D. Prepayment Model Results

Our prepayment model coefficient estimates are presented in Exhibit A-3. As with our conditional claim model, the regression results conform to prior expectations. Also, our goodness-of-fit measures indicate that our prepayment model performs well in explaining the variance in our data.

[14] For a complete discussion of burnout, see A. Davidson and M. Herskovitz, "Analyzing the Path of Dependence in MBSs," *The Handbook of Mortgage-Backed Securities*, Probus Publishing Co., Chicago, pp. 687-718.

The coefficients of the equity variables indicate mixed results for the relationship between the level of equity and the likelihood of prepayment. Higher level of equity does not necessarily lead to higher probability of prepayment, especially for low LTV and low relative house price category loans. However, as LTV increases, the effects of equity on prepayment probability become positive and statistically significant. An increase in a borrower's book equity may be interpreted as an increase in the borrower's overall wealth. Hence, borrowers with higher levels of book equity are better able to prepay their mortgages and "trade up" (*i.e.*, purchase more expensive properties). Since low LTV borrowers can trade up by taking out higher LTV loans, it is expected that the positive relationship between equity and prepayment is more pronounced for the high LTV borrowers.

Similarly, MA_RATE_t carries the expected positive sign. High interest rates in the recent past dampen the effect of burn-out. High interest rates therefore increase the probability of prepayment relative to a cohort which has experienced low interest rates and has consequently been burnt-out.

The $PVDIFxxx_{y,t}$ coefficients work as expected, all with positive coefficients. A positive coefficient on $PVDIFNEG_{y,t}$ may appear counter-intuitive. However, the variable itself is always negative, and thus, when interacted with a positive coefficient, a more negative value (representing a larger absolute loss from refinancing) will decrease the likelihood of prepayment, as expected. Furthermore, $INTRA\_INT_t$ has the expected negative sign, demonstrating that high levels of intra-year interest rates lower the likelihood that borrowers will prepay and refinance.

The $EFFINT_{n,y}$ coefficients are estimated to have negative signs, indicating that borrowers who originate loans in high interest rate environments are less likely to prepay. The interest rate differentials that are needed to induce refinancing are larger for the borrowers with high interest rate loans than those with low interest rate loans. This may be because borrowers anticipate that interest rates are more likely to come down when rates are relatively high.

Exhibit A-3

Regression Results for Conditional Prepayment Rate Model by LTV Category
(t-statistics are in parentheses)

Variable	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor
$P_{1,t}$	-4.0243 (-6.7642)	-6.7651 (-16.2402)	-4.3140 (-9.9845)	-4.3168 (-11.1278)	-4.4963 (-10.5164)	-3.3618 (-7.5444)	-3.4162 (-8.1461)	-4.2030 (-9.5282)	-6.8122 (-14.5870)
$P_{2,t}$	0.7081 (1.2022)	-5.0958 (-12.1664)	-3.9111 (-8.9878)	-2.3242 (-5.9404)	-1.7529 (-4.0791)	-0.2309 (-0.5171)	0.3874 (0.9212)	-0.3345 (-0.7513)	-4.1527 (-8.8880)
$P_{3,t}$	4.2838 (7.6871)	-4.2989 (-10.0589)	-2.7396 (-6.0904)	-0.7879 (-1.9782)	-0.1345 (-0.3078)	1.2813 (2.8375)	2.1428 (5.0648)	2.0606 (4.5184)	-2.6400 (-5.3751)
$P_{4,t}$	4.4091 (7.8749)	-4.1595 (-9.4605)	-2.4814 (-5.2989)	-1.0191 (-2.4647)	0.0815 (0.1786)	1.0975 (2.3050)	1.8494 (4.1471)	3.0618 (6.3848)	-1.9453 (-3.7376)
$P_{5,t}$	4.9380 (8.0682)	-3.5041 (-7.1858)	-1.8621 (-3.5472)	-0.8656 (-1.8732)	0.2290 (0.4539)	1.2522 (2.3950)	1.6221 (3.3146)	2.7941 (5.2991)	-0.8420 (-1.4783)
$P_{6,t}$	4.1911 (6.9442)	-1.1308 (-2.3616)	0.0051 (0.0098)	-0.2254 (-0.4510)	0.7121 (1.3051)	1.2091 (2.0521)	2.0184 (3.5985)	2.8087 (5.0910)	0.4001 (0.7277)
$P_{7,t}$	5.4966 (9.8427)	2.2168 (5.1715)	3.2383 (6.8603)	2.8623 (6.1603)	3.2393 (6.3415)	3.6846 (6.6298)	4.7028 (8.8673)	4.3168 (8.3156)	2.9237 (5.8808)
$P_{8,t}$	4.9407 (7.6234)	3.6837 (7.1642)	4.1441 (7.3088)	3.7781 (6.3651)	3.5932 (5.5720)	4.0931 (5.6342)	5.1127 (7.3805)	4.8114 (7.4765)	4.0541 (7.0981)
$P_{9,t}$	4.8754 (7.5770)	3.4277 (6.6467)	3.8979 (6.8691)	3.5803 (6.0340)	3.4801 (5.4056)	3.9978 (5.5123)	4.9936 (7.2162)	4.7423 (7.3831)	3.8613 (6.7675)
$P_{10,t}$	4.2499 (6.4503)	1.2662 (2.1151)	3.0136 (4.6739)	4.0417 (6.1465)	4.5881 (6.5674)	5.1727 (6.6193)	5.6407 (7.5456)	5.0756 (7.4376)	3.8159 (5.9757)
$P_{11,t}$	4.0991 (6.2292)	1.1463 (1.9135)	2.9382 (4.5604)	3.9967 (6.0858)	4.5599 (6.5386)	5.1202 (6.5641)	5.5845 (7.4797)	5.0187 (7.3650)	3.8107 (5.9738)
$P_{12,t}$	3.2096 (5.6749)	3.1038 (5.7783)	4.6092 (8.3127)	4.3341 (8.1155)	4.1894 (7.5162)	4.7554 (7.7116)	4.8917 (8.3488)	3.9847 (7.5640)	4.6445 (8.5938)
$P_{13,t}$	3.0831 (5.4928)	3.0919 (5.7282)	4.5940 (8.2460)	4.3400 (8.1458)	4.2152 (7.5963)	4.7219 (7.7075)	4.8969 (8.4189)	3.9650 (7.5808)	4.6671 (8.6126)
$HPC_{1,t}$ * $EBx_{y,t-1}$	0.2738 (1.2408)	-0.7933 (-3.0449)	-0.4397 (-2.2559)	-0.6024 (-3.5005)	-0.5181 (-2.9274)	-0.3047 (-1.6084)	-0.4394 (-2.5651)	-0.1807 (-1.2715)	-1.2611 (-7.2728)
$HPC_{2,t}$ * $EBx_{y,t-1}$	0.6217 (2.7494)	-0.6473 (-2.4854)	-0.2560 (-1.2929)	-0.3150 (-1.7680)	-0.1873 (-1.0094)	0.0351 (0.1769)	-0.0976 (-0.5428)	0.1587 (1.0592)	-0.8790 (-4.8392)
$HPC_{3,t}$ * $EBx_{y,t-1}$	0.6769 (2.9743)	-0.5081 (-1.9752)	-0.1538 (-0.7966)	-0.1711 (-0.9929)	-0.0887 (-0.5023)	0.1210 (0.6402)	-0.0086 (-0.0490)	0.2559 (1.7190)	-0.7999 (-4.4767)

$HPC_{4,t}$ * $EBx_{y,t-1}$	0.7540 (3.3387)	-0.4638 (-1.8293)	0.0200 (0.1071)	-0.0553 (-0.3380)	0.0349 (0.2100)	0.2482 (1.4015)	0.1832 (1.1060)	0.3863 (2.6751)	-0.6789 (-3.9538)
$HPC_{5,t}$ * $EBx_{y,t-1}$	0.8252 (3.5463)	-0.4024 (-1.5846)	0.1242 (0.6619)	0.0371 (0.2224)	0.1347 (0.7923)	0.3304 (1.8136)	0.2871 (1.6662)	0.4950 (3.1543)	-0.5514 (-3.1334)
$HPC_{6,t}$ * $EBx_{y,t-1}$	0.8314 (3.5596)	-0.3635 (-1.4413)	0.1935 (1.0505)	0.1337 (0.8207)	0.2500 (1.5114)	0.4950 (2.7958)	0.3824 (2.2368)	0.6618 (4.1621)	-0.4835 (-2.7962)
$HPC_{7,t}$ * $EBx_{y,t-1}$	0.7800 (3.3729)	-0.3586 (-1.4415)	0.3296 (1.8506)	0.2309 (1.4786)	0.3311 (2.0906)	0.6086 (3.5697)	0.6030 (3.5783)	0.7360 (4.5016)	-0.5879 (-3.5931)
$HPC_{R,t}$ * $EBx_{y,t-1}$	-0.9492 (-3.2460)	-1.3697 (-5.2952)	-1.4047 (-6.7630)	-1.6356 (-6.9889)	-1.7270 (-6.0268)	-1.6410 (-4.7328)	-2.0081 (-5.4431)	-1.7674 (-6.0928)	-2.3238 (-9.6794)
MA_RATE_t	1.7536 (7.1846)	3.4705 (17.3411)	3.3070 (15.8858)	3.2450 (16.1116)	2.7640 (13.0897)	2.7545 (12.1786)	2.9474 (13.4824)	1.7096 (8.4327)	2.5560 (12.2959)
$PVDIFPOS_{y,t}$	12.4527 (19.5055)	13.0089 (27.4285)	16.6918 (32.2256)	19.6776 (36.9293)	22.0610 (37.9173)	22.6719 (35.1084)	22.4427 (36.5312)	22.4664 (39.3683)	17.2787 (32.8762)
$PVDIFNEG_{y,t}$	15.3630 (29.3342)	7.6402 (15.5043)	8.9060 (17.5004)	9.6503 (20.0012)	9.9120 (19.9080)	9.6991 (18.2316)	9.2104 (17.8897)	9.7327 (20.6816)	8.0582 (15.8102)
$INTRA\_INT_t$	-2.5195 (-6.5911)	-0.4740 (-1.7547)	-1.4808 (-5.3695)	-1.3491 (-5.2417)	-0.9522 (-3.4067)	-1.6281 (-5.5549)	-1.8774 (-6.7951)	-1.0666 (-3.9185)	-1.0145 (-3.4738)
$EFFINT_{1,y}$	-0.2853 (-1.5718)	-0.1208 (-0.8844)	-0.9104 (-6.0889)	-1.1660 (-8.3847)	-1.2529 (-8.0080)	-1.5721 (-9.3794)	-1.5229 (-9.6354)	-0.9669 (-5.7524)	0.1680 (1.0261)
$EFFINT_{2,y}$	-1.4686 (-8.0528)	-0.1892 (-1.3505)	-0.4589 (-2.9834)	-1.3074 (-9.0871)	-1.6294 (-10.1085)	-2.0831 (-12.0725)	-2.3441 (-14.3973)	-1.8452 (-10.6923)	-0.2895 (-1.7202)
$EFFINT_{3,y}$	-2.7287 (-14.7400)	-0.3977 (-2.6818)	-0.8192 (-5.0232)	-1.7445 (-11.4794)	-2.0384 (-11.9447)	-2.4207 (-13.2238)	-2.8002 (-16.2391)	-2.5770 (-14.1414)	-0.7618 (-4.2200)
$EFFINT_{4,y}$	-2.6442 (-12.8991)	-0.4626 (-2.7547)	-0.9051 (-4.9291)	-1.5824 (-9.2870)	-2.0281 (-10.7212)	-2.2374 (-11.0419)	-2.5672 (-13.4996)	-2.8796 (-14.4522)	-0.9990 (-5.0804)
$EFFINT_{5,y}$	-2.8736 (-12.8175)	-0.7726 (-4.1047)	-1.1939 (-5.8093)	-1.6666 (-8.8085)	-2.1080 (-10.1250)	-2.3219 (-10.4748)	-2.4722 (-11.9020)	-2.7561 (-12.4637)	-1.4467 (-6.6983)
$EFFINT_{6,y}$	-2.5725 (-13.5493)	-1.7866 (-10.6331)	-2.0085 (-10.8497)	-1.9748 (-10.5770)	-2.3399 (-11.4563)	-2.3306 (-10.2530)	-2.6647 (-12.3087)	-2.7815 (-13.3111)	-1.9832 (-10.4932)
$EFFINT_{7,y}$	-2.3745 (-10.4005)	-2.3648 (-11.0834)	-2.3709 (-10.0897)	-2.3356 (-9.5539)	-2.4678 (-9.4361)	-2.4955 (-8.3907)	-2.8325 (-9.9418)	-2.9926 (-11.4772)	-2.4146 (-10.3586)
$EFFINT_{8,y}$	-2.1215 (-8.4455)	-1.5229 (-6.1806)	-2.0746 (-7.6764)	-2.5850 (-9.3874)	-2.9955 (-10.3057)	-3.0372 (-9.2847)	-3.1271 (-9.9804)	-3.1625 (-11.1193)	-2.4362 (-9.2042)
$EFFINT_{9,y}$	-1.7660 (-9.4038)	-2.3675 (-12.3893)	-2.8120 (-13.6581)	-2.7642 (-13.5775)	-2.8720 (-13.4451)	-2.8968 (-12.0657)	-2.8532 (-12.5485)	-2.7452 (-13.5657)	-2.8141 (-14.1335)
$EFFINT_{10,y}$	-1.7749 (-9.3319)	-2.3596 (-12.0958)	-2.7958 (-13.2702)	-2.7494 (-13.2127)	-2.8483 (-13.0685)	-2.8713 (-11.7373)	-2.8250 (-12.1933)	-2.6938 (-13.0889)	-2.7811 (-13.6365)
$ARMSHR_y$	0.0001 (0.0685)	-0.0068 (-11.3723)	-0.0082 (-12.6475)	-0.0088 (-13.4108)	-0.0096 (-13.2527)	-0.0099 (-12.6642)	-0.0099 (-13.7107)	-0.0075 (-11.0442)	-0.0074 (-11.0645)

Summary Regression Statistics									
Adjusted-R^2	0.959	0.961	0.961	0.968	0.965	0.964	0.969	0.967	0.961
F-statistic	1449.769	1527.311	1524.143	1848.245	1688.673	1658.266	1945.878	1786.326	1529.136

*Investor loans and loans for dwellings with two or more units.

E. Simulating Loan Performance

We used the estimated econometric claim and prepayment models to simulate the history of loan performance and to develop projections of future loan performance under alternative economic scenarios. The historical simulation analysis can be used to evaluate how well the models predict claims and prepayments across the loan categories and over the policy years. The forecast analysis develops conditional claim and prepayment rates and, in turn, projections of the number of claims and prepayments from FY 1997 forward for each of the defined loan categories and for each origination year from FY 1975 through FY 1997.

1. Simulation of Historical Claims and Prepayments

We conducted a simulation of the number of claims and prepayments across the historical period from FY 1975 to FY 1997 to evaluate the ability of the models to explain and forecast the conditional claim and prepayment rates. Actual survivor data are used for the first policy year and estimated values are used thereafter. The predicted conditional probability rates multiplied by the estimated loan survivor rates at the beginning of the policy year yield a predicted number of claims and prepayments in that policy year. The survivors less the sum of claim and non-claim terminations for each year yield a projection of the number of loans that survive to the beginning of the next policy year.

It would be useful to have a measure of the accuracy of the econometric models' predictions for the years beyond the sample period (the "out-sample" accuracy). By definition it is not possible to evaluate predictive accuracy for future periods. However, we can approximate that test by examining the models' accuracy within the estimation period (the "in-sample" accuracy). Because the models were estimated on these years, generally we would expect the accuracy over the in-sample period to be greater than the accuracy in the out-sample period.

Predictive accuracy is determined by comparing the predicted numbers of claims and prepayments across selected categories of loans. Exhibits A-4 and A-5 report the results for in-sample accuracy tests classifying the data according to LTV category, house price category, and loan termination year. In aggregate, the model simulation predicts total claims to be 98 percent of the actual value and total prepayments to be 104 percent of the actual value. Both models

Exhibit A-4

Simulation of 30-Year FRM Claims and Prepayments for the Period 1975-1997 By House Price and LTV Categories
(Across all Origination and Termination Years)

LTV Category	Number of Claims			Number of Prepayment		
	Actual	Estimated	Estimated/ Actual	Actual	Estimated	Estimated/ Actual
Unknown LTV	52318	49343	94	299958	312048	104
0-65%	4688	5526	118	141948	147381	104
65-80%	21866	21597	99	337681	350824	104
80-90%	50115	48369	97	502240	524440	104
90-93%	48094	46594	97	395602	412020	104
93-95%	52314	51212	98	403259	420457	104
95-97%	136678	132657	97	863119	903846	105
97-100%	294653	290068	98	1506658	1573080	104
Investor*	88996	86786	98	459717	475507	103
House price						
1	166534	149491	90	580263	677958	117
2	88870	81028	91	426134	472251	111
3	93103	88211	95	518607	556757	107
4	130753	125979	96	868249	903744	104
5	81632	82114	101	627848	635017	101
6	88276	91326	103	757383	755049	100
7	96187	105884	110	1082075	1072164	99
8	4367	8119	186	49622	46664	94
Total	749,722	732,152	98%	4,910,181	5,119,604	104%

*Investor loans and loans for dwellings with two or more units.

Exhibit A-5

Simulation of 30-Year FRM Claims and Prepayments by Termination Year
(Across all House Price and LTV Categories)

Termination Year	Number of Claims			Number of Prepayments		
	Actual	Estimated	Estimated/ Actual	Actual	Estimated	Estimated/ Actual
1975	110	81	74	380	720	189
1976	1725	1033	60	4120	5664	137
1977	4314	2852	66	20641	23283	113
1978	5044	4990	99	43487	29950	69
1979	5210	5882	113	52794	27472	52
1980	5352	7653	143	30485	18280	60
1981	7629	8895	117	18407	12531	68
1982	10596	11347	107	9354	13996	150
1983	17480	12505	72	60395	35147	58
1984	18969	21263	112	48108	48251	100
1985	25963	26371	102	62963	76161	121
1986	34383	40002	116	265593	266936	101
1987	48174	56032	116	356259	434188	122
1988	64070	56318	88	159908	156571	98
1989	64893	50124	77	145059	166805	115
1990	60020	52311	87	182010	201221	111
1991	60690	57387	95	220204	262447	119
1992	64301	68563	107	536552	587381	109
1993	62566	71914	115	1008015	1014091	101
1994	57650	56553	98	827301	672103	81
1995	48118	47552	99	234375	287562	123
1996	41031	40019	98	356045	413707	116
1997	41434	32504	78	267726	335136	125
Total	749,722	732,152	98%	4,910,181	5,119,603	104%

perform well in predicting claims and prepayments across LTV and house price categories. Across termination years, however, their accuracy is somewhat more volatile. In particular, claims are overestimated and prepayments underestimated during periods of heavy refinancing activity prior to FY 1988 This is caused by the unavailability of information that would allow us to identify and separately model refinancing loans prior to that year. During the most recent refinancing wave (FYs 1992 to 1994), the models' accuracy is considerably better.

2. Forecasting Future Conditional Claim and Prepayment Rates

Price Waterhouse's method for estimating future termination rates is similar to the methodology for developing in-sample predictions. Based on our projections of future economic and policy variables,[15] the models are used to estimate future claim and prepayment rates. Our forecasts, beginning with the FY 1998 policy year, use actual counts of surviving loans to the start of FY 1998 and estimated survivor counts thereafter. For future books of business, origination volumes and counts are estimated as explained in Appendix F.

After an initial survivor count is established, the estimated conditional claim and prepayment rates are applied to the number of survivors at the beginning of a policy year to estimate how many will claim during that period. These terminations are subtracted from the original count to estimate the number of survivors into the next time period. The process is then repeated through the 30th policy year. Complete forecasts of our base-case conditional claim and prepayment rates are reported in Appendix G. A summary is provided in Exhibits A-6 and A-7 where claim and prepayment rates, respectively, for the books of business from FYs 1990 through 1998 are displayed for their first eleven policy years. Ultimate claim and prepayment rates are also provided.

[15] Price Waterhouse's methodology for estimating future economic and policy conditions is discussed in detail in Appendix E.

Exhibit A-6

Forecast of Conditional Claim Rates for 30-Year FRMs for FYs 1990 through 1998

Policy Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	0.007	0.011	0.008	0.006	0.002	0.004	0.004	0.003	0.016
2	0.343	0.355	0.238	0.173	0.188	0.281	0.017	0.251	0.222
3	1.168	1.217	0.837	0.615	0.671	1.011	0.610	0.730	0.729
4	1.728	1.933	1.313	0.906	1.075	0.881	0.803	1.069	1.167
5	2.283	2.341	1.276	1.162	0.809	0.869	0.881	1.246	1.420
6	2.432	1.975	1.445	0.664	0.670	0.793	0.848	1.241	1.365
7	1.974	2.019	0.905	0.554	0.611	0.769	0.842	1.212	1.334
8	1.980	1.328	0.793	0.542	0.622	0.807	0.866	1.236	1.333
9	1.819	1.215	0.767	0.557	0.651	0.841	0.888	1.225	1.278
10	1.558	1.065	0.686	0.491	0.592	0.757	0.772	1.028	1.016
11	1.517	1.070	0.725	0.518	0.617	0.772	0.758	0.988	0.981
Ultimate	9.331	7.680	6.726	5.547	6.764	6.783	7.334	9.383	8.639

Source: A-43 database, June 30, 1997 extract.

Exhibit A-7

Forecast of Conditional Prepayment Rates for 30-Year FRMs for FYs 1990 through 1998

Policy Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	0.381	0.373	0.363	0.631	0.300	1.718	0.378	0.426	0.385
2	2.062	5.457	7.271	4.036	1.994	8.469	1.848	2.164	2.675
3	9.715	25.925	16.646	3.947	6.043	5.914	4.118	4.682	6.780
4	29.448	29.845	6.331	7.210	5.422	6.162	5.458	6.755	9.801
5	29.363	7.844	10.672	6.537	4.501	6.218	6.164	7.215	9.151
6	8.269	12.718	8.346	7.437	4.539	7.286	6.449	6.769	8.842
7	12.479	9.477	9.333	9.822	6.249	9.281	7.509	8.013	10.586
8	9.361	12.325	9.960	11.705	6.974	9.564	8.085	8.791	11.865
9	9.258	10.611	9.874	10.754	6.152	8.376	7.254	7.988	10.591
10	8.177	10.876	10.167	10.764	6.028	8.201	7.189	7.828	10.273
11	8.322	10.524	9.247	10.246	5.814	7.889	6.864	7.335	9.574
Ultimate	84.792	87.917	86.640	89.047	76.782	82.601	79.725	79.591	85.165

Source: A-43 database, June 30, 1997 extract.

In this Review, the forecasted claim and prepayment rates for all books of business and all policy years have been estimated by the same set of econometric models. As the model captures the general trend of all observations with different book and policy year combinations,

the estimates fit some observations better than others. Outliers may be found which the model cannot estimate as accurately. One example is the prepayment rate forecasts of the FY 1982 book of business. Due to the extremely high mortgage contract rates, the model estimates high prepayment rates. The FY 1982 book, however, has experienced unusually low prepayment rates during the past several years. Since over 90 percent of this book of business has already been terminated, a small difference in prepayment volume may cause a large change in prepayment rates. We realize that while the model may overestimate the prepayment rate for the next few years, given the low remaining volume, the financial impact on the fund would be immaterial.

Alternative estimates of future economic and policy variables may be substituted to simulate the future performance of loans under a variety of scenarios and to determine the sensitivity of the projections to changes in select components of our forecasts.

III. 15-Year Fixed-Rate Mortgages

Price Waterhouse estimates 15-year FRM termination rates as functions of the corresponding 30-year FRM termination rates. While conceptually much simpler than the 30-year models, the 15-year FRM models nevertheless acquire much of the explanatory power of the former.

Our choice of methodology reflects the fact that the conditional claim and prepayment rates of 15-year FRMs closely follow the conditional claim and prepayment rates of 30-year FRMs. Since both mortgage types face a fixed interest rate environment, the factors affecting the latter are similar to those affecting the former. However, because 15-year FRMs amortize more quickly than 30-year FRMs, we expect the 15-year mortgages to have lower claim rates. In addition, we anticipate prepayment rates will be lower for 15-year FRMs since the benefit of refinancing at a lower interest rate is less than the benefit of refinancing a 30-year mortgage, owing to both a smaller principle balance and a shorter remaining life.

We classified 15-year FRMs as loans with a term of 15 years or less. As with the 30-year models, our 15-year models are based on an aggregate cell-based approach with cells defined across three dimensions:

- amortization year (the fiscal year in which the first mortgage payment is made)
- policy year
- initial LTV.

Unlike the 30-year FRMs, we do not distinguish between the house price categories due to the high frequency of zero claims and prepayments which would have resulted if the data had been divided into the usual eight categories. Furthermore, limitations in the number of observations in earlier years led us to use only FYs 1985 through 1997 in our regression analysis. As with the 30-year FRM models, a separate regression is performed for each of our nine LTV categories.

A. Model Specifications

The claim and prepayment models are specified as

$$F15CCRx_{y,t} = \alpha_{CCR} + \beta_{CCR} F30CCRx_{y,t} + \varepsilon_{CCR,y,t} \quad (9a)$$

$$F15CPRx_{y,t} = \alpha_{CPR} + \beta_{CPR} F30CPRx_{y,t} + \varepsilon_{CPR,y,t} \quad (9b)$$

with $F15CCRx_{y,t}$ defined as the conditional claim rate for 15-year FRMs of LTV category x, originated in fiscal year y and observed in policy year t. The other dependent variable and the two independent variables are defined analogously. Because one rate is regressed directly on another, the Cox transformation is unnecessary. Hence all rates, including the 30-year FRM regressors, are defined strictly as the number of claim and prepayments in a cell divided by the initial number of loans in the cell.

B. Model Results

The estimates of the coefficients of the claim and prepayment models are presented in Exhibits A-8 and A-9, respectively. These results indicate that 30-year FRM loans and 15- year FRM loans have more similar patterns of prepayment than claim behavior as the R^2s of the 15- year FRM prepayment models are consistently higher than those of the 15- year FRM claim models.

Exhibit A-8

Regression Results for 15-Year FRM Conditional Claim Rate Model by LTV Category
(t-statistics in parentheses)

Variable	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor*
Constant	-0.0020 (-1.3722)	0.0000 (0.1118)	-0.0003 (-1.6233)	-0.0008 (-2.6451)	-0.0002 (-0.4666)	-0.0012 (-1.7414)	-0.0016 (-2.4833)	-0.0021 (-3.9356)	-0.0004 (-1.1181)
$F30CCRx_{y,t}$	0.3921 (9.1730)	0.1569 (9.2259)	0.2713 (16.5573)	0.3827 (22.5960)	0.3675 (15.3314)	0.4727 (14.1839)	0.4911 (19.2642)	0.5138 (26.9138)	0.3334 (24.6074)
Summary Regression Statistics									
R^2	0.411	0.414	0.697	0.811	0.663	0.627	0.757	0.859	0.836
F-statistic	84.144	85.118	274.143	510.581	235.051	201.182	371.110	724.355	605.526

*Investor loans and loans for dwellings with two or more units.

Exhibit A-9

Regression Results for 15-Year FRM Conditional Prepayment Rate Model by LTV Category
(t-statistics in parentheses)

Variable	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor*
Constant	0.0299 (3.5519)	0.0173 (3.9120)	0.0163 (4.2036)	0.0205 (5.2679)	0.0209 (5.6530)	0.0203 (5.8236)	0.0195 (6.2820)	0.0186 (5.6859)	0.0117 (3.5311)
$F30CPRx_{y,t}$	0.7079 (12.5914)	0.7605 (24.0577)	0.7878 (27.8811)	0.7978 (27.9218)	0.8019 (29.0078)	0.8208 (30.0860)	0.8060 (31.4714)	0.8409 (29.2406)	0.8883 (32.0497)
Summary Regression Statistics									
R^2	0.570	0.829	0.867	0.867	0.876	0.884	0.893	0.878	0.896
F-statistic	158.545	578.774	777.357	779.626	841.450	905.167	990.451	855.011	1027.181

*Investor loans and loans for dwellings with two or more units.

3. Simulating Loan Performance

We used the estimated econometric models for conditional claim rates and conditional prepayment rates to simulate the history of loan performance and to develop projections of future loan performance, similar to the process used for 30-year FRMs.

1. Simulation of Historical Claims and Prepayments

We conducted this analysis using the same method we had used for 30-year FRMs. The results from this analysis yielded an in-sample prediction rate of 91 percent for claims and 100 percent for prepayments. Exhibit A-10 shows the breakdown of the predicted versus the actual claim and prepayment counts across all LTV categories.

Exhibit A-10

Simulation of 15-Year FRM Claims and Prepayments for the Period 1983-1997 By House Price and LTV Categories
(Across all Origination and Termination Years)

LTV Category	Number of Claims			Number of Prepayments		
	Actual	Estimated	Estimated/ Actual	Actual	Estimated	Estimated/ Actual
Unknown LTV	508	570	112	8824	8488	96
0-65%	283	241	85	43327	43377	100
65-80%	981	882	90	50589	50683	100
80-90%	1624	1425	88	41566	41788	101
90-93%	941	835	89	16611	16613	100
93-95%	877	762	87	12378	12403	100
95-97%	2072	1779	86	23220	23360	101
97-100%	3586	3206	89	35376	35949	102
Investor*	2536	2516	99	39175	38674	99
Total	13,408	12,216	91%	271,066	271,335	100%

*Investor loans and loans for dwellings with two or more units.

Examining the actual versus predicted claim and prepayment counts for each termination year reveals comparable results to the chart above as seen in Exhibit A-11. Due to the limited number of loans in earlier years, the model's in-sample predictions during this period are less accurate than in later years.

Exhibit A-11

Simulation of 15-Year FRM Claims and Prepayments by Termination Year
(Across all House Price and LTV Categories)

Termination Year	Number of Claims			Number of Prepayments		
	Actual	Estimated	Estimated/ Actual	Actual	Estimated	Estimated/ Actual
1983	3	0	0	76	815	1072
1984	59	33	56	427	1397	327
1985	272	215	79	1150	2680	233
1986	616	460	75	9472	14438	152
1987	1099	858	78	20092	22117	110
1988	1675	1375	82	10399	12157	117
1989	1670	1429	86	10792	11842	110
1990	1473	1243	84	14353	13997	98
1991	1364	1155	85	17413	16192	93
1992	1335	1118	84	34294	31771	93
1993	1085	1041	96	49844	50835	102
1994	955	1002	105	44349	43162	97
1995	734	870	119	17457	14711	84
1996	581	711	122	22303	19551	88
1997	488	703	144	18646	15669	84
Totals	13,409	12,215	91%	271,067	271,334	100%

2. Forecasting Future Claims and Prepayments

As with the 30-year FRM models, the 15-year FRM models are used to forecast conditional claim and prepayment rates over the term life of the mortgage. Exhibits A-12 and A-13 show conditional claim and prepayment rates for books of business FYs 1990 through 1998 for the first eleven policy years. Ultimate claim and prepayment rates are also provided.

Exhibit A-12

Forecast of Conditional Claim Rates for 15-Year FRMs for FYs 1990 through 1998

Policy Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	0.000	0.000	0.000	0.004	0.000	0.010	0.000	0.000	0.002
2	0.150	0.129	0.078	0.055	0.060	0.120	0.054	0.012	0.010
3	0.516	0.402	0.406	0.235	0.183	0.353	0.131	0.173	0.166
4	0.612	0.632	0.340	0.294	0.292	0.234	0.212	0.302	0.332
5	0.678	0.609	0.372	0.269	0.206	0.236	0.245	0.366	0.426
6	0.677	0.413	0.380	0.164	0.161	0.210	0.231	0.360	0.400
7	0.490	0.498	0.255	0.124	0.140	0.200	0.226	0.347	0.385
8	0.391	0.415	0.216	0.120	0.143	0.213	0.233	0.355	0.385
9	0.568	0.378	0.211	0.127	0.155	0.228	0.243	0.357	0.375
10	0.491	0.336	0.193	0.120	0.153	0.215	0.224	0.319	0.318
11	0.476	0.334	0.206	0.128	0.158	0.217	0.215	0.301	0.302
Ultimate	3.149	2.479	1.934	1.345	1.486	1.833	1.717	2.349	2.263

Source: A43 database, June 30, 1997 extract.

Exhibit A-13

Forecast of Conditional Prepayment Rates for 15-Year FRMs for FYs 1990 through 1998

Policy Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	0.584	0.670	0.644	0.789	0.779	1.171	0.734	0.561	2.350
2	2.859	4.750	6.337	4.955	3.006	6.235	2.947	3.979	4.409
3	9.200	18.963	13.933	5.785	6.265	6.495	5.301	5.807	7.394
4	23.011	24.762	8.166	8.661	6.106	6.642	6.090	7.133	9.157
5	24.450	9.558	12.106	8.300	5.360	6.676	6.645	7.505	8.706
6	9.324	12.829	10.659	7.674	5.565	7.690	7.097	7.405	8.853
7	13.046	11.158	9.900	10.272	7.587	9.920	8.575	9.114	11.131
8	11.256	12.590	10.712	12.352	8.590	10.522	9.412	10.158	12.714
9	9.718	10.695	10.205	11.012	7.398	9.025	8.215	8.889	10.883
10	8.531	10.495	9.942	10.246	6.780	8.327	7.630	8.129	9.804
11	8.536	10.141	9.195	9.785	6.538	7.981	7.294	7.649	9.173
Ultimate	78.853	81.097	75.311	73.341	60.021	67.635	63.237	65.726	73.187

Source: A-43 database, June 30, 1997 extract.

Appendix B: Econometric Analysis of Adjustable Rate Mortgages

This appendix describes the econometric analysis we have performed on adjustable-rate mortgages (ARMs) insured by the MMI Fund. It presents the framework underlying the econometric models, provides descriptions of the model specifications, and reviews their goodness-of-fit.

I. General Approach and Data Limitations

FHA began insuring ARMs in 1984, issuing 19 loans worth $1.2 million that year. Although the number of loans increased to 587 in 1985, it was not until 1986 that volumes moved into the thousands of loans, and not until 1992 that more than $2 billion in ARMs were issued. Thus, there is relatively limited data on ARMs, and the available data is heavily skewed towards recent originations.

Our ARM modeling approach follows that described in the previous section on fixed-rate mortgages (FRM). We developed a cell-based model with which to estimate ARM claim and prepayment rates by dividing loans into cells by book of business, policy year, house price category, and initial LTV category. Each cell was then treated as an individual observation in our analysis.

Unlike the 30-year FRM equations, the ARM equations could not be estimated for individual LTV categories since there was not a sufficient number of observations. Instead, we estimated a single ARM equation for all LTV categories, differentiating the cells in the model by initial LTV category and adding LTV dummy variables to allow for different claim responses for loans with different initial LTVs. Due to the limitations in the number of observations in each cell, we limited the number of initial house price categories used in the regressions to two -- initial house price categories 1 through 4 were combined, and 5 through 8 were combined. Additionally, the number of initial LTV cell categories was reduced to two -- loans with LTV ratios less than 90 percent, and loans with LTV ratios greater than 90 percent or with unknown LTVs.

In addition to the limitations placed on the LTV and house price categories, cells with fewer than 50 observations were omitted from the equations. This was done to prevent biases that might arise from unusual individual loans within the cell. Also, the ARM conditional claim rate model does not use data from policy year one in the estimations. Although a few claims occur in the first policy year, the claim rates are low, and the small number of loans in each cell causes measurement error in the first policy year.

II. Conditional Claim Rate Model

This section describes the specification and model results for the ARM conditional claim rate model. In general, the approach is similar to the approach used for 15-year FRMs, although variables in this model have been added to capture the unique claim and prepayment characteristics of ARMs.

A. Claim Model Specification

The model used to estimate $ARMCCR_{i,j,y,t}$ the conditional claim rate of ARMs from origination year y, policy year t, house price category I, LTV category j is

$$ARMCCR_{i,j,y,t} = \sum_{n=3}^{8} \alpha_n P_{n,t} + \gamma_1 LTV_{1,j} + \beta_1 F30CCR_{i,j,y,t} + \beta_2 PAYINC_{y,t} + \varepsilon_{i,j,y,t} \qquad (1)$$

where the variables are defined as follows:

$P_{n,t}$ ≡ five policy year dummy variables ranging from policy year three to policy year greater than or equal to eight, constructed so that $P_{n,t}$ = 1 when policy year (t) = n and $P_{n,t}$ = 0 otherwise,[1]

$LTV_{1,j}$ ≡ one LTV dummy variable constructed so that $LTV_{1,j}$ = 1 when LTV ratio is less than or equal to 90 percent,

$F30CCR_{i,j,y,t}$ ≡ the conditional claim rate for 30-year FRMs of house price I, of LTV category j, endorsed in fiscal year y, and observed in policy year t, and

$PAYINC_{y,t}$ ≡ the ratio of the payment on a one dollar ARM endorsed at the average FHA ARM rate in fiscal year y with interest rate adjusted each year up to policy year t, divided by the median household income in policy year t (this ratio is scaled to 0.33 in the loan origination year).

[1] In the case of the fifth policy year dummy variable, $P_{8,t}$ = 1 when policy year (t) ≥ 8 and $P_{8,t}$ = 0 otherwise.

B. Claim Model Results

In a stable interest rate environment, we would expect ARMs and FRMs to claim at roughly the same rate. With declining interest rates, we would expect ARMs to claim at a relatively lower rate for two reasons. First, because the payment burden is eased, ARM claims decline. Second, because FRM borrowers will have little incentive to keep an above-market loan, they will claim slightly more often. When interest rates rise, we would expect ARMs to claim at a higher rate than FRMs, again for two reasons. "Payment shock", the increase of monthly payments above the level initially anticipated by the borrower, will induce greater ARM claims, while a below-market coupon rate will lower FRM claims in rising interest environments. However, we have not experienced a continuously rising interest rate environment since 1986 and are thus unable to fully analyze the effects such an environment will have on ARMs, but we expect the response to rising rates will be stronger than the response to declining rates. This supposition appears to be supported by the interest rate sensitivities discussed in Section V. In each of the rising interest rate scenarios, the benefit received from lower claims on FRMs is partially mitigated by much higher claims on ARMs.

The results from the empirical estimation of conditional claims rates for ARMs is presented in Exhibit B-1. Both the coefficients on the FRM claim rate (0.49) and the payment to income ratio (0.028) conform to our expectation and are statistically significant.

The historical ARM observations from FY 1994 to FY 1997 provide evidence on ARMs claim rates in declining and flat interest rate environments. Since 1982, long-term interest rates have been in a downward trend, declining from 17% in FY 1982 to 8% in FY 1993. From FY 1993 to 1997, the interest rates have been roughly flat, hovering around the 8% level.

FHA's ARM claim experience from FY 1984 to 1997 are consistent with our arguments that ARM claim rates would be higher than FRM claim rates when interest rates are rising or flat and lower when interest rates are declining. Compared to FRM claim rates, the ARM claim rates are higher for FY 1992-1997 books of business, a period characterized by flat interest rates, but lower for FY 1987-1991 books of business, a period of declining interest rates.

Exhibit B-1

Regression Results for ARM Conditional Claim Rate Model (t-statistics are in parentheses)	
Constant	-0.007 (-2.277)
$F30CCR_{i,j,y,t}$	0.490 (5.158)
$PAYINC_{y,t}$	0.028 (3.485)
$P_{3,t}$	0.003 (2.373)
$P_{4,t}$	0.005 (3.118)
$P_{5,t}$	0.010 (5.583)
$P_{6,t}$	0.008 (4.307)
$P_{7,t}$	0.006 (3.337)
$P_{>8,t}$	0.002 (1.344)
$LTV_{1,j}$	-0.002 (-1.889)
Summary Regression Statistics	
Adjusted R^2	0.533
F-statistic	31.268

III. Conditional Prepayment Rate Model

This section describes the model specification and results for the ARM conditional prepayment model.

A. Prepayment Model Specification

The model used to estimate $ARMCPR_{i,j,t}$ the conditional prepayment rate of ARMs from origination year y, policy year t, house price category I, and LTV category j is

$$ARMCPR_{i,j,y,t} = \sum_{n=1}^{5} \alpha_n P_{n,t} + \gamma_1 LTV_{1,j} + \beta_1 F30CPR_{i,j,y,t} + \varepsilon_{i,j,y,t} \quad (2)$$

where $F30CPR_{i,j,y,t}$ is the conditional prepayment rate for 30-year FRMs of house price I, of LTV category j, endorsed in fiscal year y, and observed in policy year t. The variables on the right hand side are defined above in the claims model discussion.[2]

B. Prepayment Model Results

We would anticipate that more mobile and more income constrained borrowers will be more likely to select ARMs. ARMs allow mobile households to avoid paying for the costly call option of FRMs, and ARMs allow constrained borrowers to circumvent constraints with a lower initial coupon rate. Those choosing ARMs for mobility reasons are likely to have lower initial LTVs than those choosing ARMs for affordability reasons.

In a stable or rising interest rate environment, we expect ARMs to prepay faster than FRMs because more mobile borrowers, who attach less value to the prepayment option, will choose ARMs. Moreover, in a rising interest rate environment, FRMs will prepay much more slowly than ARMs because FRM borrowers will avoid prepaying below-market loans. In a declining interest rate scenario, FRMs will prepay faster than ARMs because FRM borrowers will have a greater incentive to refinance into lower rate loans than ARM borrowers (ARM rates will fall without refinancing).

In modeling ARM prepayment behavior, we relate the ARM prepayment rate to the FRM prepayment rate, expecting a coefficient less than one because of the lower sensitivity of ARMs to interest rate declines. The generally greater mobility of ARM borrowers is captured by a larger constant term and coefficients on the policy year dummy variables. Exhibit B-2 shows the results from the ARM prepayment model estimation.

[2] The policy year dummy variables in the prepayment equation are specified over a different range than the variables in the claim equation.

Exhibit B-2

Regression Results for ARM Conditional Prepayment Rate Model (t-statistics in parentheses)	
Constant	0.064 (22.279)
$F30CPR_{i,j,y,t}$	0.237 (15.588)
$P_{1,t}$	-0.065 (-15.025)
$P_{2,t}$	-0.049 (-11.867)
$P_{3,t}$	-0.032 (-8.232)
$P_{4,t}$	-0.011 (-2.823)
$LTV_{4,j}$	0.008 (3.189)
Summary of Regression Statistics	
Adjusted R^2	0.805
F-statistc	187.473

Appendix C: Econometric Analysis of Streamline Refinancing Loans

The Federal Housing Administration's (FHA's) program of streamline refinancing (SR) allows borrowers to refinance their FHA-insured loans at low cost and with minimum paperwork. Generally, applications in the SR program are processed without cash outlays, credit checks, nor, most importantly, appraisals. The lack of appraisal information precludes any direct measure of a borrower's equity and is hence a complication when attempting to model SR loans together with purchase mortgages.[1] Furthermore, while working with SR data, it becomes increasingly obvious that SR loans experience termination patterns which differ significantly from those observed for other loan types. Our SR model is designed to overcome the lack of equity information and to explain the different loan behavior we observe.

Below, we discuss our data source, the difficulties inherent in analyzing SRs, our modeling approach, and the results of our analysis.

I. Data Source and Limitations

Price Waterhouse's SR analysis is based on FHA's A-43 database, several limitations of which make it difficult to properly identify and classify SR loans. In FY 1988 a refinance indicator was added to the A-43 database and loans coded "R" or "S" were identified as SR loans.[2] In addition to this population, we classified as SRs those loans with loan-to-value (LTV) ratios coded as 30% or 999%. Because SRs generally lack appraisal information (and hence lack LTV ratios), individual field offices often used these values to indicate an SR loan's unknown LTV ratio. Field offices also used zeros to indicate SRs, and in past actuarial reviews Price Waterhouse has included such loans in the SR category. As with last year's Review, we are discontinuing this practice since the zero code is also used for any loan with an unknown or non-conforming LTV

[1] There is a third category of loans in addition to SRs and purchases mortgages: refinancings required to obtain an appraisal (*i.e.*, non-streamline refinancings). Since these loans report appraisal information, they can be successfully modeled together with purchase mortgages. Hence, throughout this section, the term "home purchases" is a bit of a misnomer and is understood to include the small number of refinancings with appraisals. Furthermore, despite the lack of an appraisal requirement for SRs, approximately 25 percent of our sample reported an appraisal value in the A-43 database. Nevertheless, these loans were treated in the SR model.

[2] The refinance status of loans originated prior to FY 1988 remains unknown. However, the SR program did not see wide use until FY 1990, and prior to FY 1988 SR volume was certainly negligible.

ratio (whether SR or not). Thus, unless a loan's refinance indicator explicitly identifies it as an SR, a zero LTV ratio was not considered a streamline refinancing.[3]

Once an SR was identified, Price Waterhouse was interested in obtaining not only information on the refinancing, but also on the original endorsement. However, individual loan records do not contain data on an SR's history prior to the refinancing. In particular, there is no information on the original LTV ratio, date of origination, principal balance, or loan type. Nevertheless, since all SRs were originally FHA-insured, such information presumably exists somewhere in the A-43 database. FHA provided Price Waterhouse with SR data linked to records containing previous origination information. While this linked data does not link all loans identified as SRs, we assume that the sample of linked loans is representative of the entire population and that no systematic bias is created by the inability to link all loans, although the limited amount of data makes it impossible to conclude whether a bias does or does not exist. Our analysis is therefore contingent on the representativeness of the linked sample.

Because SRs generally have no appraisals, the properties are marked to the market based on the sales prices at the time of origination (instead of refinancing) and a house price index. As in the FRM 30-year claim models, a market equity index is constructed to measure the current equity level of the mortgaged properties using the mark-to-market values. The market equity index is expected to have negative effects on the claim rates.

II. Sample Definition

Price Waterhouse's SR claim and prepayment models are derived from the purchase mortgage models. Consistent with the latter, the SR models employ a cell-based logistic specification. However, several important differences between the purchase mortgages and the SRs necessitated separate cell and sample definitions.

The main 30-year fixed-rate mortgage (FRM) model discussed in Appendix A defines cells by amortization year, policy year, relative house price category, and LTV category. The SR model adds the additional cell dimension of refinance year.[4] This addition, compounded with the lower volume of SRs relative to purchase mortgages, risks stretching observations per cell too thinly to warrant meaningful analysis. In order to overcome this potential difficulty, SR loan cells are not

[3] Loans not coded as SRs and with LTV ratios of zero were grouped into LTV category 1, used for all loans with anomalous LTV ratios.

[4] Throughout this section, "refinance" indicates an SR's refinancing and "origination" indicates the original origination. Thus we are able to distinguish between origination year and refinance year without relying on the awkward expressions "original origination year" and "refinance origination year."

divided according to relative house price categories.[5] Furthermore, whereas in the main 30-year FRM model, separate equations are estimated for each of nine LTV categories, the SR econometric model consists of only one equation estimated across all LTV categories (not only would LTV categories have stretched the data, but in most cases, they are unknown).

After aggregating across loan size and LTV categories, the early years of the SR program (FYs 1988 through 1990) still contained too few observations. Thus, our SR model is based on refinancings occurring between FYs 1991 and 1997. Moreover, although loans endorsed prior to FY 1986 and surviving into the 1990s were eligible for the SR program, the prepayment rates for these older loans are substantially lower than the rates of more recently originated loans and consequently very few of the former appear in the SR data. Hence, the econometric analysis excludes SRs originally endorsed prior to FY 1986.

Finally, for the first policy year (the first year after refinancing) we deliberately doubled the value of observed claim and prepayment rates. We assume that refinances occur uniformly throughout the fiscal year, so that the average SR will refinance in the middle of the fiscal year. Thus, on average, our window of observation for the first policy year is actually only a half year, leading us to under-estimate the true number of terminations which would have occurred in a full year. Doubling the claim and prepayment rates in the first policy year compensates for this phenomenon.

III. 30-Year Streamline Refinancings

Price Waterhouse differentiates SRs by loan term (either 30-year or 15-year). No distinction is made between fixed-rate (FRMs), adjustable-rate (ARMs), or graduated-payment mortgages (GPMs).

A. Claim Model Specification and Results

The 30-year claim model is specified as follows:

$$S30CCR_{y,r,t} = \sum_{m=1}^{6} \alpha_m S_{m,y,r} + \sum_{n=1}^{4} \gamma_n P_{n,t} + \beta_1 EM_{y,t-1} \cdot EQADJ_{y,t-1} + \beta_2 PAYMENT_{y,t} \cdot (1 - ADJ_{y,r}) + \varepsilon_{y,r,t} \quad (1)$$

[5] Loan size categories are ignored for the econometric analysis of past SR behavior. However, when forecasting into the future, SR loan size categories are preserved. The same applies for LTV categories. This allows the cash flows of each cohort to be treated separately.

where

$S30CCR_{y,r,t}$ ≡ the Cox transformed conditional claim rate for 30-year streamline refinancings originated in fiscal year y, refinancing in fiscal year r, and observed in policy year t,

$S_{m,y,r}$ ≡ six dummy "seasoning variables" indicating the years elapsed between origination in fiscal year y and refinancing in fiscal year r constructed so that $S_{m,y,r} = 1$ when elapsed time $(r - y + 1) = m$ and $S_{m,y,r} = 0$ otherwise,

$P_{n,t}$ ≡ four policy year dummy variables indicating years elapsed since refinancing in year r constructed so that $P_{n,t} = 1$ when elapsed time $(t - r + 1) = n$ and $P_{n,t} = 0$ otherwise,

$EM_{y,t-1}$ ≡ market value of equity index for loans endorsed in fiscal year y and observed in policy year t-1 (lagged one year),

$EQADJ_{y,t-1}$ ≡ equity adjustment factor for loans endorsed in fiscal year y and observed in policy year t-1 (lagged one year),

$PAYMENT_{y,t}$ ≡ payment burden variable for loans originated in fiscal year y and observed in policy year t, and

$ADJ_{y,r}$ ≡ average percentage reduction in monthly mortgage payments for loans originated in fiscal year y and refinancing in fiscal year r.

Formal definitions and discussions of the variables listed above can be found in Appendix A.

As in all of the econometric models, the dependent variable $S30CCR_{y,r,t}$ is a conditional claim rate. Thus, it is a measure of how many loans from origination year y, refinancing in fiscal year r, will claim in policy year t, conditioned on the fact that they survive into policy year t. The seasoning variables attempt to capture intangible psychological and demographic factors which accumulate over the period of a borrower's residence. For example, a borrower who refinances after living in his home for an extended period will likely have developed non-trivial attachments to the property which, on average, would lessen the likelihood that he would default on his mortgage. The policy year dummy variables are analogous in design and purpose to the policy year variables in our other econometric models. We include only four dummy variables due to the limited experience period available for use in the SR analysis.

As mentioned above, FHA does not require an appraisal at the time of refinance for SRs. As a result, the majority of SRs lack any information regarding their equity levels. The absence of such a measure hinders our ability to assess the risk characteristics of the SRs since our general approach as well as most empirical evidence indicates that borrower equity is the most important predictor of loan performance. As a proxy for the equity level of an SR loan originated in fiscal year *y*, refinancing in fiscal year *r*, and observed in policy year *t*, we use the equity level of a new purchase endorsed in the same fiscal year *y*, which never refinances, and which is observed in policy year *t-1* (as in the other econometric models, the variable is lagged one year). In using the variable $EM_{y,\,t-1}$ from a non-refinancer as a proxy for the equity of an SR, we do not make any assumptions regarding the relative levels of house price appreciation (the main determinant of equity movement) experienced by an SR. To account for this possible discrepancy in equity, we interacted the equity variable with an adjustment factor, $EQADJ_{y,\,t-1}$. This adjustment factor is calculated by subtracting the equity level of SRs from non-SRs based on the 51 state house price indices.

The payment burden will always be lower for the SR population than the original loan population, since they have refinanced at a lower interest rate in order to obtain a lower monthly payment. Consequently, the $PAYMENT_{y,\,t}$ variable must be modified. The payment variable is adjusted using the adjustment factor $(1\text{-}ADJ_{y,\,r})$ which represents the average percentage reduction in monthly mortgage payments that SR loans originated in fiscal year *y* enjoy as a result of refinancing in fiscal year *r*. The value of $ADJ_{y,\,r}$ is constrained so that borrowers cannot increase their monthly payments by streamline refinancing.

Our estimated coefficients are presented in Exhibit C-1.

Exhibit C-1

Regression Results for 30-Year SR Conditional Claim Rate Model (t-statistics in parentheses)	
$S_{1,y,r}$	-1.285 (-4.720)
$S_{2,y,r}$	-1.329 (-5.432)
$S_{3,y,r}$	-0.779 (-3.392)
$S_{4,y,r}$	-0.596 (-2.779)
$S_{5,y,r}$	-0.395 (-1.958)
$S_{6,y,r}$	-0.213 (-1.190)
$P_{1,t}$	-14.040 (-19.404)
$P_{2,t}$	-12.048 (-16.947)
$P_{3,t}$	-10.946 (-15.767)
$P_{4,t}$	-10.091 (-15.190)
$EM_{y,t-1} * EQADJ_{y,t-1}$	-2.688 (-3.592)
$PAYMENT_{y,t} * (1 - ADJ_{y,t})$	25.780 (9.170)
Summary Regression Statistics	
Adjusted-R^2	0.788
F-statistic	69.906

B. Prepayment Model Specification and Results

Price Waterhouse specified the following thirty-year prepayment model:

$$S30CPR_{y,r,t} = \sum_{m=1}^{6} \alpha_m S_{m,y,r} + \sum_{n=1}^{4} \gamma_n P_{n,t} + \beta_1 PVDIFPOS_{r,t} + \beta_2 PVDIFNEG_{r,t} + \varepsilon_{y,r,t} \quad (2)$$

where

$S30CPR_{y,r,t}$ ≡ the Cox transformed conditional prepayment rate for thirty-year streamlined refinancings originated in fiscal year y, refinancing in fiscal year r, and observed in policy year t,

$PVDIFPOS_{r,t}$ ≡ the discounted present value of the gain from refinancing at a lower interest rate in policy year t a mortgage already streamline refinanced in fiscal year r, and

$PVDIFNEG_{r,t}$ ≡ the discounted present value of the loss from refinancing at a higher interest rate in policy year t a mortgage already streamline refinanced in fiscal year r (the calculation of $PVDIFNEG_{r,t}$ is identical to the calculation of $PVDIFPOS_{r,t}$).

Independent variables in eq. (2) that are not described above are identical in definition and purpose to those used in the claim model.

As is the case with our other econometric models, the dependent variable is again a conditional claim rate. The seasoning and policy year dummy variables are identical to those constructed above in the claim model section. The $PVDIFxxx_{r,t}$ variables are analogous to those used in the 30-year FRM purchase mortgage model. See Appendix A for a full discussion of their definition and justification. Exhibit C-2 presents the coefficient estimates from our model.

Exhibit C-2

Regression Results for 30-Year SR Conditional Prepayment Rate Model (t-statistics in parentheses)	
$S_{1,y,r}$	0.504 (3.397)
$S_{2,y,r}$	0.473 (3.191)
$S_{3,y,r}$	0.253 (1.708)
$S_{4,y,r}$	0.157 (1.061)
$S_{5,y,r}$	0.073 (0.489)
$S_{6,y,r}$	0.016 (0.108)
$P_{1,t}$	-3.011 (-28.578)
$P_{2,t}$	-2.391 (-18.486)
$P_{3,t}$	-2.435 (-16.807)
$P_{4,t}$	-2.863 (-22.967)
$PVDIFPOS_{r,t}$	34.414 (10.772)
$PVDIFNEG_{r,t}$	19.100 (3.071)
Summary Regression Statistics	
Adjusted-R^2	0.600
F-statistic	28.805

IV. Fifteen-year Streamline Refinancings

As with the thirty-year SRs, the fifteen-year models do not distinguish between FRMs, ARMs, nor GPMs. Furthermore, like the fifteen-year purchase FRM model, the fifteen-year SR model is a simple regression of fifteen-year SR claim and prepayment rates on those of thirty-year SRs. In so doing, cells are defined only by refinance year r and policy year t. Exhibit C-3 presents the regression results for the 15-year SR claim and prepayment equations.

Exhibit C-3

Regression Results for 15-Year SR Conditional Claim and Prepayment Models (t-statistics in parentheses)		
Variable	**Claim Model**	**Prepayment Model**
$S30CxR_{r,t}$	0.193 (23.465)	0.717 (15.789)
Summary Regression Statistics		
Adjusted-R^2	0.921	0.761
F-statistic	312.938	86.189

Appendix D: Loss Rate Analysis

I. Introduction

One of the primary sources of variation in MMI Fund performance has been the loss experienced on loans that result in claims. This loss, when expressed as a percentage of either the dollar amount of the claim payment, or the acquisition cost of the loan or the underlying real estate, is referred to as the "loss rate." This appendix describes our analysis of historical loss rates.

For the FY 1997 Review, a complete loss rate model was applied to the cash flow model, similar to the FY 1996 Review. The loss rate model was based on comprehensive data on loan performance up through most of FY 1996, including some of the FY 1996 dispositions, due to the lack of any FY 97 dispositions. Because conveyances account for the majority of claims and assignments were terminated in 1996, the model of this analysis could also be applicable to other types of claim settlement. However, the primary focus of our analysis was on losses resulting from foreclosures and property conveyances.

II. Data Sources

The analysis of historical loss rates is based on extracts of three FHA database systems: the A-43, the A-43C, and the A-78 (the Single-Family Accounting and Management System (SAMS)). Since each of these databases contains independent information, we obtained extracts from each and linked them. The A-43 database contains loan and borrower characteristics, the A-43C database provides information related to claim settlement and property acquisition, and the SAMS provides information on holding costs and property sales.

Using FHA case numbers, Price Waterhouse linked extracts from all three of these databases in order to construct a single data set for analysis. Given that the June 30, 1997 SAMS extract contains no FY 1997 terminations due to the lags both in reporting and from acquisition to disposition, there were no linked observations for FY 1997 terminations to permit loss rate analysis for FY 1997. However, there was sufficient loss data in the June 30, 1997 cuts of the A-43 and A-43C databases to permit analysis of default-to-claim lags for FYs 1996 and 1997. Meanwhile, the lack of recent disposition lags and loss rates was due to a lack of credible experience regarding FY 1996 and FY 1997 termination updates in the A-43 data extract as of June 30, 1997. Thus, the analysis of aggregate loss rates and disposition lags can only be applied to pre-FY 1995 claims. Both are described in sub-section III of this appendix.

III. Trends in Historical Data

While the principal objective of this analysis is to create a model that predicts future loss rates, another goal is to better understand and explain the trends in loss rates experienced by the MMI

Fund. To achieve this goal, we have examined the effects of economic, policy, and time variables on the Fund and the losses incurred by FHA.

In order to fully understand this analysis, it is illustrative to consider the process that occurs prior to a claim payment by FHA. When a mortgagor misses a monthly payment, he is considered delinquent. If the delinquency persists for 60 days, the mortgage is in default and the lender may initiate foreclosure proceedings. While FHA currently offers and encourages several alternatives to foreclosure, this analysis focuses on loans for which foreclosure is pursued. Once foreclosure takes place, FHA makes a payment to the lender to settle the claim and acquires the underlying property. The claim payment FHA makes to the lender, known as the "acquisition cost," may be viewed as including three components: the remaining principal balance of the loan, the foregone interest lost by the lender as a result of the loan default, and legal and administrative costs associated with foreclosure, including any expenses associated with the cost of repairing or maintaining the property prior to conveyance. The acquisition cost can be expressed as:

Acquisition Cost = Remaining Principal Balance + Foregone Interest + Foreclosure Costs

Following acquisition, FHA attempts to sell the property, sometimes at a reduced price in order to assist prospective low-income homebuyers in obtaining a house. During the time in which the property is held by FHA, but not yet sold, FHA incurs various costs and generates several cash flows in preparation for selling the property. Outflows include any taxes, repairs, and maintenance on the property, and inflows include rental and other types of income. The net effect of these cash flows is called the "holding cost." Upon sale, FHA receives the sales price less any sales expense. In sum, the loss amount is the total amount that FHA loses on the mortgage. The loss amount is calculated as:

Loss Amount = Acquisition Cost + Holding Cost - Sales Price + Sales Expense

The loss amount expressed as a percentage of acquisition cost is referred to as the "loss rate." This loss rate provides a way to judge FHA's performance in managing real estate assets. The loss rate is given as:

Loss Rate on Claim Amount = Loss Amount/Acquisition Cost

In analyzing the historical loss rate trends, Price Waterhouse examined loss rates by LTV, house price, policy year, termination year, and origination year. The first three groupings are described in greater detail in Appendix A. Origination year is the fiscal year in which a mortgage begins to amortize, while termination year is the fiscal year in which a mortgage terminates. It is useful to examine loss rates by termination year since this enables us to better capture changes in FHA asset management and disposition policies.

Exhibit D-3

Time Lags for Conveyances by Termination Year (in months)		
Termination Year	**Default-to-Claim Lag**	**Disposition Lag**
1975	n/a	n/a
1976	9.00	1.00
1977	14.20	47.33
1978	11.84	64.94
1979	11.66	52.95
1980	12.42	38.45
1981	11.78	21.68
1982	12.95	9.70
1983	12.94	7.24
1984	14.47	6.02
1985	14.54	6.61
1986	13.83	7.53
1987	13.72	7.40
1988	14.11	6.96
1989	14.17	7.15
1990	13.89	6.15
1991	14.15	5.64
1992	14.25	5.57
1993	14.69	5.36
1994	15.38	5.05
1995	15.88	3.77
1996	16.28	n/a
1997	15.67	n/a

Source: A-43 database, June 30, 1997 extract.

IV. Loss Rate Model Specification

For the purposes of our analysis, loss costs were separated into three components: foreclosure costs (including foregone interest cost), holding costs, and the change in asset value. Foreclosure costs comprise the costs incurred by the lender necessary for undertaking foreclosure proceedings, which are eventually reimbursed by FHA, and foregone interest cost, which is the amount of lost interest that FHA reimburses lenders. Holding costs are the costs FHA incurs prior to the disposition of the property, including repair costs, maintenance costs, net taxes, and other costs required to maintain the property. The change in (or loss on) asset value represents the difference between sales price at disposition and the remaining principal balance at acquisition. This section describes the relationship between each of these components and the loss rates experienced by FHA.

A. Estimation of Foreclosure Cost

The model used to estimate *FCRPB*, the foreclosure cost on FHA insured properties as a percentage of remaining principal balance (RPB), is:

$$FCRPB = \alpha + \beta_1 TLAG + \beta_2 JUD + \beta_3 PYR \qquad (1)$$

where

FCRPB ≡ foreclosure costs as a percentage of remaining principal balance,

TLAG ≡ lag (in months) between default and claim,

JUD ≡ variable equal to 1 when a claim occurred in a state with judicial law and 0 otherwise, and

PYR ≡ policy year.

The results of this regression are given in Exhibit D-4. Since the costs of foreclosure are primarily fixed and heavily dependent on state laws, these costs are largely a function of a constant term and other variables which reveal the static nature of foreclosure costs. In our estimation of foreclosure costs, it is also assumed that foreclosure costs are dependent on the lag between default and termination. More specifically, foreclosure costs increase as the lag between default and termination increases. This is indicated by the coefficient of 0.005 on the termination lag variable.

Exhibit D-4

Regression Results for Estimating Foreclosure Costs as a Percentage of RPB (t-statistics in parentheses)			
CONSTANT	TLAG	JUD	PYR
-0.064429 (-126.85)	0.004583 (192.64)	0.025889 (66.53)	0.007190 (128.65)

B. Estimation of the Holding Cost

The costs FHA incurs while holding a property for disposition were calculated as:

$$Holding\ cost = Nettax + Repair + Mando - Capinc \quad (2)$$

where

Nettax ≡ net amount of money paid out by HUD in taxes on behalf of a property and of money HUD has been reimbursed for prepaid taxes that are yet unearned at the time of sale,

Repair ≡ sum of money that HUD paid on behalf of a property for repairs,

Mando ≡ sum of money that HUD has paid on behalf of a property for maintenance and operation, and

Capinc ≡ total net inflow of income generated from the holding of a property.

The model used to estimate *HCUPB,* the holding costs incurred by FHA as a percentage of RPB, is:

$$HCUPB = \alpha + \beta_1 DLAG \quad (3)$$

where

HCUPB ≡ holding costs as a percentage of remaining unpaid principal balance and

DLAG ≡ lag (in months) between acquisition and disposition.

Exhibit D-5 shows the results of this regression. The constant has a coefficient of 0.049 while

the disposition lag has a coefficient of 0.004. This shows that the longer FHA takes to sell a property, the greater the holding cost.

Exhibit D-5

Regression Results for Estimating Holding Costs as a Percentage of RPB (t-statistics in parentheses)	
CONSTANT	DLAG
0.048877 (207.09)	0.003960 (150.02)

C. The Change in Asset Value Component

The model that we used to estimate *AVUPB,* the change in asset value as a percentage of RPB, is:

$$AVUPB = \alpha + \beta_1 DLAG + \beta_2 JUD + \beta_3 PYR + \beta_4 HPDISP + \beta_5 LT2 + \beta_6 LT3 + \beta_7 LT4 + \beta_8 LT5 + \beta_9 LT6 + \beta_{10} HLS1 + \beta_{11} HLS2 + \beta_{12} HLS3 + \beta_{13} HLS4 + \beta_{14} HLS5 + \beta_{15} HLS6 + \beta_{16} HLS7 \quad (4)$$

where, in addition to previously mentioned variables in this Appendix,

AVUPB ≡ the change in asset value as a percentage of remaining principal balance,

HPDISP ≡ house price dispersion index by disposition year,

LT2 ≡ variable equal to 1 if a S30 resulted in the claim and 0 otherwise,

LT3 ≡ variable equal to 1 if an ARM resulted in the claim and 0 otherwise,

LT4 ≡ variable equal to 1 if a F15 resulted in the claim and 0 otherwise,

LT5 ≡ variable equal to 1 if a S15 resulted in the claim and 0 otherwise,

LT6 ≡ variable equal to 1 if a GPM resulted in the claim and 0 otherwise, and

HLSi ≡ interaction of house price growth with relative house price category *I*, with *I* ranging from 1 to 7.

Exhibit D-6 presents the results of this model. The results show that as house price increases, the loss on asset value decreases. This supports our finding that higher-priced homes tend to have lower loss rates. The policy year variables capture the effect of mortgage life on loss rates. For example, our estimated coefficient on policy year is -0.016, implying that mortgages that terminated in earlier policy years tend to have higher losses in asset value compared to those terminated in later policy years.

House price dispersion is another crucial factor in predicting the change in asset value. Incorporating a dispersion index creates a proxy for the effect of the regional differences in house price growth (see Appendix A for a full description of house price dispersion). Additionally, in lieu of a single house price variable, we interacted house price growth by disposition year with house price category dummy variables. The coefficients of these variables are generally negative, implying that increases in house price growth result in a decrease in the loss on asset value. This follows intuition since sales price is a direct function of house price growth and as house price grows, sales price increases, and FHA will recoup more of its losses. Furthermore, the steadily decreasing trend in loss rates with relative house price reflects the expected behavior that the larger houses in the FHA insurance portfolio are the standard houses in the area and usually face more liquid markets. The higher liquidity allows FHA to dispose of the properties more easily and at better prices, which lead to lower loss rates. Furthermore, variables for all loan types except 30-year FRMs were included to allow us to forecast loss rates for each loan type.

Exhibit D-6

Regression Results for Estimating the Loss on Asset Value as a Percentage of RPB		
Variable	**Coefficient**	**T-statistic**
CONSTANT	0.171	97.20
DLAG	0.010	83.06
JUD	0.069	54.73
PYR	-0.016	-79.17
HPDISP	-0.182	-4.52
LT2	-0.014	-3.81
LT3	0.009	2.63
LT4	0.009	3.15
LT5	-0.075	-9.31
LT6	0.011	3.37
HLS1	0.124	49.86
HLS2	0.034	9.86
HLS3	-0.014	-4.01
HLS4	-0.053	-18.12
HLS5	-0.076	-20.82
HLS6	-0.088	-25.03
HLS7	-0.100	-27.18

*Loss rates for relative house price category 8, due to few historical observations and their atypical behavior in the regression results, were based on historical averages in lieu of the predicted loss rates via the above regression.

V. Forecasting Loss Rates

In order to forecast loss rates and incorporate them into the cash flow model, the loss rates must be in the same cell format as the cash flow model--by termination year, LTV, and relative house price category--for each of six mortgage types and each beginning amortization year. This categorization is accounted for by the inclusion of the relative house price categories and mortgage type variables in at least one of the three regressions. Additionally, future values of the independent variables are needed to obtain the forecasted loss rates by cell. General economic variables such as mortgage contract rate and house price growth rate are forecasted into the future by Freddie Mac and DRI/McGraw-Hill. Other variables strictly pertaining to the model, such as default-to-claim lags and disposition lags, are weighted averages of the past three years, not varying in the future years.

The next step is to multiply the estimated coefficients by the forecasted independent variables, which will result in forecasted values of holding costs, foreclosure costs, and loss on asset value, all expressed as percentages of remaining principal balance. Adding these together and combining with foregone interest income as a percentage of remaining principal balance yields the forecasted loss rate by cell. The foregone interest is not predicted by regressions but is calculated directly using future values of mortgage rates and default-to-claim lags. However, since other analyses performed in the MMI review utilize loss rates expressed as a percentage of acquisition cost, the forecasted loss rates are converted to losses as a percentage of acquisition cost by the additional costs of claims settlement adjustment factor. The forecasted loss rates are then grouped by beginning amortization year and loan type, which allows for them to be used directly in the cash flow model.

Appendix E: Cash Flow Analysis

I. Introduction

The purpose of the actuarial analysis is to assess the MMI Fund's ability to withstand future losses caused by either its current mortgage portfolio or its future books of business. Specifically, we analyze the Fund's value under alternative economic and policy scenarios by projecting future loan performance and the corresponding financial performance of the Fund. This appendix focuses on how the projections of loan performance are used to evaluate the financial soundness of the Fund.

In evaluating the Fund's value, we examined the Fund in a manner similar to the way an investor would evaluate the market value of a company. An investor estimates a company's value as the present value of its current business plus the present value of new business expected to be undertaken. Assuming FHA continues to insure loans, its value depends on both its current portfolio of loans and its future books of business.

In order to analyze future changes in the Fund's equity, we developed a model that incorporates projections of loan and operating performance and information about its insurance-in-force (IIF) to project the Fund's major cash flows. The discounted value of cash flows occurring between two points in time equals the change in the Fund's equity over that same time period.

The actuarial model uses the forecasts from the econometric models discussed in Appendices A through D. The econometric models forecast conditional claim and prepayment rates and loss rates for each cross-sectional category of loan-to-value (LTV) ratio and house price on an origination and policy year basis for 30-year fixed-rate mortgages (FRMs), 15-year FRMs, adjustable rate mortgages (ARMs), and streamline refinancings (SRs).

Based on the termination rates predicted by the econometric model, the major components of cash flow are projected into the future. Future interest income is reflected through the present value process. The cash flow components analyzed are presented in Exhibit E-1.

These components were projected for each cross-section of LTV ratio and house price category and then aggregated according to the origination year and fiscal year level. For mortgage types with smaller volumes, we have distinguished between LTV categories, not loan sizes. The next section discusses the sources of each of these cash flows.

Exhibit E-1

Cash Flow Components	Cash Inflow	Cash Outflow
Premiums	X	
Claim Payments		X
Proceeds from Asset Dispositions	X	
Refunded Premiums		X
Administrative Expenses		X
Distributive Shares		X

II. Cash Flow Components

A. Background Information

We provide the following background information to clarify our discussion of the components of cash flow:

- **Insurance-in-force**: the unamortized insurance-in-force value 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.

- **Average Outstanding Balance Factor (AOB):** the principal balance outstanding divided by the original mortgage amount. The AOB is calculated based on the term and type of the mortgage and mortgage contract rate. The outstanding balance is taken at the mid-point of the fiscal year. We obtained the historical average mortgage contract rates for all loans from the FHA A-43 database. These rates reflect the average contract rate for all originations during that fiscal year. For ARMs, this is the initial mortgage interest rate. For future years, we used October 1997 DRI forecasts. These values are shown in Exhibit E-2.

- **Conditional Claim Rate:** the number of claims divided by the number of surviving loans in force at the beginning of the period.

- **Conditional Prepayment Rate:** the number of prepayments divided by the number of surviving loans in force at the beginning of the period.

Exhibit E-2

FHA Contract Rates				
Fiscal Year	30 Year FRM	15 Year FRM	Adjustable Rate Mortgage	Graduated Payment Mortgage
1975	8.47%	8.76%	n/a	n/a
1976	8.61%	8.73%	n/a	n/a
1977	8.22%	8.23%	n/a	8.31%
1978	8.70%	8.69%	n/a	9.17%
1979	9.74%	9.88%	n/a	9.76%
1980	11.12%	11.40%	n/a	11.49%
1981	13.24%	13.74%	n/a	13.88%
1982	15.16%	15.23%	n/a	15.30%
1983	12.15%	11.27%	n/a	12.31%
1984	12.73%	11.94%	12.80%	13.03%
1985	12.24%	11.73%	11.25%	12.52%
1986	10.15%	9.96%	9.10%	10.77%
1987	9.31%	9.07%	7.74%	9.47%
1988	10.11%	9.89%	8.88%	9.98%
1989	10.08%	10.04%	9.08%	9.81%
1990	9.72%	9.67%	8.54%	9.74%
1991	9.47%	9.28%	7.56%	9.48%
1992	8.55%	8.43%	6.47%	8.43%
1993	7.91%	7.64%	5.95%	7.03%
1994	7.57%	7.14%	6.06%	6.90%
1995	8.39%	8.23%	7.18%	8.13%
1996	7.84%	7.52%	6.49%	7.89%
1997	8.01%	7.79%	6.57%	8.17%
1998	8.18%	8.18%	8.18%	8.18%

*Shaded values indicate forecast values. 1998 forecasts are from DRI October 1997 Control Forecasts.

- **Termination Year:** this refers to the year in which a mortgage terminates through either a claim or a prepayment.

- **Policy Year:** the first policy year starts the day the mortgage has originated. Subsequent policy years start on the anniversary of the mortgage origination.

- **Fiscal Policy Year:** a fiscal policy year covers a single fiscal year. The year in which the mortgage is originated is assigned a fiscal policy year of one, even though it is not a complete year. For calculation purposes, we assume that all mortgages are originated in the middle of the year. For example, for FY 1993, we assume that the average of all mortgage origination dates is six months into the fiscal year. Thus, the first fiscal policy year is assumed to start at month six of the first fiscal year. In order to be consistent with the model's fiscal year convention, the first fiscal policy year is thus on average only six months long (i.e., it ends at the end of the first fiscal year). It is assumed that the second fiscal policy year contains the last six months of the first policy year and the first six months of the second policy year. The last fiscal policy year corresponds to the last six months of the mortgage; therefore, for 30-year mortgages, the model has 31 fiscal policy years.

B. Premiums

Premium Structure

The insurance premium is the primary source of revenues collected by the Fund. 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 incurred in insuring the mortgages. During the period being analyzed, the insurance premium was structured in three ways:

- Through September 1, 1983 the mortgage premium was collected on a monthly basis as a percentage of the outstanding principal balance for the period. We assumed for this analysis that the annual premium policy was in effect through the end of FY 1983.

- Between September 1, 1983 and September 30, 1991 a mortgage premium based on a percentage of the original mortgage amount was collected at the time of origination. This amount was 3.8 percent for 30-year mortgages and 2.4 percent for 15-year mortgages.

- As of July of FY 1991, the NAHA-specified premium structure became effective. This structure specifies that an up-front premium be collected and an annual

renewal premium that depends on the initial LTV of the loan be assessed on the outstanding balance for a period.

- As of April 17, 1994, FHA lowered the up-front premium rate on 30-year mortgages from 3 percent to 2.25 percent. In our model, we have used a weighted average of the two up-front premium rates for FY 1994. FHA has maintained the FY 1994 NAHA annual premium schedule since then and it is assumed that this will be continued in the future.

- As of September 3, 1996, FHA lowered the up-front premium rate on 30-year mortgages for first-time home buyers who receive homeowner counseling from 2.25 percent to 2 percent. This rate was further reduced to 1.75 percent for mortgages executed on or after September 22, 1997. Because this premium reduction affected a relatively small proportion of mortgages originated in fiscal year 1997, the up-front premium rate used in last year's model has been retained.

The up-front premium schedule for new origination mortgages with 15- and 30-year termination schedules is presented in Exhibit E-3.

Exhibit E-3

Up-front Premium Rates for New FHA Originations		
Fiscal Year	**Fifteen Year Mortgages**	**Thirty Year Mortgages**
1983 through 1991	2.4%	3.8%
1992	2.0%	3.8%
1993	2.0%	3.0%
1994 through April 16, 1994	2.0%	3.0%
April 17 through the end of FY 1994	2.0%	2.25%
1995 and later	2.0%	2.25%
1997*	2.0%	2.0%
1998 and later*	2.0%	1.75%

*For first-time home buyers who received homeowner counseling.

The NAHA Annual Premium Schedule for new mortgage originations is shown below in Exhibit E-4:

Exhibit E-4

NAHA Annual Premium Rate for 15- and 30-Year Mortgages (purchase originations only)			
Mortgage Term	**Initial LTVs**	**Fiscal Years**	
		1992	**1993-2000**
30-Year	Below 90%	0.50% for 5 Years	0.50% for 7 Years
	Between 90% and 95%	0.50% for 8 Years	0.50% for 12 Years
	Above 95%	0.50% for 10 Years	0.50% for 30 Years
15-Year	Below 90%	0.50% for 5 Years	0.00%
	Between 90% and 95%	0.50% for 8 Years	0.25% for 4 Years
	Above 95%	0.50% for 10 Years	0.25% for 8 Years

Insurance Premiums for SRs are shown in Exhibit E-5 below:

Exhibit E-5

Premium Rates for Streamline Refinancings		
Year of Initial Origination	**30-Year Mortgages**	**15-Year Mortgages**
Pre-NAHA (prior to July 1, 1991)	3.8% Up-front Premium - No Annual Premiums	2.4% Up-front Premium - No Annual Premiums
FY 1992	3.8% Up-front Premium - Annual Premiums 7 Years	3.8% Up-front Premium - Annual Premiums 7 Years
FY 1993	3.0% Up-front Premium - Annual Premiums 7 Years	2.0% Up-front Premium - No Annual Premiums
1994 until April 17, 1994	3.0% Up-front Premium - Annual Premiums 7 Years	2.0% Up-front Premium - No Annual Premiums
April 17, 1994 until end of FY 1994	2.25% Up-front Premium - Annual Premiums 7 Years	2.0% Up-front Premium - No Annual Premiums
FY 1995 through FY 2000	2.25% Up-front Premium - Annual Premiums 7 Years	2.0% Up-front Premium - No Annual Premiums

Calculating the Premiums

The up-front premium is calculated as follows:

Premium Amount = Origination Amount (excluding any financed up-front premium) Mortgage Insurance Premium Rate (percentage)*

The up-front premiums calculated by our model may not be equivalent to the up-front premiums received by FHA in a particular fiscal year due to limitations inherent in the data provided from the FHA A-43 database. Since the A-43 database records the origination on the first amortization date, not the actual endorsement date, our origination volume does not match the actual

endorsement volume with originations in FY 1997 included in FHA's FY 1997 financial statements. For example, in FY 1997, the data from the A-43 database produced a larger volume of originations than the endorsements on FHA's financial statements. This was primarily because some originations in FY 1997 were not endorsed until FY 1998. To adjust for this time lag, we included in our estimates of premium income an adjustment of $220 million in FY 1997 to reflect the up-front premiums for the net of loans endorsed in FY 1998, but originated in FY 1997 and loans originated in FY 1997, but endorsed in FY 1998. Since our model already includes all other future cash flows associated with these loans in our estimate of the FY 1997 book's economic value, this change makes our up-front premium calculation consistent with our other cash flow predictions.

The A-43 database origination amount also includes the up-front premium if the up-front premium has been financed. However, the A-43 database does not indicate whether or not the up-front premium has been financed and thus included in the origination amount. In our model we assume that the up-front premium is always financed. This is a rational assumption because by financing the up-front premium, a borrower can allocate the money toward lowering the initial LTV and thus reducing annual premiums.

However, when a mortgage defaults, FHA must pay a claim consisting of the unamortized portion of both the mortgage and financed premium. As a result, in our model, FHA effectively collects very little of the up-front premium on mortgages that result in a claim early in their lives.

The annual premium is actually collected on a monthly basis by FHA. However, in our model, we only calculate one annual premium for the fiscal year, assumed to be calculated in the middle of the fiscal year. The annual premium calculation is as follows:

*Annual Premium = Amortized Insurance in Force (excluding any up-front premiums) * Annual Insurance Premium Rate (percentage)*

Although FHA is responsible for insuring financed up-front premiums, the annual premium is not assessed on the financed up-front premium and as a result is not applied against it in the cash flow model.

C. Losses Associated with Claims

Losses due to claims are the Fund's largest expense. When a mortgage defaults, the lender files a claim with FHA and FHA pays the claim to the lender. In most cases, FHA takes possession of the foreclosed property and sells the property to recover its loss. This type of claim is called a conveyance.

A claim results in two separate cash flows:

- the cash outflow of the claim payment
- the cash inflow of any net proceeds received in selling the conveyed property

Because there is typically a lag between the time of the claim payment and the receipt of proceeds from the sale of the property disposition, we analyze these two cash flow components separately.

The claim payment consists primarily of the outstanding balance at the time of the default. In addition, FHA may pay for other costs incurred by the mortgagee on the defaulted mortgages. In order to account for these costs on a portfolio-wide basis, we use the following formula:

$$\textit{Claim Payment}_t\textit{ (Acquisition Cost)} = \textit{(Amortized Insurance in Force * Claim Rate}_t\textit{ * Additional Costs of Claims Settlement Adjustment Factor)+ Interest Income Lost}$$

In this Review, we assume that the primary cost associated with claims is the interest income lost by the mortgagee between the time at which the mortgage defaults and the claim is paid. Based upon our analysis of the A-43 data, we estimated the average lag between default and conveyed claim payment to be approximately 15.27 months in FY 1997, 14.43 months in FY 1998, and 14.56 months in FYs 1999-2000, respectively. The FY 1996 Review assumed a lag of 14.46 months, 13.37 months, and 14.51 months in FY 1996, FY 1997, and FYs 1998-2000, respectively. Thus, the additional mortgagee costs were estimated as interest income lost on the outstanding balance of the mortgage for the length of time between default and claim payment.

In addition to interest income lost, mortgagees usually incur additional costs associated with a claim such as legal fees. These costs are captured in the "Additional Costs of Claims Settlement Adjustment Factor." The adjustment factor is calculated by comparing the actual dollar value of claims paid according to FHA's financial statements with the claim payments calculated by our model. We calculated the average cost of claims settlement factor in every year since FY 1989 to be about 13.6 percent, which is what we assumed for all future claims settled by foreclosure and conveyance. However, we assumed that the cost of claims settlement factor on pre-foreclosure sales will be 3 percent, since many of the legal and administrative costs associated with foreclosure would be avoided.

Proceeds on the sale of a conveyed property were estimated by multiplying the claim payment by one minus the loss rate for a conveyance. However, because property sales currently lag claim payments, we allocated the net proceeds cash flow to the appropriate fiscal year. Based on our analysis of disposition lags, we used a lag of 5.26 months in FY 1997, 4.85 months in FY 1998, and 4.96 months in FYs 1999-2000. These lags are slightly higher than the lag used last year of approximately 4.7 months. Proceeds received in fiscal year t are calculated as follows:

$$Proceeds_t = (Property\ Disposition\ Lag/12) * Claim\ Payments_{t-1} * (1\text{-}Loss\ Rate) + ((12 - Property\ Disposition\ Lag)/12) * Claim\ Payments\ (1 - Loss\ Rate)_t$$

The definition of a loss rate is as follows:

$$Loss\ Rate\ on\ Claim\ Amount = Loss\ Amount/Acquisition\ Cost$$

The acquisition cost is the amount that FHA pays to the lender, which is approximately the unamortized value of the mortgage plus the interest income lost. The loss amount is the total amount that FHA loses on the mortgage, which includes the holding costs that FHA incurs until FHA sells the property.

The loss ratio calculations were based on data obtained by linking the June 30, 1997 extracts from the A-43 and A-43C databases with the June 1997 extract of the SAMS database. We examined the data for different trends in loss rates. Specifically, we analyzed loss rates by different mortgage types, relative house prices, initial LTVs, endorsement year, policy year of termination, and fiscal year of termination. See Appendix D for a complete description of our loss rate analysis.

The upper limits for house price categories one through seven are based on breakpoints determined as a percentage of the median house price in each of the 44 largest metropolitan statistical areas (MSAs) and the 50 states. House price category eight represents all originations in areas that exceed the FHA limit, as well as loans missing MSA or state identifiers. This category contains loans with a wide variety of exceptions to the general limit, such as loans in Alaska, Hawaii, Guam, and the Virgin Islands; loans originated under special programs; and other special cases.

FHA has experienced a downward trend in loss rates in recent years, particularly in house price categories four through eight. This decline in loss rates can be explained by FHA's ability to reduce losses by disposing of properties more quickly and using other loss mitigation techniques more frequently. Future loss rates are projected using the loss rate model described in Appendix D. Exhibit E-6 presents a summary of loss rates used for all loan types by house price category.

Exhibit E-6

	Loss Rates*							
Mortgage Type	House Price 1	House Price 2	House Price 3	House Price 4	House Price 5	House Price 6	House Price 7	House Price 8
Fixed 30s	0.42	0.35	0.30	0.27	0.25	0.24	0.23	0.13
Streamline 30s	0.41	0.34	0.29	0.26	0.24	0.23	0.22	0.12
ARMs	0.43	0.35	0.31	0.28	0.26	0.25	0.24	0.13
Fixed 15s	0.43	0.35	0.31	0.28	0.26	0.25	0.24	0.13
Streamline 15s	0.36	0.29	0.24	0.21	0.19	0.18	0.17	0.10
GPMs	0.43	0.36	0.31	0.28	0.26	0.25	0.24	0.13

*Loss rates for relative house price category 8, due to few historical observations and their atypical behavior in the regression results, were based on historical averages in lieu of the predicted loss rates from the loss rate forecast model.

The construction of relative house price categories has produced an observable trend in loss rates by house price category. Specifically, loss rates are lower for loans falling into categories with higher house prices. These findings are consistent with those included in past Reviews regarding the relationship between loss rates and house price categories.

Assigned Loans and the Pre-Foreclosure Sales Program

In 1996, legislation passed by Congress went into effect terminating the Single-Family Mortgage Assignment Program (the "Assignment Program"). Studies by HUD and the General Accounting Office found that the losses incurred by FHA on assigned mortgage notes are significantly greater than losses on conveyed properties. In addition, our analysis suggests that the loss rate on future mortgage assignments is likely to be 43 percent, which is higher than the loss rate for future property conveyances. Thus the discontinuation of the Assignment Program has had a significant positive impact on our assessment of the Fund's current economic value.

The same legislation that terminated the Assignment Program authorized FHA to recompense mortgagees for their actions to mitigate potential losses by providing mortgage foreclosure alternatives, such as special forbearance, mortgage assumptions by lenders, pre-foreclosure sales, deed-in-lieu-of-foreclosure transactions, partial claim payments, and loan modifications. Many of

these loss mitigation techniques have been successfully employed in the conventional mortgage market by private mortgage insurers, Fannie Mae, and Freddie Mac. The degree of uncertainty surrounding the effectiveness of these techniques and FHA's ability to utilize them makes it difficult for us to provide a dollar estimate of the effects they will have on the MMI Fund, except in the case of pre-foreclosure sales.

The Pre-foreclosure Sales Program, which began as a demonstration program in October 1991, became a nationwide program in November 1994. In our analysis of FHA's data on the Pre-foreclosure Sales Program we estimated that the average loss as a percent of total claim payments for a pre-foreclosure sale was 25 percent, which is lower than the loss rate for properties conveyed over the same period. In FY 1997, FHA successfully resolved 6 percent of claims using pre-foreclosure sales. Together with other alternative methods, loans being resolved by loss mitigation methods during FY 1997 totaled about 7.23 percent of claims. Based on the upward trend in the number of terminations being resolved through pre-foreclosure sales, the likelihood that FHA will continue promoting the loss mitigation programs, and the fact that mortgagees now have more experience with FHA's loss mitigation tools, we have assumed that FHA will successfully resolve 10 percent of claim terminations in FY 1998 and beyond using pre-foreclosure sales and other loss mitigation methods. Assuming a loss rate of 25 percent for pre-foreclosure sales, we estimated that the economic value of the Fund in FY 1997 would be $65 million higher and the capital ratio would be higher by 0.01 percentage points if 20 percent of claim terminations were successfully resolved using pre-foreclosure sales and other loss mitigation techniques.

D. Refunded Premiums

With the initiation of the up-front premium in FY 1984, FHA began refunding a portion of the premium when borrowers prepaid their mortgages. The up-front premiums are considered to be "earned" over the life of the loan, and upon prepayment, an approximation of the unearned portion of the premium is returned to the borrower. Thus, the amount of the refund depends upon the time in the life of the mortgage at which it is prepaid. The insurance-in-force used to calculate the refunded premium does not include the financed up-front premium.

The refund payments are calculated as follows:

*Refund Payments = Unamortized Insurance in Force (excluding up-front premium) * Up-front Premium Rate * Prepayment Rate * Refund Rate * Refund Adjustment Factor*

The refund adjustment factor has been estimated to be approximately 87 percent in FY 1997, and we assume it will remain at this level in future years. This adjustment factor can be attributed to problems related to the data as recorded in the A-43 database and to timing. We assume that a prepayment occurs in the middle of a fiscal policy year and assign the corresponding refund rate on the refund schedule. In reality, the timing of prepayments may be slightly different due to the pattern of interest rate movements within a particular year and the time it takes to make these payments.

Exhibit E-7

Percentage of Up-front Premium Refunded			
Fiscal Policy Year	Current Refund Schedule		New Refund
	Thirty Year Mortgages	Fifteen Year Mortgages	All Mortgages
1	0.99	0.99	0.98
2	0.94	0.93	0.90
3	0.82	0.81	0.80
4	0.67	0.66	0.60
5	0.54	0.51	0.39
6	0.43	0.39	0.22
7	0.35	0.29	0.08
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		

Exhibit E-7 shows the two refund schedules. For refunds after January 1, 1994 the new seven-year refund schedule applies. Therefore, mortgages originating before 1990 no longer receive a refund of their up-front premium.

E. Administrative Expenses

In addition to estimating cash flows associated with loan performance, the cash flow model also projects administrative costs incurred in insuring mortgages. Administrative expenses are calculated based on the outstanding balance of the insurance-in-force over the period. The factor used in determining future cash flows in this analysis is 0.1022 percent, which is the experience rate for FY 1997.

F. Distributive Shares

Distributive shares were designed to allow FHA to return a portion of the insurance premium to the insured borrower if the business for that endorsement year was more profitable than expected. Specifically, if the premiums for a cohort of loans are more than sufficient to cover the costs of insuring the loans, a portion of the premium in excess of the costs can be returned to the borrower through a distributive shares payment. However, payment of distributive shares has been suspended since 1990. This suspension is assumed to continue indefinitely, even though we estimate that the Fund has already achieved its capital ratio goals.

III. Economic Value and Capital Ratio

A. Historical Portfolio Rates

For years prior to FY 1992, we revised our interest rate series to reflect more appropriately the interest that FHA accumulates on its investments. Although estimates of the rates were used prior to FY 1983, we were able to obtain actual FHA portfolio rates for FYs 1983 through 1997. The interest rates are shown in Exhibit E-8.

B. FHA Contract Rate

One of the most important economic determinants of the Fund's performance is the average initial contract rate on FHA-insured loans. The initial contract rate is among the most influential variables in determining both claim and prepayment behavior, and small changes in interest rate forecasts can significantly affect estimates of FHA's performance.

Exhibit E-8

Investment Yields			
Fiscal Year	Interest Rate	Fiscal Year	Interest Rate
1975	6.98%	1987	9.08%
1976	7.02%	1988	8.54%
1977	7.06%	1989	8.59%
1978	7.89%	1990	8.93%
1979	8.74%	1991	8.85%
1980	10.81%	1992	6.93%
1981	12.87%	1993	5.9%
1982	12.23%	1994	6.21%
1983	10.84%	1995	7.11%
1984	9.60%	1996	6.33%
1985	10.06%	1997	6.51%
1986	9.39%		

The average initial FHA contract rate on FRMs is closely related to, but distinct from, other major mortgage interest rate measures, such as the FHLMC commitment rate. In order to forecast future FHA contract rates, we have estimated the historical movements of the FHLMC commitment rate and FHA's contract rates. These rates have moved in lock-step for several years. Using forecasts of the FHLMC commitment rate obtained from DRI/McGraw-Hill, we forecast future FHA contract rates based on the historical relationship between these two rates.

Exhibit E-9 provides our forecasts of the FHA rate and DRI's forecasts of the FHLMC rate.

C. Credit Reform Act and Interest Rate Forecasts

In the Federal Credit Reform Act of 1990, which became effective on October 1, 1991, OMB specifies the methodology that FHA must follow in accounting for its cash flows, based upon the date when the credit was authorized or committed. For books of business originating prior to FY 1992, cash flows are processed through a "liquidating account." For books of business originating in FY 1992 or later, cash flows are processed through a "financing account."

Exhibit E-9

Forecasted FHA Contract Rate and FHLMC Commitment Rate		
Year	FHLMC Commitment Rate	FHA Contract Rate
1998	8.24%	8.24%
1999	8.21%	8.21%
2000	7.99%	8.03%
2001	7.81%	7.89%

Sources: A-43 June 1997 Extract and DRI Forecasting.

The interest rates associated with the financing account, which are based on ten-year Treasury bonds, are generally lower than the interest rates associated with the liquidating account. Investments in the liquidating accounts will earn higher yields due to investments made in prior years.

D. Calculating the Economic Value and Capital Ratio

For FY 1997, the economic value of the MMI Fund was calculated by first determining the present value of the future cash flows for all previous books of business as of September 30, 1997. This figure was then added to the 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. To analyze mortgages endorsed prior to FY 1975, we used FHA's most recent survivorship tables for 30-year mortgages. These mortgages were sufficiently seasoned such that economic conditions should not affect their performance significantly.

For fiscal years beyond 1997, the economic value of the fund was calculated by the following equation:

Economic Value = Economic Value at the beginning of the year + Interest + Economic Value of the New Book of Business

The interest rate used in the above equation is 3.0 percent and represents an estimate of future real rates of interest.

Appendix F: Demand Analysis Model

I. Introduction

The MMI Fund's performance is largely determined by four factors: the size and composition of future books of business; the projected prepayment experience; the projected claims experience; and the projected loss severity. The future capital ratios of the MMI fund depend not only on the performance of the current insurance-in-force but also on those of future books of business. The further into the future, the more influence the future books of business have on the Fund's capital ratios.

The capital ratio of the Fund in the future can be viewed as a weighted average of the capital ratios of the current insurance-in-force and the future books of business. The impact of the future books of business on the capital ratio is a function of the changes in economic environment. If house prices were to fall following a recent rally, new books of business originated right before or at the beginning of the decline will be more likely to default than the existing mortgages. In this case, the underestimation of the future books of business will result in the overestimation of the future capital ratios. The composition of future books of business is an important determinant of the Fund's future performance as the premiums and termination rates for different LTV categories are substantially different. Thus, a better estimation of the future demand for FHA mortgage insurance will enhance the accuracy of the estimates of the MMI fund's performance for the future years.

For the FY 1997 Review, Price Waterhouse has developed a macroeconomic time series demand model to replace the existing demand model. The previous demand model used a macroeconomic time series model to project total market purchase originations and a microsimulation model to allocate the total market originations to different segments of the market including FHA/conventioal, FRM/ARM, LTV, and house price categories. The macroeconomic time series demand model has several advantages over the combined model used in the FY 1995 and FY 1996 Reviews. Since the macroeconomic demand model only uses aggregate data to project FHA volume, it is free of the sampling errors that normally occur in a microsimulation model. The macroeconomic demand model used data up to FY 1997 to estimate various regression models while the previous demand model uses data only up to FY 1994 in estimation. In addition, the macroeconomic demand model is designed in such a way that the categorization of loans follows that of the Actuarial Review. This is an improvement over the previous model, in which only four LTV categories were considered in the regression. There are nine LTV categories being used in the MMI Review to estimate termination probabilities and to calculate the Fund's cash flow.

The purpose of the demand analysis model is to forecast the size and composition of FHA's future books of business and to analyze the financial consequences of changes in economic conditions. For a given economic scenario, this model will produce the demand for FHA mortgage insurance for each combination of mortgage product, LTV, and house price category. The demand model explicitly quantifies the relationship between various macroeconomic variables and the total volume and distribution of purchase mortgages that FHA is likely to endorse. The macroeconomic variables include, among others, current and historical 30-year mortgage rates, 52-week T-bill yields, unemployment rates, changes in house price, and changes in disposable income.

II. The Structure of the Demand Analysis Model

There are five components in the Demand Analysis Model:

1. FHA Purchase Volume Module: a module designed to produce forecasts of the aggregate dollar volume of FHA purchase originations;

2. Loan Type Distribution Module: a module designed to divide the volume of FHA purchase originations into four loan types (30-year FRMs, 15-year FRMs, ARMs, and GPMs);

3. LTV Distribution Module: a module designed to divide the volume of FHA purchase originations for each loan type into nine LTV categories;

4. House Price Distribution Module: a module designed to divide the volume of FHA purchase originations in each loan type and LTV category into eight relative house price categories;

5. Refinance Mortgage Origination Module: a module designed to divide the volume of FHA refinancings into FHA recaptures (i.e. FHA-insured mortgages that refinance with FHA) and conventional captures (i.e. FHA-insured mortgages that refinance with conventional mortgages, either insured or uninsured).

The first four modules concern FHA's purchase volume and distribution, while the last module deals with FHA's recapture rates of refinancing loans. The first four modules are sequential models in that FHA's purchase volume is first estimated and then distributed among the four loan types. The LTV distribution is estimated within each loan type and the relative house price distribution within each loan type and LTV category.

III. Data Sources

The two major data sources for the demand analysis are the A-43 data set and DRI macroeconomic forecasts. FHA's total purchase volume for each fiscal year from FY 1975 to FY 1997 and its distribution among different loan type, LTV, and house price categories are calculated from A-43. The macroeconomic time series data used in estimation and projection are obtained from DRI. In the loan type module, a time series of market ARM share (for conventional and FHA loans combined) is constructed using monthly (1983 -1994) and quarterly (1995-1997) ARM data from the Federal Housing Finance Board and quarterly market origination data from the Survey of Mortgage Lending Activities.

IV. FHA Purchase Volume Module

Because the dollar volume of purchase mortgage originations is nonstationary and positively correlated with the house price level and total population, the dependent variable used in FHA purchase mortgage origination regression is the log of the real per capita purchase dollar volume, which is defined as the dollar volume of FHA purchase mortgage originations deflated by a house price index and divided by total population.

Mortgage originations are sensitive to macroeconomic conditions as measured by interest rate, unemployment rate, house price, and income. Mortgage originations are likely to be high in an environment of low interest rates, low unemployment, and high income levels, and to be low when both interest rates and unemployment rates are high. Characterized by modest and sometimes wide fluctuations over time, FHA's purchase volume has increased from $4.7 billion in FY 1975 to $56.0 billion in FY 1997. During the rising interest rate period in the late 1970s to the early 1980s, FHA's purchase volume dropped from $15.7 billion in FY 1979 to $7.3 billion in FY 1982. In the subsequent declining interest rate period, FHA's purchase volume reached an all-time high of $69.9 billion in FY 1987, which was followed by a 40 percent drop in volume in FY 1988 because of temporarily exhausted demand. Since then, FHA's purchase volume has been less volatile, remaining between the $40-56 billion level.

Because the underwriting criteria normally require a maximum payment-to-income ratio of 29 percent, lower interest rates enable low-income borrowers to qualify for the loans which they otherwise would not be able to afford. For the middle and high income borrowers, lower interest rates would stimulate the demand of mortgages due to lower homeownership cost. Both the quantity and size of the mortgages are likely to increase when interest rates are lower.

In addition to the current level of interest rate, historical interest rates also affect FHA's purchase originations. When interest rates are rising, borrowers qualified to obtain loans may have already

done so. This is similar to the burnt-out effect in the mortgage refinancing activities. Thus, given the same level of current interest rates, we would expect lower FHA mortgage volume if interest rates are rising. To capture the effects of the dynamics of interest rate movement on FHA's purchase volume, a three-year moving average of interest rates is included in the regression.

While we expect both unemployment rates and income to be correlated with FHA's purchase volume, income is not included in the regression model because the estimated coefficient was insignificant and sensitive to model specification.

Model Specification

The FHA purchase mortgage origination model is as follows:

$$LNPSVOL_t = \beta_0 + \beta_1 UNEMP_t + \beta_2 LNMRTRATE_t + \beta_3 LNMAV3RATE_t + \beta_4 CHG3AVHP_t + \epsilon_t$$

where

$LNPSVOL_t$ ≡ log of the per capita FHA purchase dollar volume deflated by a house price index,

$UNEMP_t$ ≡ unemployment rate at time t,

$LNMRTRATE_t$ ≡ log of 30-year mortgage rate at time t,

$LNMAV3RATE_t$ ≡ log of the average of the 30-year mortgage rates for the last three years (time t-1, t-2, and t-3), and

$CHG3AVHP_t$ ≡ the change in the log of average house price index from time t-1 to time t.

The model is estimated by using an AR(2) process to correct for the autocorrelation bias, i.e.,

$$\epsilon_t = \rho_1 \epsilon_{t-1} + \rho_2 \epsilon_{t-2} + u_t.$$

Model Results

The results of the purchase mortgage origination regression are reported in Exhibit F-1. The simple AR(1) structure for the error term is rejected as the Durbin-Watson statistic is estimated to be 2.015. However, the estimated ρ_2 for the AR(2) model is significant, indicating an AR(2) model fits the data better. The R^2 improved from 0.658 for the OLS model to 0.746 for the AR(2) model. All the coefficients in the AR(2) model are statistically significant and the signs are consistent with our expectations. FHA's purchase volume is projected to decline slightly to $53.3 billion for FY 1998 and then increase to $57.2 billion in FY 1999 and $65.6 billion in FY 2000. The historical and projected purchase originations for FHA loans are reported in Exhibit F-3.

V. Loan Type Distribution Module

The purpose of the loan type distribution module is to break FHA's purchase originations into four different loan types: 30-year FRMs, 15-year FRMs, ARMs, and GPMs. Because 15-year FRMs and GPMs constitute only a small portion of FHA's business in the past few years, we group 30-year FRMs, 15-year FRMs, and GPMs as a larger category (FRM), thus reducing the types of loans to FRMs and ARMs. We assume that future GPM volume remains the same as that in the most recent year and the percentage of 15-year FRM loans relative to 30-year FRM loans are the same as the average in the recent three years. Therefore, only ARM share needs to be forecasted using a regression model.

In constrast to the conventional loan's ARM share, which has been a significant portion of the originations since the 1980s, the ARM percentages in FHA loans were neglible prior to FY 1992 (see Exhibit F-3). This is most likely due to institutional factors rather than macroeconomic conditions. To avoid the bias that might arise from the model estimation using FHA's ARM percentages before FY 1992, we employ a two-step method to project FHA's ARM shares. In the first step, a regression for the total market's ARM shares (conventional and FHA combined) is estimated and market ARM shares are projected. In the second step, the market ARM shares are used to estimate FHA's ARM shares.

V.1. Market ARM Share Model

The first step regression uses as dependent variable the log of quarterly ARM percentages from FY 1983 to FY 1997. The explanatory variables for the regression include the unemployment rate, 30-year mortgage rate, yield curve spread, and change in house prices and income. The housing literature has found that mortgage rate and yield curve spread are the two most important factors in explaining borrower's choice of ARM versus FRM. When mortgage rates are

relatively high, housing becomes less affordable, boosting the demand for ARMs because the ARMs require smaller initial monthly payments. In addition, borrowers may expect mortgage rates to decline eventually and thus are less willing to commit to fixed rates for a long period of time. Another important factor influencing borrower's choice of ARM versus FRM is the difference between the long-term mortgage rates and the one-year T-bill rate. The one-year T-bill rate is commonly used as an index to adjust the rates for ARMs. Higher spreads mean lower relative prices for ARMs, thus increasing the incentive for borrowers to choose ARMs over FRMs.

Model Specification

The market ARM share model is as follows:

$$LNMKTARMPT_t = \beta_0 + \beta_1 UNEMP_t + \beta_2 LNMRTRATE_t + \beta_3 LNYLDSPRD_t + \beta_4 LNMAV3RATE_t + \beta_5 CHG3AVHP_t + \beta_6 CHG3DPI_t + \epsilon_t$$

where

$LNMKTARMPT_t \equiv$ log of the total market ARM percentage,

$LNYLDSPRD_t \equiv$ log of the difference between the 30-year mortgage rates and 52-week T-bill yields

$CHG3DPI_t \equiv$ the change in the log of disposable income from time t-1 to time t.

Model Results

The regression results for the market ARM share model is shown in Exhibit F-2. Although the coefficeints for the OLS model are mostly significant and only one variable in the AR(1) model has a significant coefficient, the i.i.d. hypothesis in the OLS model is rejected because of the high serial correlation in the residuals (0.686). The estimates from the AR(2) model are similar to those of the AR(1) model and the additional second-order autocorrelation coefficient is close to zero and insignificant. Therefore, the AR(1) model is used to project the market ARM share.

The results from the AR(1) model indicate that mortgage rates are positively correlated with ARM shares as expected. Mortgage rate is the only variable that is statistically significant in the model although the coefficients for other variables have signs that are consistent with borrowers' mortgage choice behavior. The coefficient for yield curve spread is positive but insignificant, indicating that the difference between long and short rates is less important than the mortgage rate level in determining the market ARM share. Higher unemployment rates tend to squeeze out

marginal borrowers and make borrowers more risk averse, leading to lower demand for ARMs. The positive coefficient for the moving average mortgage rates indicates that borrowers are less likely to choose ARMs when mortgage rates are declining. Borrowers who wait for mortgage rates to come down to obtain mortgages are more likely to be satisfied with the prevailing rates and would have a high probability of choosing FRMs over ARMs.

V.2. FHA ARM Share Model

FHA's ARM share model establishes a relationship between FHA's ARM share and the market ARM share. The relationship is specified as follows:

$$LNFHAARMPT_t = \beta_0 + \beta_1 LNMKTARMPT_t + \epsilon_t$$

where $LNFHAARMPT_t$ and $LNMKTARMPT_t$ are the log of FHA and total market ARM percentages respectively. Annual data from FY 1992 to FY 1997 (six observations) are used for estimation. The OLS estimates for β_0 and β_1 are 0.829 (t-value 0.66) and 0.751(t-value 1.97) respectively. The model has an R^2 of 0.492. FHA's future ARM shares are projected by plugging the projected market ARM shares into the estimated FHA ARM share model.

FHA's historical and projected loan type distribution is reported in Exhibit F-3. The ARM shares in FHA loans are expected to drop slightly to 26.8% in FY 2,000 while the FRM shares are expected to edge upward to 71.5% in FY 2000.

VI: LTV Distribution Module

The accurate projection of the distribution of loans among different LTV categories is crucial to the determination of the MMI Fund's economic value and capital ratio. Since FHA's high LTV loans tend to have much higher default rates than the low LTV loans, an underestimation of the high LTV loan volume would result in an overestimation of the economic value and capital ratio if incremental loss cannot be recovered from the additional premium charged to higher LTV loans.

Because the volume of 15-year FRMs and GPMs are relatively small, the future distribution of both types of loans are assumed to be the same as their average in the past three years. For both 30-year FRMs and ARMs, a regression model is estimated for each LTV category (except for the unknown LTV category). The projected percentages for each year are normalized so that the total percentages across the nine LTV categories sum up to 100.

Model Specification

The LTV distribution model is as follows:

$$LNLTVCATPT_{yjt}=\beta_0+\beta_1 UNEMP_t+\beta_2 LNMRTRATE_t+\beta_3 LNMAV3RATE_t \\ +\beta_4 CHG3AVHP_t+\beta_5 CHG3DPI_t+\epsilon_t$$

where $LNLTVCATPT_{yjt}$ is the log of the loan percentage of LTV category j in loan type y endorsed in fiscal year t.

The model is assumed to have an AR(2) error structure and estimated by maximum likelihood methods. In the cases when the computation for maximizing the likelihood does not converge, the model is estimated by assuming an AR(1) error process. This is equivalent to restricting the autocorrelation correlation coefficient of the second order to zero.

The regression results for the 30-year FRMs and ARMs are shown in Exhibit F-4 and F-5 respectively. The results indicate that when interest rates are higher, 30-year FRM borrowers tend to choose lower LTV loans. This is because higher borrowing costs increase the incentive to make higher down payments and thus reduce the loan amounts and LTV ratios. However, the regression results for the ARM model do not show this relationship. This may be because ARM borrowers are more likely to be constrained by financial resouces and often cannot afford to make larger downpayments when interest rates are high.

VII. House Price Distribution Module

The purpose of the house price distribution module is to divide the projected volume in each loan type and LTV category into different relative house price categories. The relative house price is defined as the ratio of purchase price to the relevant MSA or state median house price. Eight relative house price categories are used in the MMI model: 0-60%, 60-70%, 70-80%, 80-95%, 95-106%, 106-122%, greater than 122%.

For the 15-year FRM, ARM, and GPM loans, we take the average relative house price distribution for each loan type and LTV category in the past three years as the future house price distribution. For the 30-year FRM loans, a time series regression model for each LTV and relative house price category is estimated to project the future relative house price percentage for the specific category. Given the eight LTV categories (excluding the unknown category) and eight relative house price categories, in total, 64 regression models are estimated .

Model Specification

The house price distribution model is as follows:

$$LNHPCATPT_{jkt}=\beta_0+\beta_1 UNEMP_t+\beta_2 LNMRTRATE_t+\beta_3 LNMAV3RATE_t \\ +\beta_4 CHG3AVHP_t+\beta_5 CHG3DPI_t+\epsilon_t$$

where $LNHPCATPT_{jkt}$ is the log of the percentage of relative house price category k in LTV category j and fiscal year t.

To estimate the model, we assume that the error term follows an AR(2) process. As in the LTV distribution module, the error term is modified as an AR(1) process when the iteration to search for the maximum likelihood does not converge. For each LTV category, a share for each relative house price category is projected. Adjustments are made so that the percentages for the eight relative house price categories across each LTV category sum to 100.

VIII. Refinance Mortgage Origination Module (RMOM)

Projecting future demand for FHA-insurance will require forecasts of purchase mortgage originations as well as refinance mortgage originations. The decision to purchase a new home and the decision to refinance an existing property are sufficiently dissimilar as to require separate models. The determinants of refinancing activity are discussed here. Particular attention is given to the recapture rate, which is the incidence that an FHA insured loan is refinanced by another FHA loan covered by the MMI Fund as opposed to conventional refinancing. In this section, we present the econometric specification of the refinance mortgage origination module (RMOM), which is designed to estimate future recapture rates, and the results from the regression analysis.

Determinants of Refinancing Activity

Traditionally, homeowners' decisions about refinancing existing mortgage debt have been motivated by two major factors: lower mortgage interest rates and increased property values. Preliminary research has yielded promising results based on house price indices for new and existing homes and fixed-rate mortgage interest rates. In particular, we would expect the number of refinancings to increase as mortgage interest rates decrease and allow borrowers to take advantage of lower monthly payments. We would also expect the level of refinancing to increase as property values rise, since rising property values both increase a household's ability to qualify for a refinancing and expand the number of households that will pursue cash-out refinancings (or home equity loans). When analyzing homeowners with FHA insured mortgages, additional factors must also be considered. For example, FHA's premium refund policy will obviously

affect a borrower's decision to prepay and refinance.

We are concerned not only with overall refinancing activity within the MMI pool of mortgages, but particularly with those borrowers who stay within the Fund as opposed to those who seek refinancing in the conventional market. The decision to stay within the Fund will depend on two important factors: equity growth and the difference in costs between FHA and private mortgage insurance (PMI). As a borrower experiences increases in housing equity, he is more likely to refinance into a conventional loan in order to lower the mortgage insurance premium. More importantly, however, is the difference in premiums. Obviously, the more competitively priced FHA premiums are, the more likely borrowers are to stay within the MMI Fund.

Refinance Model Specification

The specification of our refinancing model employs a cell-based approach similar to those used in the existing models of claim and prepayment behavior for the Actuarial Review. We define cells according to origination year, policy year of observation, and relative house price category. Separate equations have been estimated for each loan-to-value (LTV) category using ordinary least squares techniques. Our specified model of refinancing activity follows, taking into account both the incentives to refinance and the decision to stay within the MMI Fund:

$$RECAPx_{y,t,l} = \sum_{l=1}^{n} \alpha P_{l,t} + \beta_1 NPVPREMx_{y,t} + \beta_2 CQHPI_{y,t} + \beta_3 HPDISP_t + \epsilon_{y,t}$$

where

$RECAPx_{y,t,l}$ ≡ the portion of FHA-insured mortgages of LTV category x, of loan size category I, originated in fiscal year y, that refinance within the MMI Fund in policy year t,

$P_{l,t}$ ≡ n policy year dummy variables constructed so that $P_{l,t} = 1$ when policy year $(t) = l$ and $P_{l,t} = 0$ otherwise,

$NPVPREMx_{y,t}$ ≡ the net present value of premiums (including refunds and origination costs) expected to be paid on a conventional refinancing minus the net present value of premiums expected to be paid if one remained with FHA in policy year t a loan originated in fiscal year y of LTV category x,

$HPI_{y,t}$ ≡ the house price index in policy year t, indexed to its value in the base year y, and

$HPDISP_{y,t}$ ≡ house price dispersion index for loans originated in year y and observed in policy year t-1 (lagged one year).

Model Results

The expected effect of the policy year variable is that as a loan ages, the equity a borrower will have in his or her home will increase. This, in turn, increases the accessibility of a conventional loan and decreases the recapture rate. We expect this trend to increase in the first few policy years, and then flatten out as time goes by. The policy year variable constructed above indicates that this is the likely effect of time on the recapture rate.

Since the net present value (NPV) of premiums is the NPV of premiums refinancing conventionally minus the NPV of refinancing within FHA, we expect the recapture rate to increase as this variable increases. As FHA decreases its premiums, the NPV of the premiums from refinancing with FHA decreases, causing the total NPV of premiums to increase (or move closer to zero if negative), and the recapture rate to increase. The effect of the estimated net present value premium on recapture rates is as expected.

As the rate of house price growth increases, the equity accumulation a borrower experiences will increase. This, in turn, will increase a borrower's likelihood of qualifying for a conventional loan and leaving FHA. As the dispersion of house prices increases, the number of FHA homeowners who experience lower than average house price appreciation increases. These borrowers achieve less equity growth, and are therefore less likely to obtain a conventional loan and more likely to remain with FHA. Both coefficients are significant and have the expected sign. Exhibit F-8 summarizes the coefficients obtained in the regression analysis and the overall fit of the equations.

Exhibit F-1

Regression Results for FHA Purchase Mortgage Origination Model (t-statistics are in parentheses)		
Variable	*OLS Estimates.*	*AR(2) Error Model*
Constant	13.823 (20.38).	13.616 (41.96)
UNEMP	-0.176 (-2.99)	-0.233 (-6.65)
LNMRTRATE	-1.581 (-3.61)	-1.169 (-4.60)
LNMAV3RATE	2.076 (4.68)	1.942 (8.41)
CHG3AVHP	-0.057 (-0.07)	-0.409 (-1.00)
R-Square	0.658	0.746
ρ_1		-0.250 (-1.39)
ρ_2		-0.503 (-2.79)

Exhibit F-2

Regression Results for Market ARM Share Model (t-statistics are in parentheses)		
Variable	*OLS Estimates.*	*AR(1) Error Model*
Constant	0.809 (2.16)	0.214 (0.28)
UNEMP	-0.024 (-0.46)	-0.141 (-1.79)
LNMRTRATE	3.330 (7.67)	2.387 (5.06)
LNYLDSPRD	0.494 (3.37)	0.124 (0.65)
LNMAV3RATE	-2.397 (-4.80)	-0.627 (-1.00)
CHG3CQHP	2.037 (2.82)	-0.235 (-0.24)
CHG3DPI	5.278 (2.73)	3.022 (1.12)
R-Square	0.774	0.835
ρ_1		0.686 (7.25)

Exhibit F-3

Historical and Projected FAH Purchase Volume and Loan Type Distribution

Fiscal Year	*FHA Volume (billion)*	*F30 (%)*	*F15 (%)*	*ARM (%)*	*GPM (%)*	*Market ARM Share (%)*
1975	4.691	99.729	0.271	0.000	0.000	N.A.
1976	5.734	99.785	0.215	0.000	0.000	N.A.
1977	7.177	99.732	0.152	0.000	0.116	N.A.
1978	10.025	86.108	0.086	0.000	13.805	N.A.
1979	15.656	64.381	0.062	0.000	35.558	N.A.
1980	14.875	65.325	0.099	0.000	34.577	N.A.
1981	10.267	72.532	0.153	0.000	27.314	N.A.
1982	7.321	77.162	0.358	0.000	22.480	N.A.
1983	26.782	81.789	6.231	0.000	11.980	N.A.
1984	15.919	81.941	5.606	0.008	12.446	60.490
1985	24.043	86.570	7.308	0.142	5.980	52.170
1986	57.521	89.386	8.293	0.740	1.581	32.923
1987	69.944	90.825	6.632	1.535	1.008	34.447
1988	37.305	90.275	3.697	5.035	0.993	59.293
1989	39.664	95.109	2.521	1.528	0.842	47.390
1990	47.060	95.530	2.672	0.800	0.997	26.375
1991	43.293	91.242	3.126	4.518	1.114	24.047
1992	38.507	77.691	2.776	19.085	0.448	20.680
1993	43.417	76.132	3.282	20.326	0.260	20.596
1994	48.417	69.145	2.835	27.844	0.175	28.675
1995	39.679	67.942	1.344	30.579	0.135	38.307
1996	53.672	69.600	1.474	28.889	0.038	24.801
1997	55.956	61.799	1.787	36.404	0.011	26.719
1998	53.323	69.020	1.595	29.375	0.011	29.808
1999	57.194	69.794	1.612	28.583	0.010	28.740
2000	65.600	71.544	1.653	26.794	0.009	26.363

Note: FHA volume and loan type distribution prior to FY 1997 are historical data. Values for FY 1997 are adjusted using partial year data. Values in the shaded area are projected using the Demand Analysis Model.

Exhibit F-4

LTV Distribution Regression Results for F30
(t-statistics in parentheses)

Variable	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor*
Constant	-7.357 (-14.98)	-4.969 (-19.30)	1.538 (3.16)	2.452 (24.47)	5.060 (47.84)	5.944 (35.06)	4.017 (9.90)	-3.660 (-6.00)
UNEMP	0.084 (1.58)	-0.0001 (-0.005)	0.123 (3.16)	0.064 (5.75)	0.060 (4.99)	-0.063 (-3.25)	-0.070 (-1.59)	0.071 (1.17)
LNMRTRATE	1.446 (4.49)	1.165 (5.43)	-0.158 (-0.71)	-0.179 (-2.16)	-0.728 (-8.09)	-0.403 (-2.88)	-0.173 (-0.57)	1.099 (2.92)
LNMAV3RATE	1.752 (5.20)	1.565 (6.97)	0.362 (1.34)	-0.133 (-1.51)	-0.583 (-6.21)	-0.527 (-3.57)	0.037 (0.11)	0.843 (1.92)
CHG3AVHP	1.179 (1.78)	1.620 (3.69)	-0.892 (-1.78)	-0.236 (-1.38)	-1.347 (-7.29)	-1.961 (-6.82)	2.552 (4.00)	2.141 (2.60)
CHG3DPI	-7.686 (-2.42)	-1.922 (-0.92)	-8.068 (-3.85)	0.958 (1.20)	1.047 (1.20)	-1.266 (-0.93)	-2.591 (-0.88)	8.332 (2.30)
R^2	0.954	0.938	0.786	0.579	0.937	0.909	0.55	0.9
ρ_1	0.805 (5.30)	-0.016 (-0.09)	1.238 (10.71)	-0.422 (-2.23)	-0.222 (-1.29)	-0.049 (-0.26)	0.014 (0.07)	0.448 (2.20)
ρ_2	-0.685 (-4.50)	-0.504 (-2.80)	-0.832 (-7.20)	-0.416 (-2.19)	-0.564 (-3.28)	-0.453 (-2.44)	-0.215 (-1.05)	-0.217 (-1.07)

Exhibit F-5

LTV Distribution Regression Results for ARM
(t-statistics in parentheses)

Variable	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor[a]
Constant	-8.272 (-11.26)	-4.923 (-7.93)	1.807 (7.84)	2.456 (13.82)	4.308 (31.21)	5.812 (29.44)	1.632 (2.90)	0.509 (1.76)
UNEMP	0.026 (0.09)	0.407 (1.54)	0.265 (3.00)	-0.174 (-2.58)	0.065 (1.09)	0.230 (2.67)	-0.337 (-1.38)	-0.087 (-0.79)
LNMRTRATE	-0.731 (-0.53)	1.624 (1.17)	-0.246 (-0.55)	-1.745 (-5.25)	-0.302 (-0.99)	0.330 (0.74)	0.642 (0.51)	-0.156 (-0.29)
LNMAV3RATE	3.871 (2.01)	-0.287 (-0.15)	-0.338 (-0.55)	2.101 (4.54)	-0.607 (-1.46)	-1.996 (-3.32)	1.001 (0.59)	0.623 (0.83)
CHG3CQHP	0.532 (0.21)	2.897 (1.19)	-0.377 (-0.45)	-2.046 (-3.31)	-0.507 (-0.95)	0.519 (0.67)	0.636 (0.29)	0.539 (0.54)
CHG3DPI	1.669 (0.43)	0.125 (0.03)	3.494 (2.72)	2.007 (2.11)	-0.762 (-0.99)	-1.368 (-1.22)	-0.648 (-0.21)	11.441 (7.43)
R^2	0.885	0.913	0.908	0.762	0.953	0.958	0.812	0.917
ρ_1	-0.626 (-3.00)	-0.283 (-1.86)	-0.261 (-1.03)	-0.593 (-2.76)	-0.671 (-2.77)	-0.544 (-2.40)	-0.653 (-2.73)	-0.612 (-2.90)
ρ_2			-0.821 (-5.38)	-0.311 (-1.23)		-0.426 (-1.76)	-0.528 (-2.32)	-0.449 (-1.88)

Note: The maximum likelihood estimation for the AR(2) error structure in the LTV 0-65%, 65-80%, and 93-95% models do not converge. Therefore, the error term is assumed to follow an AR(1) process.

Exhibit F-6

Historical and Projected LTV Distribution for F30 Loans (t-statistics in parentheses)

Year	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor
1975	17.56	0.70	3.09	7.86	9.08	8.78	14.56	31.58	6.79
1976	17.65	0.59	2.27	5.99	7.22	9.47	16.07	34.64	6.10
1977	11.33	0.82	2.95	6.93	9.38	11.75	17.73	33.53	5.58
1978	16.98	0.92	2.76	5.64	6.67	7.58	14.67	38.66	6.12
1979	21.59	1.47	3.64	6.13	5.80	5.83	13.23	35.62	6.70
1980	11.61	2.92	7.17	10.04	8.35	6.34	14.19	30.04	9.36
1981	26.24	2.55	6.24	8.69	6.46	5.28	11.55	20.72	12.27
1982	15.79	4.85	10.15	11.57	7.21	6.17	11.98	18.05	14.26
1983	19.74	4.54	10.10	12.26	7.43	6.23	11.57	16.96	11.19
1984	2.67	3.17	8.05	8.04	8.14	7.14	13.44	31.60	17.76
1985	1.03	2.95	8.17	10.85	8.74	7.48	14.30	27.06	19.43
1986	0.42	3.10	9.75	12.25	10.49	7.96	13.61	26.25	16.17
1987	0.16	3.05	9.03	12.59	7.81	7.50	18.48	27.25	14.13
1988	0.08	1.46	4.57	8.47	7.73	8.60	21.38	38.33	9.38
1989	0.52	1.16	4.29	8.19	8.12	9.10	21.84	39.46	7.33
1990	1.31	1.25	4.06	7.85	8.04	9.29	20.90	40.13	7.15
1991	3.93	1.32	3.31	11.02	7.84	9.61	19.50	40.85	2.62
1992	2.67	1.21	3.05	12.46	10.48	16.20	37.10	13.80	3.02
1993	0.12	0.80	2.20	10.84	9.61	14.45	32.89	26.11	2.98
1994	0.11	0.73	2.14	10.19	8.89	13.66	31.86	28.77	3.66
1995	0.04	0.57	2.00	9.58	8.76	13.76	32.08	28.87	4.34
1996	0.02	0.48	2.11	10.28	9.00	14.55	32.52	26.20	4.83
1997	0.00	0.64	2.52	11.05	9.43	14.69	31.37	24.79	5.50
1998	0.01	0.73	2.23	10.18	8.48	11.85	27.59	35.91	5.02
1999	0.01	0.65	2.10	8.84	8.59	11.96	28.28	36.44	4.13
2000	0.01	0.58	2.30	7.60	8.92	13.46	30.59	33.03	3.70

Note: Values prior to FY 1997 are historical data. Values for FY 1997 are based on partial year data. Values in the shaded area are projected using the Demand Analysis Model.

Exhibit F-7

Historical and Projected LTV Distribution for ARM (in percentage)

Year	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor*
1984	0.00	3.77	7.13	12.50	7.56	9.58	20.23	29.02	10.21
1985	0.37	0.99	3.20	12.15	11.18	9.80	19.22	35.74	7.35
1986	0.45	2.43	6.78	11.03	11.41	9.56	18.00	30.91	9.41
1987	0.02	1.38	4.32	9.46	9.73	11.03	21.31	35.85	6.90
1988	0.03	0.52	2.38	7.33	8.74	10.56	23.32	41.50	5.63
1989	0.06	0.56	1.93	7.00	8.60	10.83	23.19	40.82	7.00
1990	0.06	0.48	2.30	6.71	9.07	11.91	23.44	40.33	5.71
1991	3.91	0.61	2.44	10.80	9.04	12.06	25.86	31.88	3.41
1992	1.95	0.54	2.47	13.37	11.54	17.11	41.44	8.33	3.26
1993	0.05	0.32	1.75	11.51	10.57	15.46	35.75	20.97	3.63
1994	0.05	0.27	1.43	10.18	9.72	14.89	35.43	23.74	4.29
1995	0.04	0.26	1.34	9.16	8.98	14.54	35.96	24.31	5.40
1996	0.01	0.23	1.40	9.41	8.86	15.17	36.49	23.00	5.43
1997	0.00	0.26	1.65	9.69	9.26	15.29	36.27	22.02	5.55
1998	0.01	0.22	1.38	8.21	7.71	13.27	33.61	32.88	6.16
1999	0.01	0.23	1.40	8.34	7.79	14.51	36.99	26.21	4.83
2000	0.01	0.23	1.68	8.67	8.52	14.92	36.92	24.24	4.69

Note: Values prior to FY 1997 are historical data. Values for FY 1997 are based on partial year data. Values in the shaded area are projected using the Demand Analysis Model.

Exhibit F-8

Regression Results for Recapture Rate Model by LTV Category (t-statistics in parenthesis)

Variable	Unknown LTV	0-65%	65-80%	80-90%	90-93%	93-95%	95-97%	97-100%	Investor[a]
Constant	-1.019 (-0.900)	3.581 (3.028)	1.878 (1.726)	1.899 (1.969)	-0.378 (-0.384)	3.03 (2.948)	3.076 (3.020)	3.446 (3.738)	0.851 (1.062)
$P_{1,t}$	1.224 (3.483)	-0.618 (-1.629)	-0.153 (-0.443)	-0.215 (-0.705)	0.505 (1.625)	-0.237 (-0.741)	-0.509 (-1.602)	-0.619 (-2.108)	0.63 (2.320)
$P_{2,t}$	1.156 (3.473)	0.054 (0.155)	0.016 (0.052)	-0.157 (-0.556)	0.196 (0.677)	-0.457 (-1.519)	-0.462 (-1.548)	-0.296 (-1.087)	0.64 (2.700)
$P_{3,t}$	1.114 (3.489)	-0.224 (-0.668)	-0.358 (-1.180)	-0.5 (-1.851)	0.039 (0.143)	-0.51 (-1.774)	-0.557 (-1.954)	-0.348 (-1.336)	0.427 (1.894)
$P_{4,t}$	1.005 (3.297)	-0.369 (-1.163)	-0.443 (-1.535)	-0.698 (-2.715)	-0.162 (-0.616)	-0.711 (-2.601)	-0.751 (-2.771)	-0.584 (-2.373)	0.264 (1.232)
$P_{5,t}$	0.421 (1.440)	-0.25 (-0.828)	-0.321 (-1.200)	-0.671 (-2.797)	-0.087 (-0.356)	-0.526 (-2.073)	-0.598 (-2.383)	-0.635 (-2.744)	0.236 (1.166)
$P_{6,t}$	0.215 (0.818)	-0.412 (-1.546)	-0.458 (-1.908)	-0.846 (-3.958)	-0.283 (-1.291)	-0.648 (-2.855)	-0.63 (-2.787)	-0.578 (-2.808)	0.295 (1.653)
$P_{7,t}$	-0.803 (-3.452)	-0.348 (-1.480)	-0.195 (-0.918)	-0.579 (-3.057)	-0.185 (-0.954)	-0.472 (-2.345)	-0.424 (-2.130)	-0.401 (-2.205)	0.376 (2.379)
$P_{8,t}$	-0.511 (-2.581)	-0.436 (-2.110)	-0.277 (-1.488)	-0.529 (-3.186)	-0.168 (-0.988)	-0.399 (-2.266)	-0.346 (-1.983)	-0.356 (-2.231)	0.234 (1.699)
$P_{9,t}$	-0.069 (-0.399)	-0.354 (-1.956)	-0.235 (-1.442)	-0.427 (-2.932)	-0.051 (-0.339)	-0.221 (-1.435)	-0.318 (-2.064)	-0.132 (-0.947)	0.132 (1.091)
$P_{10,t}$	0.213 (1.320)	-0.08 (-0.470)	0.079 (0.523)	-0.231 (-1.735)	0.053 (0.380)	-0.068 (-0.475)	0.034 (0.244)	0.011 (0.087)	0.236 (2.127)
$NPVPREM_{y,t}$	0 (3.610)	0 (6.223)	0 (5.616)	0 (4.822)	0 (2.414)	0 (4.871)	0 (3.174)	0 (1.770)	0 (2.975)
$HPI_{y,t}$	0.297 (0.388)	-2.601 (-3.319)	-1.51 (-2.074)	-1.417 (-2.183)	-0.133 (-0.202)	-2.398 (-3.475)	-2.61 (-3.802)	-3.004 (-4.835)	-1.15 (-2.129)
$HPDISP_{y,t}$	1.048 (3.191)	0.143 (0.424)	0.512 (1.716)	0.191 (0.709)	0.85 (3.079)	0.768 (2.739)	0.582 (2.104)	0.332 (1.279)	0.218 (0.973)
Summary Regression Statistics									
Adjusted-R^2	0.474	0.289	0.135	0.165	0.096	0.161	0.134	0.252	0.394
F-statistic	26.895	11.733	5.725	7.096	4.225	6.856	5.749	11.323	20.57
D-W statistic	1.101	1.385	1.341	1.209	1.183	1.227	1.216	1.321	1.187

[a] Investor loans and loans with two or more dwelling units.

Appendix G: Loss Mitigation

Until its termination in 1996, FHA's loan assignment program was the primary alternative to foreclosure for many FHA borrowers experiencing financial difficulties. The program was terminated effective April 26, 1996 by the enactment of the Balanced Budget Downpayment Act. Its replacement, FHA's loss mitigation program, went into effect on November 12, 1996. Under this program, FHA compensates mortgagees for their actions to mitigate loss. Mortgagees can use five primary tools in their efforts to avoid foreclosure:

- Special forbearance
- Mortgage modification
- Partial claim
- Pre-foreclosure sale
- Deed-in-lieu of foreclosure.

Lenders are required to review the status of each defaulted loan in their portfolio each month, and to document their loss mitigation efforts. Although lenders have flexibility in determining which tools to use, FHA requires that all of the loss mitigation tools be considered throughout a loan's delinquency.

The program is expected to reduce the number of foreclosures and to reduce the costs associated with many foreclosures; however, after a full year of experience, little is known about the long-term prospects for success of the new loss mitigation procedures. According to HUD's 1998 budget request, the replacement of the single family assignment program is estimated to save a total of almost $1.5 billion for all books of business through 1997. Because of the uncertainty surrounding the new loss mitigation techniques and the frequency of their use by mortgagees, these estimated savings are difficult to verify.

HUD's experience with its loss mitigation tools is recorded in a loss mitigation database that is currently being used to monitor loss mitigation claims. The database contains information on the claim type, costs associated with the claim including title search and other default costs, claim payment amounts, date and type of agreements made, and other data elements. These data will eventually allow the analysis of the relationship between use of loss mitigation tools, the associated costs, and probability of eventual default. Once enough experience is accumulated and recorded in the database to establish a relatively stable, and financially significant, level of use of the loss mitigation tools, the financial effects of the loss mitigation tools could be incorporated into the actuarial review. Additional accumulated experience would also allow trends in the use of loss mitigation tools to be identified, which is necessary for accurately predicting future use of these tools. Furthermore, this data may eventually be useful in the actuarial review model as an

early warning system for potential changes in claim rates in the near future. Incorporating this information into the model may allow more accurate estimation of future claim rates.

I. Loss Mitigation Tools Designed To Keep Borrowers In the Home

Special forbearances, mortgage modifications, and partial claims are all designed to avoid foreclosure, and to keep borrowers in their homes. Each tool is appropriate for specific circumstances, and is designed to resolve a particular financial difficulty. More than one tool can be used in some situations.

Special forbearances are designed to provide relief to borrowers with temporary financial problems. Specifically, homeowners can be considered for special forbearance if they have experienced an involuntary reduction in income or increase in living expenses and the borrower has the ability to pay the arrearage on his mortgage under the terms of the special forbearance. A special forbearance allows for a period of reduced or suspended payments. The forbearance cannot result in an arrearage of more than 12 months of PITI.

In contrast to special forbearances, mortgage modifications result in permanent changes to the terms of the loan. Modifications are designed for borrowers who have recovered from financial distress, but whose net income has permanently dropped from its level prior to the default. Modifications are especially effective when the borrower has an above-market rate of interest on their mortgage. Under these circumstances, the loan can be refinanced. In addition to refinancing, modifications can include capitalizing the arrearage into the loan balance and extending the term of the mortgage to reduce monthly payments to affordable levels. Because of changes in Ginnie Mae's rules, loans modified under the loss mitigation program can now generally be repooled.

A partial claim is essentially a second loan on a property. FHA pays the amount necessary to cure the default, and a promissory note is issued to secure repayment of the partial claim. The second loan is interest free, and is not required until the first mortgage either matures or is prepaid. Partial claim can be used either by itself or with a special forbearance, although its use is restricted to loans at least four months delinquent but with arrearage of less than 12 months PITI.

II. Alternatives To Foreclosure

The three tools described above are designed to help FHA achieve its primary objective in loss mitigation: keeping borrowers in their homes. Pre-foreclosure sales and deeds-in-lieu-of-foreclosure are tools to be used when borrower loss of the property is inevitable. Both of these

tools enable the borrower to avoid some of the consequences of foreclosure.

Borrowers who agree to sell their homes using a pre-foreclosure sale are relieved of their mortgage obligation. Although borrowers are under no threat of deficiency judgment in either a pre-foreclosure sale or a deed-in-lieu-of-foreclosure, there may be tax consequences for discharge of indebtedness resulting from a short payoff. Borrowers may receive up to $1,000 from FHA to be used for seller-paid closing costs. The pre-foreclosure sale period is limited to three months, and the sales price must be at least 95 percent of the "as is" appraised value.

A deed-in-lieu of foreclosure, which is a voluntary transfer of the property deed to the lender, is used primarily when a pre-foreclosure sale fails because a qualified offer for the property is not received. For example, an offer that is at least 95 percent of the "as is" appraised value may not be received. In this case, FHA may pay borrowers up to $500 to voluntarily convey the property.

III. FHA Cost Reimbursement

FHA reimburses lenders for its estimation of their costs associated with the use of the loss mitigation tool. Lenders are paid $100 for each special forbearance agreement executed, a total of up to $750 for each mortgage modification, a $250 administrative fee for processing each partial claim, and up to $500 upon successful completion of a deed-in-lieu. Upon successful completion of a pre-foreclosure sale, a lender can be compensated for the difference between the proceeds received from the sale and the amount owed on the mortgage plus other reimbursable costs.

FHA's cost reimbursement for mortgagees is similar to the reimbursement given for use of similar loss mitigation tools used in the conventional market by Fannie Mae and Freddie Mac. For example, Freddie Mac will reimburse mortgagees $300 for each loan modification, $250 for each deed-in-lieu, and $700-$1,100 for each pre-foreclosure sale, depending on the default management rating of the servicer.

IV. Incentives

FHA lenders are scored on their success in using loss mitigation tools annually. The performance score for 1996 is based on two categories: a lender's success in holding down its default rate and the comparison of its actual costs to FHA's potential costs. Lenders are scored relative to other lenders in a state with portfolios of a similar size. Lenders scoring in the top 25th percentile of each group are awarded the following loss mitigation incentives for a year after performance scores are published:

- An additional $100 payment for each Special Forbearance Agreement executed
- An additional two months to complete pre-foreclosure sales without prior HUD approval
- Reimbursement of 75 percent of foreclosure costs for loans originated on or after September 1, 1997 (compared with the current reimbursement of 66 percent of foreclosure costs)

Before lenders are ranked, bonus points are awarded to lenders with above-median national portfolios of first-time homebuyers, minority borrowers, and borrowers in under-served areas. Eligibility for bonus points is based on loans in each lender's national portfolio that were originated in the last three years.

V. Expected Versus Actual Use Of Loss Mitigation Tools

FHA anticipates that eventually, of all seriously delinquent loans, 50 percent will self-cure and 40 percent will benefit from loss mitigation tools. Specifically, the following are FHA's expectations for all loans that become seriously delinquent[1]:

Self-cure	50 percent
Special forbearance	10 percent
Partial claim	5 percent
Mortgage modification	3 percent
Property sale by owner	8.5 percent
Pre-foreclosure sale/deed-in-lieu	18.5 percent
Foreclosure	5 percent

[1]Mortgagee Letter 96-61, November 12, 1996.

Actual experience in FY 1997 was quite different. Although data on the use of loss mitigation tools is limited, it appears that the tools were used on seriously delinquent loans approximately as follows:

	Count	% of all Claims	% of Seriously Delinquent Loans[2]
Special forbearance	580	0.9%	0.5%
Partial claim	110	0.2%	0.1%
Mortgage modification	80	0.1%	0.1%
Pre-foreclosure sale/deed-in-lieu	3,680	6.0%	3.0%
Assignment	7,010	11.4%	5.7%
Foreclosure	50,040	81.4%	40.7%
Self-cure			50%

These numbers are approximate. The first percentage distribution presented in the table represents claims actually paid in the fiscal year, and thus excludes loss mitigation actions taken by FHA where no claim payment has occurred. The second percentage distribution presents the use of loss mitigation tools (again including only claims actually paid in the fiscal year) assuming that 50 percent of all seriously delinquent loans eventually self-cure. By either measure, it is clear that the use of the tools was much lower in FY 1997 than expected. Although the assignment program has been terminated, an additional 50-100 assignments a month are expected throughout FY 1998. (As of the end of FY 1997, there were still approximately 1,390 assignment claims remaining to be paid that had been received prior to the cut-off date.) As lenders gain experience using the loss mitigation tools, their use is likely to increase, although it is difficult to estimate the magnitude of the effect of this experience.

Aside from assignments, pre-foreclosure sales were the most common tool used in FY 1997. It is likely that this is due in part to the fact that lenders have the longest experience with pre-foreclosure sales – a demonstration program for pre-foreclosure sales began in October 1991, and it became a nationwide program in November, 1994. Although other alternatives have been available prior to the formal introduction of the loss mitigation program, the use of these tools had been effectively limited by Ginnie Mae rules for re-pooling loans and by the existence of the assignment program.

Foreclosure is the most costly method of resolving serious delinquency; however, a failed loss mitigation effort that results in a foreclosure is more costly than foreclosure at the time of

[2]The most recent data from HUD as reported in the F42D Default Monitoring System as of November, 1997 suggests that approximately 55% of all seriously delinquent loans self cure.

default. Despite this, the use of loss mitigation tools is likely to have a positive effect on the economic value of the MMI Fund because of the magnitude of savings associated with successful loss mitigation. For example, in HUD's demonstration pre-foreclosure sales program, a success rate of as low as 30 percent would have produced cost savings for HUD. However, the actual success rate in the demonstration program was 63 percent, and HUD experienced savings of $2900 per loan admitted to the program.[3] Special forbearances, mortgage modifications, and partial claims all have the potential to yield greater savings than pre-foreclosure sales; therefore, success rates of even lower than 30 percent are likely to produce cost savings for HUD.

[3]Capone, Charles A., *Evaluation of the Federal Housing Administration Preforeclosure Sale Demonstration*, U.S. Department of Housing and Urban Development, Office of Policy Development & Research, June 1994.

1997 Actuarial Review
Projected MMI Fund Performance for FYs 1997 to 2001
($ Millions)

Fiscal Year	Economic Value of the Fund	Capital Ratio	Volume of New Endorsements	Insurance in Force	Economic Value of New Book of Business	Interest on Fund Balances
1997	$11,258	2.81%	$60,051	$400,850	$1,156	n/a
1998	$12,627	2.95%	$54,377	$427,327	$1,032	$338
1999	$14,052	3.08%	$58,175	$455,779	$1,045	$379
2000	$15,684	3.21%	$67,130	$488,106	$1,211	$422

1997 Actuarial Review
All Mortgages
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$4,690,760	$311,515	4%	73%	$1,036,565	$316,954	5%	$5,439
1976	$5,733,744	$367,395	4%	72%	$1,344,912	$375,820	5%	$8,424
1977	$7,176,603	$629,735	4%	67%	$2,031,678	$644,153	4%	$14,418
1978	$10,024,704	$745,932	5%	65%	$2,911,032	$772,026	6%	$26,094
1979	$15,656,213	$389,546	9%	66%	$3,892,468	$431,107	9%	$41,561
1980	$14,874,833	($972,199)	14%	69%	$2,324,611	($942,353)	14%	$29,845
1981	$10,266,780	($1,887,234)	19%	69%	$1,081,102	($1,876,648)	19%	$10,587
1982	$7,321,058	($1,532,717)	18%	72%	$609,537	($1,531,070)	18%	$1,646
1983	$26,781,701	($2,350,484)	14%	75%	$2,522,597	($2,328,136)	14%	$22,348
1984	$15,919,384	($1,838,693)	17%	72%	$1,372,691	($1,864,447)	18%	($25,754)
1985	$24,042,547	($1,992,345)	15%	74%	$2,032,058	($2,019,488)	16%	($27,144)
1986	$57,520,636	($1,034,061)	11%	65%	$12,353,879	($1,112,911)	12%	($78,850)
1987	$69,944,118	$407,330	8%	56%	$23,809,998	$225,273	9%	($182,057)
1988	$37,432,308	($207,067)	9%	64%	$9,056,627	($354,804)	11%	($147,737)
1989	$39,763,899	($113,910)	8%	66%	$8,956,081	($309,223)	10%	($195,313)
1990	$47,126,286	$26,258	6%	65%	$11,450,284	($226,097)	8%	($252,355)
1991	$44,067,212	$87,012	5%	62%	$12,867,744	($97,568)	7%	($184,580)
1992	$45,092,202	$1,544,643	3%	43%	$23,810,333	$1,474,028	6%	($70,615)
1993	$73,789,938	$2,169,637	2%	26%	$53,108,027	$2,214,121	5%	$44,484
1994	$79,670,564	$2,262,378	2%	17%	$64,926,627	$2,263,167	6%	$789
1995	$41,493,497	$919,007	1%	18%	$33,096,612	$1,008,044	7%	$89,038
1996	$61,148,019	$1,674,125	0%	3%	$58,905,999	$1,546,203	8%	($127,922)
1997	$60,051,421	$1,448,953	0%	1%	$59,817,648	$1,155,982	9%	($292,972)
1998	$54,376,638	$0	0%	0%	$0	$1,031,605	9%	$1,031,605
1999	$58,175,355	$0	0%	0%	$0	$1,045,226	9%	$1,045,226
2000	$67,129,603	$0	0%	0%	$0	$1,210,532	9%	$1,210,532

1997 Actuarial Review
30-Year Fixed Rate Mortgages
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$ 4,678,048	$ 311,515	4%	74%	$ 1,036,565	$ 316,954	5%	$ 5,439
1976	$ 5,721,419	$ 367,395	4%	72%	$ 1,344,912	$ 375,820	5%	$ 8,424
1977	$ 7,157,400	$ 628,601	4%	67%	$ 2,029,299	$ 643,003	4%	$ 14,402
1978	$ 8,632,116	$ 629,886	6%	64%	$ 2,590,258	$ 653,061	6%	$ 23,175
1979	$10,079,558	$ 243,305	9%	63%	$ 2,733,843	$ 272,749	10%	$ 29,444
1980	$ 9,716,926	$ (519,444)	14%	66%	$ 1,720,480	$ (497,396)	14%	$ 22,048
1981	$ 7,446,752	$ (1,254,205)	19%	66%	$ 877,533	$ (1,245,415)	20%	$ 8,790
1982	$ 5,649,062	$ (1,009,736)	17%	72%	$ 501,096	$ (1,007,917)	18%	$ 1,819
1983	$21,904,572	$ (1,645,160)	14%	75%	$ 2,087,594	$ (1,623,685)	14%	$ 21,475
1984	$13,044,425	$ (1,329,318)	17%	72%	$ 1,132,594	$ (1,351,083)	18%	$ (21,765)
1985	$20,813,749	$ (1,702,286)	16%	74%	$ 1,659,542	$ (1,725,725)	17%	$ (23,440)
1986	$51,415,418	$ (985,617)	12%	65%	$10,971,823	$ (1,061,829)	13%	$ (76,212)
1987	$63,526,872	$ 353,551	9%	56%	$21,607,591	$ 176,456	10%	$ (177,096)
1988	$33,676,707	$ (194,857)	9%	65%	$ 7,801,446	$ (336,708)	11%	$ (141,851)
1989	$37,723,857	$ (82,890)	8%	66%	$ 8,318,228	$ (274,148)	10%	$ (191,258)
1990	$44,956,291	$ 66,823	6%	66%	$10,776,005	$ (181,138)	8%	$ (247,962)
1991	$39,501,119	$ 74,997	5%	64%	$11,010,794	$ (100,738)	7%	$ (175,735)
1992	$29,916,489	$ 1,095,461	4%	41%	$16,124,192	$ 1,051,139	6%	$ (44,322)
1993	$33,054,493	$ 1,232,478	2%	21%	$25,526,998	$ 1,481,864	5%	$ 249,385
1994	$33,477,732	$ 1,089,172	2%	13%	$28,483,160	$ 1,371,819	6%	$ 282,647
1995	$26,958,807	$ 639,363	1%	16%	$22,160,666	$ 746,252	6%	$ 106,889
1996	$37,355,624	$ 1,029,931	0%	2%	$36,456,056	$ 1,128,713	7%	$ 98,782
1997	$34,568,711	$ 818,995	0%	0%	$34,418,541	$ 739,284	9%	$ (79,711)
1998	$36,803,572	$ -	0%	0%	$ -	$ 713,277	8%	$ 713,277
1999	$39,917,929	$ -	0%	0%	$ -	$ 723,164	9%	$ 723,164
2000	$46,932,792	$ -	0%	0%	$ -	$ 882,459	9%	$ 882,459

1997 Actuarial Review
30-Year Streamline Refinancings
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$0	$0	0%	0%	$0	$0	0%	$0
1976	$0	$0	0%	0%	$0	$0	0%	$0
1977	$0	$0	0%	0%	$0	$0	0%	$0
1978	$0	$0	0%	0%	$0	$0	0%	$0
1979	$0	$0	0%	0%	$0	$0	0%	$0
1980	$0	$0	0%	0%	$0	$0	0%	$0
1981	$0	$0	0%	0%	$0	$0	0%	$0
1982	$0	$0	0%	0%	$0	$0	0%	$0
1983	$0	$0	0%	0%	$0	$0	0%	$0
1984	$0	$0	0%	0%	$0	$0	0%	$0
1985	$0	$0	0%	0%	$0	$0	0%	$0
1986	$0	$0	0%	0%	$0	$0	0%	$0
1987	$0	$0	0%	0%	$0	$0	0%	$0
1988	$118,179	($5,449)	7%	75%	$17,264	($5,545)	7%	($96)
1989	$94,798	($6,214)	8%	69%	$15,279	($6,234)	9%	($19)
1990	$61,411	($2,450)	6%	65%	$13,136	($2,565)	6%	($115)
1991	$663,912	$4,708	3%	80%	$96,763	$3,730	4%	($978)
1992	$5,584,826	$82,033	2%	61%	$2,024,834	$57,968	3%	($24,065)
1993	$24,445,596	$527,380	2%	32%	$16,186,084	$316,500	6%	($210,880)
1994	$24,784,525	$664,391	2%	19%	$19,704,735	$385,237	6%	($279,153)
1995	$1,427,199	$32,533	1%	25%	$1,036,877	($162)	11%	($32,695)
1996	$6,424,799	$189,634	0%	9%	$5,828,575	$26,698	12%	($162,936)
1997	$3,677,319	$119,106	0%	2%	$3,597,466	($3,349)	12%	($122,455)
1998	$895,421	$0	0%	0%	$0	$3,223	9%	$3,223
1999	$834,217	$0	0%	0%	$0	$2,002	9%	$2,002
2000	$1,300,330	$0	0%	0%	$0	($13,675)	11%	($13,675)

1997 Actuarial Review
Adjustable Rate Mortgages
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$0	$0	0%	0%	$0	$0	0%	$0
1976	$0	$0	0%	0%	$0	$0	0%	$0
1977	$0	$0	0%	0%	$0	$0	0%	$0
1978	$0	$0	0%	0%	$0	$0	0%	$0
1979	$0	$0	0%	0%	$0	$0	0%	$0
1980	$0	$0	0%	0%	$0	$0	0%	$0
1981	$0	$0	0%	0%	$0	$0	0%	$0
1982	$0	$0	0%	0%	$0	$0	0%	$0
1983	$0	$0	0%	0%	$0	$0	0%	$0
1984	$1,236	($64)	15%	79%	$79	($64)	16%	($0)
1985	$34,030	($1,262)	20%	51%	$10,081	($1,285)	21%	($23)
1986	$425,638	$726	13%	51%	$147,914	$461	14%	($265)
1987	$1,073,637	$21,115	10%	49%	$431,785	$20,046	11%	($1,069)
1988	$1,878,117	$24,206	9%	50%	$740,395	$21,181	11%	($3,025)
1989	$606,113	$9,655	8%	51%	$248,422	$8,560	10%	($1,095)
1990	$376,658	$8,532	6%	48%	$178,521	$7,795	8%	($737)
1991	$1,955,843	$40,761	5%	40%	$1,101,790	$36,282	8%	($4,479)
1992	$7,349,137	$306,988	4%	36%	$4,433,741	$306,888	8%	($100)
1993	$8,825,187	$267,230	4%	30%	$5,953,471	$297,235	9%	$30,005
1994	$13,481,090	$356,478	3%	22%	$10,221,208	$387,247	9%	$30,770
1995	$12,133,466	$230,407	2%	23%	$9,084,713	$251,214	8%	$20,806
1996	$15,505,393	$415,937	0%	4%	$14,836,946	$368,911	9%	($47,026)
1997	$20,359,133	$481,567	0%	1%	$20,359,132	$406,031	10%	($75,536)
1998	$15,663,416	$0	0%	0%	$0	$305,926	10%	$305,926
1999	$16,347,831	$0	0%	0%	$0	$309,147	10%	$309,147
2000	$17,576,787	$0	0%	0%	$0	$329,674	10%	$329,674

1997 Actuarial Review
15-Year Fixed Rate Mortgages
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$12,712	$0	0%	0%	$0	$0	10%	$0
1976	$12,324	$0	0%	0%	$0	$0	10%	$0
1977	$10,910	$0	0%	0%	$0	$0	6%	$0
1978	$8,654	$0	0%	0%	$0	$0	5%	$0
1979	$9,662	$0	0%	0%	$0	$0	9%	$0
1980	$14,667	$0	0%	0%	$0	$0	15%	$0
1981	$15,757	$0	0%	0%	$0	$0	19%	$0
1982	$26,221	($3,402)	12%	80%	$0	($3,191)	12%	$211
1983	$1,668,784	($11,560)	5%	80%	$193,741	($11,543)	5%	$17
1984	$892,441	($41,644)	7%	73%	$118,356	($41,696)	8%	($52)
1985	$1,756,953	($52,114)	6%	74%	$234,230	($52,304)	6%	($189)
1986	$4,769,921	$29,747	3%	70%	$1,090,026	$28,778	3%	($969)
1987	$4,638,494	$72,383	2%	61%	$1,561,900	$70,324	2%	($2,059)
1988	$1,379,244	$5,387	4%	61%	$415,374	$3,936	4%	($1,450)
1989	$1,000,003	$5,734	3%	61%	$293,068	$4,065	4%	($1,669)
1990	$1,257,499	$9,196	2%	61%	$379,717	$6,756	3%	($2,440)
1991	$1,353,277	$11,122	2%	57%	$477,386	$8,493	2%	($2,629)
1992	$1,068,971	$52,178	1%	41%	$586,950	$52,071	2%	($107)
1993	$1,424,822	$28,604	1%	26%	$1,048,051	$25,174	1%	($3,429)
1994	$1,372,766	$24,500	1%	15%	$1,158,862	$18,987	2%	($5,513)
1995	$533,446	$9,096	0%	13%	$456,370	$6,324	2%	($2,773)
1996	$791,016	$15,520	0%	4%	$762,000	$9,502	2%	($6,017)
1997	$995,854	$19,207	0%	1%	$995,853	$9,013	2%	($10,194)
1998	$850,260	$0	0%	0%	$0	$7,326	2%	$7,326
1999	$922,210	$0	0%	0%	$0	$9,327	3%	$9,327
2000	$1,084,272	$0	0%	0%	$0	$11,113	2%	$11,113

1997 Actuarial Review
15-Year Streamline Refinancings
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$0	$0	0%	0%	$0	$0	0%	$0
1976	$0	$0	0%	0%	$0	$0	0%	$0
1977	$0	$0	0%	0%	$0	$0	0%	$0
1978	$0	$0	0%	0%	$0	$0	0%	$0
1979	$0	$0	0%	0%	$0	$0	0%	$0
1980	$0	$0	0%	0%	$0	$0	0%	$0
1981	$0	$0	0%	0%	$0	$0	0%	$0
1982	$0	$0	0%	0%	$0	$0	0%	$0
1983	$0	$0	0%	0%	$0	$0	0%	$0
1984	$0	$0	0%	0%	$0	$0	0%	$0
1985	$0	$0	0%	0%	$0	$0	0%	$0
1986	$0	$0	0%	0%	$0	$0	0%	$0
1987	$0	$0	0%	0%	$0	$0	0%	$0
1988	$9,450	($182)	2%	56%	$3,249	($188)	2%	($6)
1989	$5,237	($79)	1%	62%	$1,581	($83)	1%	($4)
1990	$5,094	($100)	2%	64%	$1,598	($91)	2%	$9
1991	$110,565	$1,452	1%	62%	$37,383	$1,362	1%	($91)
1992	$1,000,280	$15,688	1%	44%	$541,869	$13,587	1%	($2,101)
1993	$5,926,966	$114,212	0%	27%	$4,297,220	$93,159	1%	($21,053)
1994	$6,469,507	$126,355	0%	18%	$5,280,718	$98,251	1%	($28,104)
1995	$386,922	$6,657	1%	18%	$313,000	$3,724	2%	($2,933)
1996	$1,050,990	$22,516	0%	5%	$1,002,590	$11,919	2%	($10,597)
1997	$444,452	$9,937	0%	1%	$440,703	$4,939	2%	($4,997)
1998	$158,015	$0	0%	0%	$0	$1,799	2%	$1,799
1999	$147,215	$0	0%	0%	$0	$1,543	2%	$1,543
2000	$229,470	$0	0%	0%	$0	$915	2%	$915

1997 Actuarial Review
Graduated Payment Mortgages
Base Case Scenario
($ Thousands)

Book of Business	Mortgage Originations	Cash Balance EOY 97	Cumulative Claim Rate ($) EOY	Cumulative Prepayment Rate ($) EOY	Insurance in Force EOY 1997	NPV of Final Cash Balance 1997 Dollars	Ultimate Claim Rate ($)	PV of Future Cash Flows 1997 Dollars
1975	$0	$0	0%	0%	$0	$0	0%	$0
1976	$0	$0	0%	0%	$0	$0	0%	$0
1977	$8,293	$1,134	2%	70%	$2,379	$1,150	2%	$16
1978	$1,383,934	$116,047	5%	72%	$320,774	$118,965	5%	$2,918
1979	$5,566,994	$146,241	8%	71%	$1,158,625	$158,358	8%	$12,117
1980	$5,143,240	($452,755)	13%	75%	$604,131	($444,958)	13%	$7,797
1981	$2,804,272	($633,029)	17%	76%	$203,569	($631,232)	17%	$1,797
1982	$1,645,774	($519,579)	20%	73%	$108,441	($519,962)	20%	($383)
1983	$3,208,345	($693,763)	20%	72%	$241,262	($692,908)	20%	$855
1984	$1,981,281	($467,666)	21%	73%	$121,662	($471,604)	22%	($3,937)
1985	$1,437,815	($236,683)	17%	74%	$128,205	($240,175)	18%	($3,492)
1986	$909,658	($78,916)	14%	70%	$144,115	($80,320)	15%	($1,404)
1987	$705,116	($39,720)	13%	57%	$208,723	($41,552)	14%	($1,833)
1988	$370,610	($36,173)	18%	61%	$78,899	($37,481)	20%	($1,308)
1989	$333,891	($40,116)	21%	55%	$79,504	($41,384)	23%	($1,268)
1990	$469,333	($55,743)	20%	58%	$101,306	($56,854)	22%	($1,111)
1991	$482,496	($46,028)	16%	54%	$143,628	($46,697)	19%	($669)
1992	$172,499	($7,705)	14%	28%	$98,746	($7,625)	17%	$79
1993	$112,874	($266)	8%	6%	$96,203	$189	12%	$455
1994	$84,944	$1,484	4%	4%	$77,945	$1,626	9%	$142
1995	$53,655	$950	2%	14%	$44,986	$693	8%	($257)
1996	$20,197	$587	0%	2%	$19,832	$459	7%	($127)
1997	$5,953	$142	0%	0%	$5,953	$63	9%	($79)
1998	$5,953	$0	0%	0%	$0	$55	9%	$55
1999	$5,953	$0	0%	0%	$0	$43	9%	$43
2000	$5,953	$0	0%	0%	$0	$46	9%	$46

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
All LTV Categories

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.06	0.11	0.05	0.03	0.03	0.03	0.10	0.15	0.02	0.04	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02
2	0.80	0.94	0.52	0.44	0.49	0.80	1.59	2.32	0.56	1.19	0.98	0.50	0.40	0.46	0.39	0.34	0.36	0.24	0.17	0.19	0.28	0.17	0.25	0.22	0.23	0.22
3	1.17	1.01	0.66	0.61	0.94	1.43	3.58	4.49	1.71	3.12	3.49	1.87	1.14	1.26	1.22	1.17	1.22	0.84	0.62	0.67	1.01	0.61	0.73	0.73	0.80	0.84
4	0.91	0.77	0.47	0.56	0.83	1.74	3.30	5.21	2.31	4.98	6.07	2.33	1.37	1.66	1.71	1.73	1.93	1.31	0.91	1.08	0.88	0.80	1.07	1.17	1.33	1.37
5	0.62	0.47	0.36	0.45	0.92	1.55	3.40	5.58	3.34	6.71	5.48	2.16	1.40	1.89	1.94	2.28	2.34	1.28	1.16	0.81	0.87	0.88	1.25	1.42	1.57	1.62
6	0.40	0.33	0.28	0.51	0.82	1.55	3.21	6.37	4.70	5.86	4.19	1.99	1.39	1.89	2.43	2.43	1.98	1.45	0.66	0.67	0.79	0.85	1.24	1.37	1.50	1.47
7	0.29	0.28	0.30	0.42	0.82	1.52	3.89	6.29	4.08	4.11	3.54	1.79	1.29	2.19	2.59	1.97	2.02	0.91	0.55	0.61	0.77	0.84	1.21	1.33	1.41	1.32
8	0.21	0.29	0.24	0.43	0.84	1.85	4.39	4.25	2.86	3.19	3.16	1.66	1.40	2.31	2.13	1.98	1.33	0.79	0.54	0.62	0.81	0.87	1.24	1.33	1.35	1.23
9	0.27	0.26	0.26	0.43	0.97	2.27	3.24	2.85	2.44	2.85	3.06	1.81	1.38	1.89	2.02	1.82	1.22	0.77	0.56	0.65	0.84	0.89	1.23	1.28	1.26	1.16
10	0.22	0.21	0.26	0.48	1.19	1.93	2.56	2.18	2.20	2.44	2.89	1.86	1.17	1.80	1.89	1.56	1.07	0.69	0.49	0.59	0.76	0.77	1.03	1.02	1.00	0.92
11	0.22	0.23	0.29	0.64	1.07	1.57	2.07	1.85	1.91	2.39	2.69	1.51	1.16	1.60	1.76	1.52	1.07	0.73	0.52	0.62	0.77	0.76	0.99	0.98	0.98	0.92
12	0.19	0.24	0.39	0.62	0.91	1.35	1.73	1.42	1.87	1.95	1.94	1.40	0.71	1.33	1.53	1.36	1.02	0.70	0.50	0.57	0.70	0.67	0.87	0.88	0.88	0.84
13	0.21	0.34	0.39	0.55	0.82	1.17	1.50	1.33	1.59	1.81	1.83	0.77	0.56	1.12	1.33	1.23	0.93	0.62	0.43	0.48	0.58	0.55	0.72	0.75	0.75	0.72
14	0.26	0.34	0.38	0.49	0.70	1.12	1.34	1.06	1.07	1.43	1.38	0.69	0.51	1.02	1.24	1.15	0.86	0.56	0.39	0.42	0.51	0.49	0.65	0.67	0.68	0.65
15	0.27	0.34	0.32	0.39	0.60	1.02	1.25	0.75	0.99	1.56	1.21	0.60	0.46	0.95	1.15	1.05	0.77	0.49	0.34	0.37	0.45	0.44	0.58	0.60	0.61	0.59
16	0.26	0.26	0.29	0.34	0.56	0.88	0.84	0.69	0.95	1.33	1.07	0.53	0.41	0.86	1.03	0.90	0.65	0.42	0.30	0.32	0.39	0.38	0.51	0.53	0.54	0.52
17	0.22	0.26	0.24	0.31	0.50	0.55	0.72	1.29	0.79	1.14	0.95	0.46	0.36	0.74	0.87	0.73	0.53	0.35	0.25	0.27	0.34	0.33	0.43	0.46	0.46	0.44
18	0.22	0.25	0.19	0.25	0.37	0.48	0.79	1.05	0.69	1.02	0.85	0.41	0.31	0.63	0.72	0.60	0.45	0.30	0.22	0.23	0.30	0.28	0.38	0.40	0.40	0.38
19	0.19	0.20	0.18	0.19	0.31	0.36	0.68	0.89	0.62	0.91	0.77	0.36	0.26	0.53	0.60	0.50	0.38	0.26	0.20	0.20	0.26	0.25	0.33	0.35	0.35	0.33
20	0.15	0.18	0.15	0.18	0.26	0.31	0.57	0.78	0.58	0.85	0.70	0.32	0.22	0.45	0.51	0.43	0.33	0.24	0.18	0.18	0.24	0.22	0.29	0.31	0.31	0.30
21	0.15	0.12	0.13	0.18	0.23	0.27	0.51	0.70	0.53	0.79	0.64	0.28	0.19	0.39	0.45	0.38	0.30	0.22	0.17	0.17	0.22	0.20	0.26	0.28	0.28	0.27
22	0.08	0.10	0.17	0.17	0.21	0.25	0.47	0.64	0.50	0.71	0.57	0.24	0.16	0.34	0.40	0.34	0.27	0.20	0.16	0.15	0.20	0.18	0.24	0.26	0.26	0.25
23	0.07	0.17	0.16	0.16	0.19	0.24	0.44	0.58	0.47	0.64	0.52	0.22	0.14	0.30	0.37	0.31	0.25	0.18	0.15	0.14	0.19	0.17	0.22	0.24	0.24	0.23
24	0.16	0.16	0.16	0.15	0.18	0.22	0.40	0.52	0.44	0.58	0.49	0.20	0.13	0.28	0.34	0.28	0.24	0.17	0.14	0.13	0.18	0.16	0.21	0.22	0.22	0.21
25	0.16	0.16	0.16	0.15	0.18	0.21	0.35	0.46	0.41	0.54	0.46	0.18	0.12	0.25	0.31	0.26	0.22	0.17	0.14	0.13	0.16	0.15	0.19	0.21	0.21	0.20
26	0.16	0.16	0.15	0.15	0.17	0.20	0.32	0.41	0.39	0.49	0.43	0.17	0.11	0.23	0.29	0.24	0.21	0.16	0.14	0.12	0.15	0.14	0.18	0.20	0.20	0.19
27	0.16	0.16	0.16	0.14	0.16	0.18	0.30	0.36	0.37	0.46	0.40	0.16	0.10	0.22	0.27	0.23	0.20	0.15	0.14	0.11	0.15	0.13	0.17	0.19	0.18	0.17
28	0.16	0.17	0.15	0.14	0.15	0.17	0.27	0.32	0.35	0.43	0.38	0.15	0.09	0.20	0.26	0.22	0.19	0.15	0.14	0.11	0.14	0.13	0.16	0.18	0.18	0.16
29	0.16	0.16	0.16	0.13	0.14	0.16	0.25	0.29	0.32	0.39	0.37	0.14	0.08	0.19	0.24	0.20	0.18	0.14	0.14	0.10	0.14	0.12	0.15	0.18	0.17	0.16
30	0.16	0.16	0.16	0.13	0.14	0.16	0.23	0.25	0.31	0.35	0.35	0.14	0.08	0.17	0.23	0.19	0.18	0.13	0.14	0.10	0.13	0.11	0.14	0.17	0.16	0.15

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
All LTV Categories

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.06	0.11	0.05	0.03	0.03	0.03	0.10	0.15	0.02	0.04	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02
2	0.85	1.05	0.56	0.47	0.51	0.83	1.69	2.45	0.58	1.23	1.01	0.51	0.41	0.47	0.40	0.35	0.37	0.25	0.18	0.19	0.28	0.17	0.25	0.24	0.24	0.24
3	1.99	2.01	1.20	1.06	1.44	2.23	5.19	6.04	2.26	4.26	4.06	2.29	1.53	1.70	1.58	1.49	1.51	1.02	0.76	0.84	1.19	0.77	0.96	0.94	1.01	1.04
4	2.80	2.67	1.62	1.59	2.24	3.90	8.07	9.62	4.44	8.05	7.95	4.41	2.83	3.25	3.15	2.98	2.83	2.02	1.59	1.82	1.92	1.52	1.95	1.99	2.19	2.27
5	3.30	3.03	1.93	2.00	3.11	5.33	10.79	12.79	6.96	11.58	10.88	6.26	4.11	4.91	4.64	4.34	3.92	2.91	2.56	2.51	2.60	2.28	3.00	3.12	3.44	3.59
6	3.58	3.28	2.17	2.46	3.88	6.72	13.13	15.15	9.45	14.11	12.80	7.86	5.32	6.30	5.93	5.33	4.75	3.80	3.07	3.05	3.17	2.97	3.96	4.09	4.52	4.68
7	3.78	3.48	2.42	2.84	4.62	8.03	15.31	16.73	11.27	15.62	14.19	9.19	6.33	7.44	6.90	6.05	5.47	4.31	3.46	3.52	3.68	3.60	4.83	4.94	5.42	5.55
8	3.92	3.69	2.61	3.22	5.37	9.44	17.15	17.60	12.38	16.62	15.23	10.22	7.20	8.31	7.60	6.67	5.89	4.71	3.80	3.96	4.16	4.20	5.63	5.69	6.19	6.28
9	4.10	3.86	2.82	3.58	6.17	10.90	18.32	18.11	13.21	17.40	15.99	11.03	7.86	8.95	8.18	7.17	6.22	5.05	4.11	4.39	4.61	4.76	6.34	6.32	6.81	6.88
10	4.24	4.00	3.01	3.96	7.08	12.02	19.14	18.46	13.86	17.93	16.52	11.64	8.38	9.47	8.65	7.55	6.48	5.32	4.36	4.75	4.97	5.20	6.89	6.76	7.25	7.31
11	4.37	4.14	3.21	4.43	7.85	12.86	19.75	18.74	14.30	18.36	16.88	12.08	8.84	9.88	9.05	7.89	6.70	5.58	4.58	5.10	5.32	5.60	7.36	7.13	7.63	7.70
12	4.49	4.29	3.47	4.85	8.46	13.53	20.20	18.93	14.63	18.63	17.12	12.44	9.09	10.19	9.36	8.16	6.90	5.81	4.78	5.41	5.60	5.93	7.75	7.43	7.94	8.01
13	4.60	4.47	3.71	5.20	8.97	14.05	20.55	19.09	14.86	18.83	17.31	12.62	9.28	10.44	9.61	8.38	7.05	5.99	4.93	5.65	5.81	6.18	8.04	7.66	8.18	8.26
14	4.73	4.65	3.93	5.50	9.38	14.49	20.81	19.21	15.00	18.99	17.45	12.76	9.43	10.65	9.81	8.57	7.18	6.13	5.06	5.85	5.98	6.39	8.29	7.85	8.38	8.46
15	4.86	4.81	4.10	5.72	9.70	14.81	21.02	19.29	15.11	19.15	17.55	12.88	9.57	10.83	9.99	8.73	7.29	6.25	5.15	6.01	6.13	6.56	8.49	8.01	8.55	8.63
16	4.98	4.93	4.25	5.90	9.96	15.04	21.15	19.36	15.21	19.27	17.63	12.97	9.68	10.98	10.13	8.86	7.37	6.35	5.23	6.14	6.24	6.70	8.66	8.13	8.68	8.77
17	5.07	5.04	4.37	6.05	10.15	15.17	21.25	19.49	15.29	19.37	17.70	13.04	9.77	11.10	10.25	8.95	7.43	6.42	5.29	6.25	6.33	6.81	8.79	8.22	8.78	8.87
18	5.16	5.14	4.45	6.15	10.28	15.27	21.36	19.58	15.35	19.46	17.75	13.10	9.84	11.20	10.33	9.02	7.47	6.47	5.34	6.33	6.41	6.90	8.89	8.30	8.86	8.96
19	5.23	5.22	4.52	6.22	10.38	15.34	21.44	19.64	15.41	19.52	17.80	13.14	9.90	11.28	10.40	9.08	7.51	6.51	5.37	6.40	6.47	6.97	8.98	8.36	8.92	9.02
20	5.28	5.27	4.57	6.28	10.45	15.40	21.51	19.69	15.45	19.59	17.83	13.18	9.95	11.34	10.45	9.12	7.54	6.55	5.40	6.46	6.52	7.04	9.05	8.41	8.98	9.08
21	5.33	5.31	4.61	6.34	10.51	15.45	21.56	19.73	15.49	19.64	17.87	13.21	9.99	11.39	10.50	9.16	7.56	6.58	5.43	6.51	6.57	7.09	9.11	8.45	9.02	9.12
22	5.35	5.33	4.66	6.39	10.57	15.49	21.61	19.77	15.53	19.69	17.90	13.24	10.02	11.43	10.53	9.19	7.58	6.61	5.45	6.56	6.60	7.13	9.16	8.49	9.06	9.16
23	5.37	5.38	4.70	6.43	10.61	15.53	21.66	19.80	15.56	19.73	17.92	13.26	10.04	11.47	10.57	9.21	7.60	6.63	5.47	6.59	6.64	7.17	9.20	8.52	9.09	9.19
24	5.40	5.41	4.74	6.47	10.65	15.56	21.70	19.82	15.59	19.76	17.94	13.28	10.07	11.50	10.59	9.24	7.62	6.65	5.48	6.63	6.67	7.20	9.24	8.54	9.11	9.22
25	5.43	5.44	4.78	6.51	10.69	15.60	21.73	19.85	15.61	19.79	17.96	13.29	10.09	11.53	10.62	9.26	7.63	6.67	5.50	6.66	6.69	7.23	9.27	8.56	9.14	9.25
26	5.46	5.48	4.81	6.54	10.73	15.62	21.76	19.86	15.64	19.82	17.98	13.31	10.10	11.55	10.64	9.28	7.64	6.68	5.51	6.68	6.71	7.26	9.30	8.58	9.16	9.27
27	5.49	5.50	4.84	6.57	10.76	15.65	21.79	19.88	15.66	19.84	18.00	13.32	10.12	11.57	10.66	9.29	7.65	6.69	5.52	6.71	6.73	7.28	9.32	8.60	9.17	9.28
28	5.52	5.53	4.86	6.60	10.78	15.67	21.81	19.89	15.68	19.87	18.01	13.33	10.13	11.59	10.68	9.31	7.66	6.71	5.53	6.73	6.75	7.30	9.35	8.61	9.19	9.30
29	5.54	5.55	4.89	6.62	10.81	15.69	21.83	19.91	15.69	19.89	18.03	13.34	10.14	11.61	10.70	9.32	7.67	6.72	5.54	6.75	6.77	7.32	9.37	8.63	9.20	9.31
30	5.57	5.58	4.91	6.64	10.83	15.71	21.85	19.92	15.71	19.91	18.04	13.35	10.15	11.63	10.71	9.33	7.68	6.73	5.55	6.76	6.78	7.33	9.38	8.64	9.22	9.32

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
All LTV Categories

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.20	0.28	0.36	0.35	0.29	0.36	0.17	0.35	0.28	0.21	0.30	0.51	0.26	0.37	0.45	0.38	0.37	0.36	0.63	0.30	1.72	0.38	0.43	0.39	0.37	0.37
2	1.88	3.39	3.25	2.46	0.82	0.92	0.42	17.43	0.92	1.41	11.19	3.73	1.02	1.50	2.01	2.06	5.46	7.27	4.04	1.99	8.47	1.85	2.16	2.68	2.93	2.90
3	6.76	8.39	6.18	2.05	0.68	0.35	7.10	9.35	2.19	18.65	23.35	2.68	1.74	3.06	4.12	9.72	25.93	16.65	3.95	6.04	5.91	4.12	4.68	6.78	7.21	6.12
4	9.97	8.98	3.53	1.32	0.36	1.76	4.76	12.31	17.64	25.75	10.60	3.18	2.85	4.60	14.94	29.45	29.85	6.33	7.21	5.42	6.16	5.46	6.76	9.80	8.83	7.84
5	8.96	4.73	1.82	0.75	1.42	2.03	6.03	29.05	26.79	11.34	8.51	4.47	3.42	14.29	28.61	29.36	7.84	10.67	6.54	4.50	6.22	6.16	7.22	9.15	8.54	7.95
6	4.48	2.41	0.79	1.99	1.64	2.65	19.39	26.24	10.82	9.19	10.34	5.49	8.49	26.88	27.67	8.27	12.72	8.35	7.44	4.54	7.29	6.45	6.77	8.84	8.58	8.26
7	2.35	1.00	2.69	2.08	2.04	9.21	21.59	11.76	8.45	9.95	12.40	14.41	19.65	26.15	8.21	12.48	9.48	9.33	9.82	6.25	9.28	7.51	8.01	10.59	10.48	9.95
8	1.15	3.25	2.76	2.40	4.81	14.12	9.80	8.27	9.78	10.52	21.61	26.40	21.03	7.88	12.12	9.36	12.33	9.96	11.71	6.97	9.56	8.09	8.79	11.87	11.47	10.69
9	3.30	3.34	3.16	5.29	7.59	7.24	7.24	6.64	11.75	16.23	23.14	25.37	6.49	11.90	9.57	9.26	10.61	9.87	10.75	6.15	8.38	7.25	7.99	10.59	10.04	9.42
10	3.37	3.60	5.80	7.66	5.49	5.87	7.11	6.02	19.33	17.47	22.74	7.55	10.14	9.49	8.64	8.18	10.88	10.17	10.76	6.03	8.20	7.19	7.83	10.27	9.77	9.34
11	3.59	6.10	7.65	5.64	5.17	6.58	7.35	7.30	19.21	18.64	8.47	11.42	8.27	6.45	7.73	8.32	10.52	9.25	10.25	5.81	7.89	6.86	7.34	9.57	9.17	8.73
12	5.90	7.90	5.74	5.18	5.53	7.28	11.05	7.53	19.50	7.67	10.07	9.30	5.60	5.82	7.80	8.02	9.15	8.33	9.21	5.39	7.15	6.24	6.62	8.48	8.05	7.70
13	7.73	5.87	5.23	5.42	5.29	13.68	12.83	7.62	7.73	8.73	8.55	8.56	5.41	6.06	7.71	7.36	8.59	8.25	9.29	5.40	6.93	6.19	6.55	8.26	7.83	7.61
14	5.76	5.33	5.48	5.29	8.80	16.12	13.36	3.88	8.84	7.27	9.73	8.67	6.19	6.52	7.65	7.54	8.98	8.80	9.96	5.81	7.26	6.64	6.91	8.69	8.28	8.22
15	5.23	5.48	5.24	7.30	13.81	16.69	6.37	4.04	7.34	7.22	8.44	8.96	6.26	5.97	7.13	7.22	8.75	8.68	9.94	5.83	7.13	6.61	6.82	8.55	8.33	8.24
16	5.40	5.32	7.05	10.52	15.24	7.65	7.05	3.66	7.15	6.17	8.06	8.80	5.92	5.57	6.75	6.96	8.39	8.44	9.93	5.85	6.96	6.59	6.78	8.57	8.32	8.24
17	5.49	7.31	9.53	12.51	7.69	9.35	6.51	13.61	6.44	5.97	7.58	8.18	5.72	5.33	6.50	6.68	7.98	8.22	9.85	5.81	6.77	6.53	6.79	8.52	8.21	8.15
18	7.47	10.06	10.96	7.36	9.53	8.52	5.96	10.88	6.20	5.37	6.48	7.65	5.56	5.08	6.11	6.28	7.56	8.03	9.79	5.79	6.63	6.55	6.78	8.43	8.08	8.11
19	9.92	10.93	7.30	9.21	8.60	4.83	5.12	9.46	5.70	4.55	5.67	7.26	5.42	4.77	5.69	5.92	7.21	7.83	9.74	5.79	6.59	6.56	6.76	8.30	7.99	8.08
20	11.01	7.51	8.86	8.69	5.84	4.43	4.70	7.88	5.02	3.96	5.04	6.91	5.23	4.46	5.32	5.62	6.85	7.64	9.69	5.82	6.52	6.55	6.72	8.21	7.93	8.05
21	9.44	10.16	9.83	6.60	5.57	4.34	4.17	6.32	4.51	3.50	4.52	6.52	5.02	4.18	5.01	5.33	6.53	7.48	9.72	5.84	6.44	6.53	6.69	8.14	7.89	8.03
22	8.47	8.25	8.37	6.46	5.68	4.15	3.69	5.38	4.19	3.18	4.12	6.21	4.87	3.99	4.77	5.12	6.30	7.42	9.70	5.85	6.34	6.50	6.67	8.08	7.86	8.00
23	8.31	7.86	8.23	6.67	5.52	3.81	3.26	4.49	3.84	2.81	3.68	5.87	4.71	3.77	4.51	4.89	6.12	7.33	9.69	5.85	6.25	6.49	6.65	8.04	7.82	8.01
24	7.22	7.68	8.48	6.61	5.28	3.55	2.92	3.80	3.52	2.51	3.33	5.58	4.56	3.58	4.29	4.74	5.93	7.24	9.66	5.85	6.19	6.49	6.64	8.01	7.82	8.03
25	7.08	7.89	8.46	6.46	5.10	3.35	2.62	3.23	3.24	2.26	3.05	5.33	4.43	3.43	4.14	4.59	5.76	7.13	9.63	5.85	6.13	6.48	6.62	8.01	7.83	8.05
26	7.26	7.79	8.32	6.36	4.97	3.18	2.38	2.79	3.02	2.05	2.81	5.11	4.31	3.31	4.00	4.45	5.60	7.05	9.61	5.86	6.08	6.47	6.63	8.01	7.83	8.05
27	7.19	7.65	8.26	6.32	4.88	3.04	2.23	2.51	2.87	1.93	2.65	4.96	4.26	3.23	3.89	4.35	5.48	6.98	9.59	5.86	6.04	6.48	6.63	8.00	7.83	8.04
28	7.07	7.57	8.23	6.26	4.76	2.91	2.07	2.25	2.72	1.80	2.50	4.84	4.19	3.14	3.79	4.25	5.38	6.93	9.57	5.86	6.03	6.50	6.64	8.00	7.82	8.04
29	7.01	7.51	8.18	6.18	4.66	2.81	1.95	2.06	2.60	1.71	2.40	4.73	4.14	3.07	3.70	4.18	5.30	6.88	9.55	5.87	6.03	6.50	6.64	7.99	7.82	8.04
30	6.98	7.44	8.11	6.11	4.59	2.74	1.88	1.93	2.52	1.63	2.32	4.66	4.09	3.02	3.64	4.13	5.25	6.84	9.55	5.88	6.01	6.49	6.63	7.98	7.80	8.02

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
All LTV Categories

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.20	0.28	0.36	0.35	0.29	0.36	0.17	0.35	0.28	0.21	0.30	0.51	0.26	0.37	0.45	0.38	0.37	0.36	0.63	0.30	1.72	0.38	0.43	0.39	0.37	0.37
2	2.08	3.66	3.59	2.80	1.11	1.28	0.59	17.69	1.20	1.61	11.45	4.22	1.27	1.87	2.46	2.43	5.81	7.61	4.64	2.29	10.04	2.22	2.58	3.05	3.29	3.26
3	8.64	11.65	9.52	4.79	1.78	1.62	7.53	25.16	3.35	19.73	31.89	6.77	2.99	4.86	6.46	11.88	30.13	22.95	8.40	8.18	15.35	6.24	7.13	9.61	10.24	9.17
4	17.55	19.40	12.67	6.03	2.13	3.31	11.68	33.63	20.00	39.30	38.68	9.65	5.71	9.16	20.20	37.39	50.54	27.76	14.95	13.11	20.49	11.31	13.34	18.37	18.08	16.21
5	24.68	23.09	14.24	6.72	3.49	5.19	16.52	50.12	40.24	45.27	43.22	13.50	8.83	21.67	42.13	54.90	54.19	35.25	20.40	16.94	25.31	16.69	19.45	25.66	24.89	22.69
6	27.91	24.87	14.90	8.53	5.02	7.56	30.61	59.85	45.95	49.24	47.97	17.90	16.23	41.41	56.86	58.27	59.52	40.42	26.13	20.60	30.57	21.91	24.70	31.96	31.04	28.78
7	29.52	25.59	17.13	10.38	6.88	15.45	42.76	62.79	49.72	52.88	52.83	28.59	31.65	55.08	59.91	62.81	62.91	45.62	33.09	25.37	36.72	27.55	30.42	38.73	37.79	35.39
8	30.29	27.90	19.36	12.46	11.14	26.26	46.87	64.48	53.54	56.20	59.96	45.02	44.69	58.03	63.94	65.73	66.81	50.61	40.51	30.33	42.42	33.12	36.11	45.41	44.30	41.71
9	32.46	30.18	21.82	16.92	17.48	30.91	49.48	65.67	57.54	60.61	65.70	56.38	47.81	62.04	66.66	68.28	69.70	55.02	46.50	34.37	46.89	37.67	40.76	50.59	49.27	46.61
10	34.60	32.56	26.19	23.01	21.67	34.32	51.77	66.65	63.20	64.45	69.86	58.84	52.30	64.79	68.83	70.29	72.32	59.08	51.82	38.06	50.87	41.81	44.90	55.02	53.56	50.95
11	36.79	36.42	31.61	27.12	25.35	37.85	53.90	67.74	67.60	67.73	71.02	62.21	55.56	66.45	70.57	72.13	74.55	62.37	56.31	41.39	54.35	45.44	48.44	58.68	57.15	54.60
12	40.26	41.12	35.35	30.67	29.04	41.44	56.82	68.76	71.13	68.80	72.24	64.60	57.55	67.83	72.16	73.74	76.27	65.04	59.91	44.27	57.24	48.50	51.37	61.58	59.99	57.50
13	44.53	44.32	38.55	34.17	32.35	47.60	59.76	69.69	72.23	69.90	73.15	66.57	59.36	69.16	73.59	75.07	77.71	67.45	63.19	46.99	59.81	51.32	54.04	64.14	62.50	60.13
14	47.46	47.05	41.71	37.37	37.51	53.78	62.39	70.13	73.37	70.72	74.07	68.37	61.30	70.49	74.87	76.32	79.08	69.78	66.37	49.74	62.31	54.14	56.66	66.59	64.92	62.73
15	49.96	49.70	44.56	41.54	44.84	59.08	63.46	70.56	74.23	71.46	74.79	70.06	63.13	71.62	75.97	77.41	80.28	71.87	69.21	52.33	64.57	56.75	59.06	68.77	67.15	65.10
16	52.40	52.12	48.18	47.09	51.77	61.08	64.56	70.93	74.99	72.04	75.41	71.56	64.75	72.60	76.91	78.37	81.33	73.72	71.75	54.77	66.61	59.17	61.26	70.76	69.17	67.26
17	54.74	55.26	52.72	52.97	54.71	63.31	65.49	72.25	75.62	72.56	75.94	72.83	66.21	73.47	77.76	79.23	82.23	75.36	74.02	57.04	68.44	61.39	63.30	72.56	70.99	69.22
18	57.74	59.25	57.42	55.98	58.06	65.14	66.28	73.15	76.18	72.99	76.35	73.91	67.54	74.25	78.49	79.97	83.01	76.82	76.05	59.17	70.11	63.48	65.19	74.18	72.62	70.99
19	61.42	63.15	60.20	59.47	60.79	66.09	66.91	73.84	76.67	73.34	76.68	74.85	68.77	74.95	79.13	80.62	83.70	78.13	77.86	61.16	71.66	65.42	66.94	75.64	74.10	72.61
20	65.09	65.52	63.33	62.45	62.47	66.91	67.46	74.35	77.06	73.62	76.96	75.68	69.88	75.56	79.68	81.20	84.30	79.30	79.48	63.05	73.09	67.23	68.56	76.95	75.45	74.09
21	67.89	68.49	66.49	64.52	63.98	67.68	67.92	74.73	77.40	73.86	77.20	76.41	70.90	76.11	80.18	81.72	84.83	80.36	80.95	64.83	74.40	68.91	70.06	78.14	76.68	75.44
22	70.15	70.65	68.91	66.40	65.43	68.38	68.31	75.03	77.70	74.06	77.40	77.05	71.83	76.61	80.62	82.18	85.31	81.33	82.27	66.51	75.61	70.47	71.45	79.22	77.80	76.68
23	72.19	72.54	71.08	68.22	66.75	68.99	68.64	75.26	77.96	74.24	77.57	77.62	72.68	77.06	81.02	82.61	85.75	82.22	83.46	68.08	76.72	71.92	72.74	80.21	78.83	77.81
24	73.81	74.23	73.14	69.89	67.95	69.54	68.92	75.45	78.19	74.39	77.72	78.13	73.47	77.47	81.38	82.99	86.14	83.02	84.53	69.56	77.75	73.28	73.94	81.11	79.78	78.86
25	75.28	75.84	75.01	71.42	69.04	70.04	69.16	75.60	78.39	74.52	77.86	78.59	74.20	77.85	81.72	83.35	86.50	83.76	85.49	70.96	78.71	74.55	75.05	81.94	80.65	79.82
26	76.68	77.30	76.69	72.82	70.05	70.50	69.38	75.73	78.57	74.64	77.97	79.00	74.88	78.20	82.02	83.68	86.83	84.43	86.36	72.27	79.59	75.73	76.09	82.70	81.45	80.70
27	77.97	78.62	78.22	74.13	70.98	70.92	69.58	75.84	78.74	74.75	78.08	79.39	75.52	78.53	82.31	83.99	87.13	85.05	87.14	73.50	80.42	76.83	77.06	83.40	82.18	81.50
28	79.14	79.82	79.61	75.34	71.85	71.31	69.76	75.94	78.89	74.84	78.18	79.74	76.12	78.84	82.57	84.27	87.41	85.63	87.84	74.66	81.20	77.86	77.97	84.04	82.86	82.24
29	80.21	80.92	80.88	76.45	72.66	71.68	69.92	76.02	79.03	74.93	78.27	80.07	76.69	79.14	82.82	84.54	87.67	86.15	88.48	75.75	81.92	78.83	78.81	84.63	83.48	82.92
30	81.21	81.93	82.03	77.49	73.42	72.02	70.08	76.10	79.16	75.02	78.36	80.37	77.23	79.42	83.06	84.79	87.92	86.64	89.05	76.78	82.60	79.73	79.59	85.17	84.05	83.55

= Actual Experience

Summary of Conditional Claim Rates
Adjustable Rate Mortgages
All LTV Categories

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.02	0.01	0.01	0.05	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2	0.00	1.20	0.58	0.18	0.41	0.44	0.17	0.12	0.18	0.17	0.17	0.35	0.19	0.37	0.33	0.31	0.32
3	5.26	3.32	1.80	0.91	1.56	1.51	0.82	0.64	0.67	0.70	0.90	1.57	0.88	0.92	0.89	0.92	0.96
4	7.69	3.86	2.31	1.70	2.07	1.93	1.06	1.00	1.06	1.29	1.88	1.11	1.12	1.22	1.25	1.34	1.39
5	14.29	3.74	2.62	2.31	2.24	2.04	1.62	1.28	1.46	2.24	1.66	1.54	1.59	1.75	1.83	1.93	1.97
6	0.00	3.60	3.16	2.05	1.65	1.44	1.15	1.48	2.06	1.52	1.39	1.29	1.38	1.57	1.62	1.70	1.70
7	0.00	4.72	2.22	1.58	1.41	0.95	1.69	2.02	1.36	1.28	1.17	1.11	1.21	1.39	1.44	1.49	1.46
8	0.00	2.10	1.37	1.43	1.29	1.19	1.72	0.94	0.85	0.81	0.73	0.69	0.79	0.96	1.00	1.01	0.98
9	0.00	1.33	1.35	1.02	1.01	1.11	1.08	0.86	0.81	0.80	0.74	0.70	0.79	0.94	0.96	0.96	0.92
10	0.00	1.17	0.74	0.75	0.98	1.06	0.93	0.76	0.75	0.76	0.71	0.65	0.72	0.84	0.82	0.82	0.80
11	0.00	0.44	0.49	0.88	0.99	0.97	0.88	0.74	0.77	0.77	0.71	0.65	0.70	0.81	0.79	0.80	0.79
12	0.00	0.47	1.00	0.63	0.84	0.83	0.78	0.71	0.75	0.75	0.68	0.60	0.65	0.74	0.73	0.74	0.74
13	0.00	0.69	0.62	0.54	0.72	0.73	0.72	0.66	0.69	0.71	0.62	0.54	0.59	0.66	0.66	0.67	0.67
14	0.00	0.79	0.55	0.48	0.65	0.68	0.67	0.62	0.66	0.68	0.59	0.50	0.55	0.62	0.61	0.63	0.63
15	0.70	0.70	0.49	0.45	0.61	0.63	0.62	0.57	0.62	0.65	0.56	0.47	0.52	0.58	0.57	0.59	0.60
16	0.60	0.62	0.45	0.42	0.57	0.57	0.54	0.51	0.58	0.62	0.52	0.44	0.49	0.54	0.53	0.55	0.56
17	0.51	0.56	0.41	0.40	0.51	0.49	0.46	0.45	0.54	0.59	0.50	0.40	0.46	0.50	0.49	0.51	0.52
18	0.45	0.51	0.38	0.37	0.45	0.41	0.40	0.41	0.51	0.57	0.47	0.38	0.43	0.47	0.46	0.48	0.49
19	0.42	0.47	0.36	0.34	0.40	0.36	0.35	0.38	0.49	0.55	0.45	0.36	0.41	0.44	0.44	0.45	0.46
20	0.39	0.42	0.33	0.31	0.36	0.31	0.31	0.35	0.47	0.53	0.44	0.34	0.39	0.42	0.41	0.43	0.44
21	0.36	0.39	0.30	0.29	0.33	0.28	0.28	0.33	0.45	0.52	0.42	0.33	0.38	0.40	0.40	0.41	0.43
22	0.33	0.35	0.28	0.28	0.30	0.26	0.26	0.31	0.44	0.51	0.41	0.32	0.37	0.39	0.38	0.39	0.41
23	0.30	0.31	0.27	0.26	0.28	0.23	0.25	0.30	0.43	0.50	0.40	0.30	0.35	0.37	0.37	0.38	0.40
24	0.28	0.29	0.25	0.25	0.26	0.22	0.23	0.29	0.42	0.49	0.39	0.30	0.35	0.36	0.36	0.37	0.38
25	0.26	0.28	0.24	0.24	0.25	0.20	0.22	0.28	0.41	0.48	0.38	0.29	0.34	0.35	0.35	0.36	0.37
26	0.24	0.26	0.23	0.23	0.23	0.19	0.21	0.27	0.40	0.47	0.37	0.28	0.33	0.34	0.34	0.35	0.36
27	0.22	0.24	0.22	0.22	0.22	0.18	0.20	0.26	0.39	0.47	0.37	0.27	0.32	0.33	0.33	0.34	0.35
28	0.21	0.23	0.21	0.21	0.21	0.17	0.19	0.25	0.39	0.46	0.36	0.26	0.31	0.32	0.32	0.33	0.34
29	0.20	0.22	0.20	0.20	0.20	0.16	0.18	0.25	0.38	0.46	0.35	0.26	0.30	0.31	0.31	0.32	0.34
30	0.18	0.21	0.19	0.20	0.19	0.16	0.17	0.24	0.37	0.46	0.34	0.25	0.30	0.31	0.31	0.32	0.33

= Actual Experience

Summary of Cumulative Claim Rates
Adjustable Rate Mortgages
All LTV Categories

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.02	0.01	0.01	0.05	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2	0.00	1.20	0.59	0.19	0.41	0.48	0.17	0.14	0.18	0.17	0.17	0.36	0.19	0.37	0.32	0.31	0.32
3	5.26	4.27	2.33	1.09	1.93	1.94	0.97	0.76	0.83	0.84	1.04	1.75	1.04	1.26	1.19	1.21	1.26
4	10.53	7.51	4.46	2.72	3.82	3.65	1.94	1.66	1.77	2.00	2.67	2.59	2.05	2.38	2.34	2.44	2.53
5	15.79	10.41	6.72	4.79	5.69	5.26	3.25	2.70	2.96	3.72	3.92	3.66	3.38	3.86	3.87	4.05	4.18
6	15.79	12.97	9.21	6.47	6.89	6.20	4.05	3.80	4.39	4.74	4.88	4.48	4.42	5.05	5.08	5.32	5.47
7	15.79	16.04	10.79	7.62	7.76	6.73	5.11	5.11	5.21	5.51	5.62	5.11	5.25	6.00	6.05	6.32	6.45
8	15.79	17.24	11.63	8.50	8.45	7.35	6.03	5.64	5.67	5.95	6.03	5.47	5.74	6.59	6.65	6.93	7.04
9	15.79	17.92	12.35	9.05	8.94	7.86	6.54	6.07	6.06	6.34	6.42	5.80	6.19	7.12	7.17	7.45	7.55
10	15.79	18.43	12.69	9.42	9.38	8.30	6.93	6.41	6.39	6.68	6.75	6.07	6.56	7.54	7.57	7.85	7.95
11	15.79	18.60	12.90	9.82	9.77	8.67	7.27	6.71	6.69	6.99	7.06	6.32	6.88	7.91	7.91	8.20	8.30
12	15.79	18.77	13.29	10.07	10.08	8.95	7.54	6.98	6.96	7.25	7.33	6.54	7.16	8.22	8.20	8.49	8.60
13	15.79	19.01	13.52	10.27	10.32	9.18	7.77	7.19	7.19	7.48	7.55	6.71	7.39	8.47	8.44	8.73	8.84
14	15.79	19.26	13.70	10.44	10.52	9.37	7.96	7.38	7.38	7.68	7.74	6.85	7.58	8.69	8.64	8.94	9.05
15	15.86	19.46	13.84	10.58	10.69	9.53	8.12	7.54	7.55	7.85	7.91	6.98	7.75	8.87	8.81	9.11	9.24
16	15.92	19.62	13.96	10.70	10.83	9.66	8.25	7.66	7.69	8.00	8.06	7.08	7.90	9.03	8.95	9.26	9.39
17	15.97	19.75	14.06	10.80	10.95	9.76	8.35	7.76	7.81	8.13	8.18	7.17	8.02	9.16	9.07	9.39	9.52
18	16.00	19.85	14.15	10.89	11.04	9.84	8.43	7.85	7.91	8.24	8.29	7.25	8.13	9.27	9.17	9.50	9.63
19	16.03	19.94	14.22	10.96	11.12	9.91	8.50	7.92	8.00	8.34	8.39	7.31	8.22	9.37	9.26	9.59	9.73
20	16.06	20.02	14.28	11.03	11.19	9.96	8.55	7.98	8.08	8.42	8.48	7.37	8.30	9.45	9.34	9.67	9.81
21	16.08	20.08	14.33	11.08	11.24	10.00	8.59	8.03	8.15	8.50	8.55	7.42	8.37	9.52	9.40	9.74	9.89
22	16.10	20.14	14.38	11.13	11.29	10.04	8.63	8.07	8.21	8.56	8.62	7.47	8.43	9.59	9.46	9.80	9.95
23	16.11	20.18	14.41	11.17	11.32	10.07	8.66	8.11	8.26	8.62	8.68	7.51	8.49	9.65	9.51	9.85	10.01
24	16.13	20.22	14.45	11.21	11.36	10.09	8.69	8.15	8.31	8.67	8.73	7.54	8.54	9.70	9.56	9.90	10.06
25	16.14	20.25	14.48	11.24	11.39	10.11	8.71	8.18	8.35	8.72	8.78	7.57	8.59	9.74	9.60	9.94	10.10
26	16.15	20.28	14.50	11.27	11.41	10.13	8.73	8.20	8.39	8.76	8.82	7.60	8.63	9.78	9.63	9.98	10.14
27	16.16	20.30	14.52	11.29	11.44	10.15	8.75	8.23	8.42	8.80	8.86	7.62	8.66	9.82	9.66	10.01	10.18
28	16.16	20.32	14.54	11.31	11.46	10.16	8.77	8.25	8.45	8.84	8.90	7.65	8.69	9.85	9.69	10.04	10.21
29	16.17	20.34	14.56	11.33	11.47	10.18	8.78	8.27	8.48	8.87	8.93	7.67	8.72	9.88	9.72	10.07	10.23
30	16.18	20.36	14.57	11.35	11.49	10.19	8.79	8.28	8.50	8.89	8.96	7.68	8.75	9.90	9.74	10.09	10.26

= Actual Experience

Summary of Conditional Prepayment Rates
Adjustable Rate Mortgages
All LTV Categories

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.51	0.43	0.05	0.34	0.40	0.06	0.21	0.23	0.48	0.32	1.61	0.50	0.58	0.08	0.08	0.09
2	0.00	5.83	2.28	0.78	1.81	2.71	1.90	2.11	3.19	3.58	2.61	9.59	3.57	2.10	2.20	2.27	2.27
3	26.32	5.90	2.94	2.22	4.76	6.36	5.44	6.59	7.05	5.60	9.90	12.81	4.24	4.39	4.87	4.97	4.71
4	38.46	3.86	4.10	4.70	6.85	9.55	10.79	9.00	7.32	13.03	10.48	6.87	6.70	7.02	7.73	7.46	7.22
5	0.00	4.41	5.89	6.28	10.02	14.71	12.40	7.32	13.35	10.48	7.56	7.98	7.97	8.22	8.66	8.47	8.34
6	33.33	5.04	6.74	9.27	13.91	12.94	8.74	11.68	11.53	8.26	7.57	8.24	8.03	8.11	8.59	8.49	8.42
7	0.00	7.61	10.87	13.58	12.52	7.14	13.07	11.23	8.77	8.86	7.99	8.74	8.29	8.41	9.00	8.97	8.86
8	0.00	7.78	13.18	11.80	6.37	9.26	9.96	9.51	8.93	9.32	8.17	8.81	8.43	8.60	9.31	9.21	9.05
9	0.00	13.29	11.57	6.41	8.58	8.60	8.73	9.11	8.92	9.09	7.97	8.53	8.24	8.42	9.03	8.88	8.74
10	25.00	9.73	5.88	8.53	8.34	8.62	8.49	9.20	9.01	9.11	7.95	8.50	8.24	8.41	8.99	8.85	8.75
11	33.33	5.68	7.65	8.74	8.08	8.41	8.55	9.13	8.79	9.00	7.90	8.43	8.17	8.29	8.83	8.71	8.61
12	0.00	5.58	7.63	7.85	7.94	8.44	8.48	8.79	8.57	8.76	7.80	8.26	8.02	8.12	8.56	8.45	8.37
13	0.00	8.17	8.61	7.81	8.01	8.42	8.31	8.66	8.57	8.79	7.81	8.21	8.01	8.11	8.51	8.40	8.36
14	0.00	9.02	8.65	8.02	8.14	8.42	8.37	8.76	8.71	8.96	7.92	8.31	8.13	8.21	8.63	8.51	8.51
15	8.43	8.70	8.74	8.05	8.00	8.29	8.30	8.72	8.69	8.97	7.93	8.28	8.13	8.19	8.60	8.53	8.52
16	8.22	8.61	8.70	7.97	7.90	8.20	8.25	8.64	8.64	8.98	7.94	8.25	8.13	8.19	8.62	8.54	8.53
17	8.21	8.46	8.53	7.90	7.83	8.13	8.17	8.53	8.58	8.96	7.92	8.20	8.11	8.19	8.60	8.51	8.50
18	8.11	8.15	8.39	7.86	7.76	8.04	8.07	8.42	8.53	8.95	7.92	8.16	8.12	8.19	8.58	8.48	8.49
19	7.94	7.93	8.29	7.82	7.69	7.93	7.98	8.34	8.48	8.94	7.92	8.15	8.12	8.18	8.56	8.46	8.49
20	7.81	7.76	8.21	7.78	7.61	7.84	7.90	8.25	8.44	8.93	7.93	8.14	8.12	8.18	8.53	8.45	8.49
21	7.71	7.62	8.11	7.73	7.54	7.76	7.83	8.16	8.40	8.94	7.94	8.12	8.12	8.17	8.52	8.44	8.48
22	7.64	7.52	8.03	7.69	7.49	7.69	7.77	8.10	8.39	8.94	7.94	8.09	8.12	8.17	8.51	8.44	8.48
23	7.56	7.40	7.95	7.65	7.43	7.63	7.71	8.06	8.36	8.94	7.94	8.07	8.12	8.17	8.50	8.43	8.49
24	7.49	7.31	7.88	7.61	7.38	7.57	7.67	8.01	8.34	8.94	7.94	8.06	8.12	8.17	8.50	8.44	8.50
25	7.43	7.23	7.81	7.57	7.34	7.53	7.63	7.97	8.32	8.94	7.94	8.05	8.12	8.16	8.50	8.44	8.50
26	7.38	7.17	7.76	7.55	7.31	7.49	7.60	7.93	8.30	8.94	7.95	8.04	8.12	8.17	8.51	8.45	8.51
27	7.35	7.13	7.72	7.53	7.29	7.47	7.58	7.90	8.28	8.95	7.95	8.03	8.13	8.17	8.51	8.45	8.51
28	7.32	7.09	7.69	7.52	7.27	7.44	7.55	7.88	8.27	8.94	7.95	8.03	8.13	8.18	8.52	8.45	8.52
29	7.30	7.07	7.66	7.50	7.25	7.42	7.53	7.86	8.27	8.95	7.96	8.03	8.13	8.18	8.52	8.46	8.52
30	7.28	7.05	7.64	7.49	7.24	7.40	7.52	7.85	8.25	8.95	7.96	8.03	8.13	8.18	8.52	8.46	8.52

= Actual Experience

Summary of Cumulative Prepayment Rates
Adjustable Rate Mortgages
All LTV Categories

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.51	0.43	0.05	0.34	0.40	0.06	0.21	0.23	0.48	0.32	1.61	0.50	0.58	0.08	0.08	0.09
2	0.00	6.31	2.70	0.83	2.14	3.10	1.96	2.32	3.41	4.04	2.92	11.05	4.05	2.66	2.28	2.35	2.36
3	26.32	11.78	5.54	3.03	6.78	9.23	7.28	8.75	10.21	9.40	12.51	22.40	8.11	6.92	7.02	7.19	6.94
4	52.63	15.02	9.32	7.53	13.03	17.71	17.18	16.89	16.72	21.09	21.56	27.61	14.20	13.37	14.11	14.02	13.57
5	52.63	18.43	14.40	13.17	21.36	29.27	27.21	22.85	27.60	29.15	27.29	33.18	20.87	20.29	21.35	21.10	20.57
6	63.16	22.01	19.72	20.77	31.50	37.74	33.29	31.54	35.61	34.69	32.49	38.38	26.96	26.45	27.77	27.46	26.91
7	63.16	26.96	27.44	30.66	39.22	41.75	41.48	38.81	40.87	40.06	37.50	43.37	32.65	32.21	33.81	33.49	32.90
8	63.16	31.40	35.59	37.94	42.59	46.52	46.80	44.14	45.69	45.13	42.14	47.91	37.88	37.52	39.41	39.03	38.39
9	63.16	38.23	41.69	41.38	46.79	50.49	50.92	48.71	50.03	49.58	46.27	51.89	42.53	42.23	44.28	43.83	43.16
10	68.42	42.49	44.40	45.60	50.48	54.08	54.53	52.88	53.98	53.60	50.03	55.49	46.75	46.49	48.64	48.14	47.47
11	73.68	44.71	47.68	49.54	53.73	57.24	57.83	56.59	57.47	57.17	53.45	58.73	50.57	50.30	52.51	51.97	51.31
12	73.68	46.76	50.69	52.73	56.62	60.12	60.79	59.82	60.54	60.31	56.53	61.61	53.98	53.70	55.89	55.34	54.69
13	73.68	49.57	53.79	55.64	59.29	62.72	63.42	62.69	63.32	63.16	59.35	64.23	57.09	56.78	58.95	58.38	57.76
14	73.68	52.42	56.62	58.37	61.76	65.09	65.83	65.33	65.89	65.79	61.97	66.64	59.98	59.64	61.76	61.18	60.60
15	74.57	54.89	59.22	60.88	63.98	67.21	68.01	67.71	68.21	68.17	64.37	68.84	62.62	62.23	64.31	63.73	63.18
16	75.36	57.10	61.56	63.15	65.98	69.11	69.97	69.85	70.31	70.32	66.57	70.83	65.03	64.60	66.63	66.05	65.54
17	76.08	59.07	63.65	65.22	67.80	70.84	71.75	71.77	72.20	72.26	68.58	72.64	67.23	66.76	68.73	68.15	67.67
18	76.72	60.81	65.52	67.10	69.45	72.40	73.36	73.49	73.90	74.02	70.42	74.29	69.24	68.73	70.64	70.05	69.60
19	77.30	62.34	67.20	68.83	70.95	73.81	74.81	75.05	75.44	75.60	72.11	75.80	71.08	70.53	72.36	71.78	71.37
20	77.82	63.72	68.73	70.40	72.31	75.08	76.13	76.45	76.84	77.04	73.65	77.17	72.76	72.18	73.93	73.36	72.97
21	78.29	64.96	70.11	71.83	73.55	76.24	77.33	77.72	78.11	78.34	75.07	78.42	74.30	73.68	75.36	74.79	74.43
22	78.72	66.09	71.36	73.15	74.69	77.30	78.42	78.88	79.26	79.52	76.37	79.57	75.70	75.05	76.65	76.10	75.76
23	79.11	67.11	72.49	74.35	75.74	78.27	79.42	79.93	80.31	80.58	77.56	80.62	76.99	76.30	77.83	77.28	76.97
24	79.47	68.04	73.52	75.45	76.69	79.15	80.34	80.89	81.26	81.55	78.66	81.57	78.17	77.45	78.91	78.37	78.08
25	79.80	68.90	74.46	76.46	77.57	79.96	81.17	81.76	82.13	82.42	79.66	82.45	79.25	78.50	79.89	79.36	79.09
26	80.10	69.68	75.32	77.39	78.38	80.70	81.94	82.56	82.92	83.21	80.58	83.25	80.24	79.46	80.79	80.26	80.01
27	80.37	70.39	76.11	78.24	79.12	81.39	82.65	83.29	83.64	83.93	81.42	83.99	81.14	80.34	81.60	81.09	80.85
28	80.63	71.06	76.83	79.03	79.81	82.02	83.30	83.96	84.30	84.58	82.19	84.66	81.97	81.14	82.34	81.84	81.61
29	80.86	71.67	77.49	79.75	80.44	82.60	83.90	84.57	84.90	85.17	82.90	85.28	82.73	81.88	83.02	82.53	82.31
30	81.08	72.23	78.10	80.42	81.02	83.13	84.45	85.13	85.44	85.70	83.55	85.84	83.43	82.56	83.64	83.15	82.94

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
Unknown LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.11	0.36	0.15	0.05	0.05	0.03	0.13	0.23	0.01	0.02	0.19	0.09	0.11	0.00	0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.07
2	1.42	1.93	1.27	0.70	0.73	0.54	1.53	2.81	0.45	2.43	3.92	2.83	2.27	0.88	1.20	0.75	0.40	1.28	0.21	0.23	0.91	1.25	0.79	0.73	0.73	0.76
3	1.73	1.59	1.16	0.86	1.03	1.16	3.10	4.77	1.63	5.89	8.90	9.26	3.16	1.34	5.09	1.98	1.91	2.34	1.15	2.28	3.32	0.92	1.33	1.21	1.32	1.39
4	1.11	1.07	0.69	0.72	0.87	1.59	2.72	5.22	2.26	7.15	12.61	5.95	1.48	4.06	3.79	2.60	2.80	2.39	1.69	2.24	1.11	0.91	1.59	1.56	1.76	1.82
5	0.71	0.66	0.52	0.54	0.85	1.38	2.94	5.46	3.25	9.85	10.16	1.73	3.99	1.59	5.46	3.03	3.24	2.40	2.86	1.08	1.21	1.06	2.04	2.14	2.36	2.42
6	0.39	0.37	0.31	0.61	0.75	1.34	2.71	5.87	4.58	6.92	4.94	5.04	2.02	2.31	4.46	3.16	2.24	2.43	1.22	1.06	1.38	1.23	2.51	2.69	2.91	2.87
7	0.31	0.35	0.39	0.50	0.78	1.24	3.27	5.32	3.90	3.59	5.14	0.94	1.27	2.02	3.60	2.09	2.14	1.47	1.22	1.17	1.69	1.48	3.02	3.21	3.32	3.16
8	0.26	0.35	0.27	0.59	0.74	1.56	3.66	3.41	2.77	3.69	2.36	0.83	1.33	1.44	3.06	2.00	1.72	1.39	1.49	1.38	2.13	1.75	3.59	3.82	3.79	3.60
9	0.33	0.28	0.34	0.50	0.90	1.80	2.92	2.31	2.47	3.35	2.02	1.51	2.44	0.83	2.56	2.98	1.48	1.32	1.57	1.50	2.34	1.80	3.69	3.73	3.63	3.46
10	0.27	0.26	0.35	0.47	1.05	1.49	2.09	2.23	2.15	2.69	2.27	3.20	2.69	2.62	2.70	2.50	1.30	1.27	1.66	1.55	2.41	1.71	3.55	3.46	3.37	3.27
11	0.26	0.31	0.36	0.72	0.94	1.12	1.67	1.94	1.73	2.36	2.70	5.01	0.00	2.82	2.30	2.27	1.21	1.27	1.71	1.58	2.41	1.57	3.41	3.21	3.16	3.11
12	0.26	0.30	0.56	0.74	0.78	1.30	1.65	1.64	1.87	2.29	2.80	2.77	1.91	2.70	2.27	2.36	1.30	1.42	2.13	1.81	2.69	1.66	3.82	3.61	3.58	3.58
13	0.28	0.55	0.59	0.61	0.70	1.04	1.31	1.36	1.52	1.30	1.93	1.25	1.66	2.48	2.11	2.31	1.27	1.36	2.05	1.69	2.49	1.49	3.64	3.36	3.35	3.37
14	0.40	0.61	0.58	0.54	0.62	1.08	1.28	1.10	1.10	2.28	1.23	1.04	1.46	2.22	1.92	2.17	1.16	1.23	1.80	1.48	2.20	1.28	3.31	2.99	2.98	3.04
15	0.37	0.48	0.41	0.47	0.51	0.93	1.15	0.73	0.87	0.95	1.00	0.88	1.28	1.99	1.71	1.81	1.01	1.06	1.51	1.26	1.89	1.07	2.91	2.57	2.58	2.65
16	0.41	0.38	0.40	0.42	0.50	0.84	0.80	0.88	0.69	0.74	0.82	0.73	1.13	1.73	1.45	1.52	0.85	0.91	1.24	1.04	1.60	0.87	2.49	2.16	2.18	2.24
17	0.36	0.35	0.28	0.32	0.51	0.39	0.78	1.00	0.54	0.58	0.67	0.62	0.96	1.44	1.15	1.15	0.72	0.68	1.00	0.85	1.32	0.69	2.07	1.76	1.77	1.83
18	0.39	0.34	0.24	0.28	0.25	0.38	0.45	0.78	0.45	0.47	0.57	0.53	0.80	1.16	0.89	0.91	0.60	0.53	0.82	0.70	1.10	0.56	1.74	1.44	1.45	1.49
19	0.23	0.34	0.36	0.23	0.28	0.24	0.37	0.64	0.38	0.40	0.49	0.45	0.67	0.93	0.69	0.75	0.55	0.41	0.68	0.59	0.94	0.46	1.48	1.20	1.20	1.24
20	0.15	0.23	0.17	0.20	0.25	0.20	0.31	0.54	0.34	0.34	0.42	0.37	0.54	0.74	0.55	0.64	0.41	0.37	0.58	0.51	0.81	0.38	1.27	1.00	1.01	1.04
21	0.18	0.15	0.23	0.17	0.21	0.18	0.28	0.48	0.31	0.29	0.36	0.31	0.45	0.61	0.45	0.56	0.28	0.34	0.50	0.44	0.71	0.32	1.11	0.85	0.86	0.89
22	0.11	0.18	0.21	0.15	0.18	0.16	0.26	0.43	0.28	0.25	0.30	0.25	0.38	0.51	0.38	0.51	0.27	0.32	0.44	0.39	0.63	0.27	0.97	0.74	0.74	0.77
23	0.11	0.21	0.19	0.14	0.17	0.15	0.24	0.38	0.26	0.21	0.25	0.21	0.32	0.43	0.32	0.47	0.25	0.22	0.39	0.35	0.56	0.23	0.87	0.64	0.65	0.67
24	0.17	0.19	0.18	0.13	0.15	0.14	0.22	0.33	0.23	0.17	0.22	0.18	0.28	0.37	0.27	0.44	0.25	0.21	0.35	0.31	0.51	0.20	0.78	0.57	0.57	0.59
25	0.16	0.18	0.18	0.12	0.14	0.13	0.21	0.28	0.21	0.15	0.19	0.16	0.25	0.32	0.24	0.42	0.24	0.21	0.31	0.28	0.46	0.17	0.70	0.50	0.50	0.52
26	0.16	0.18	0.18	0.12	0.13	0.12	0.19	0.24	0.20	0.13	0.16	0.14	0.22	0.28	0.21	0.18	0.16	0.20	0.28	0.26	0.42	0.15	0.63	0.44	0.44	0.46
27	0.16	0.17	0.18	0.11	0.12	0.12	0.18	0.21	0.19	0.11	0.14	0.12	0.20	0.24	0.18	0.16	0.16	0.20	0.26	0.23	0.38	0.13	0.57	0.39	0.39	0.40
28	0.15	0.17	0.17	0.11	0.11	0.11	0.17	0.18	0.18	0.09	0.12	0.11	0.17	0.21	0.16	0.13	0.16	0.20	0.23	0.21	0.35	0.11	0.51	0.34	0.34	0.36
29	0.14	0.17	0.17	0.11	0.10	0.11	0.16	0.15	0.17	0.08	0.11	0.09	0.15	0.18	0.14	0.12	0.16	0.05	0.21	0.19	0.32	0.10	0.46	0.30	0.30	0.31
30	0.14	0.15	0.17	0.10	0.10	0.10	0.15	0.13	0.17	0.07	0.09	0.08	0.14	0.16	0.12	0.10	0.16	0.04	0.19	0.17	0.29	0.08	0.41	0.26	0.26	0.27

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
0 - 65 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.04	0.03	0.00	0.00	0.04	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.13	0.14	0.14
2	0.07	0.13	0.16	0.03	0.23	0.25	0.42	0.22	0.09	0.23	0.15	0.05	0.06	0.10	0.11	0.16	0.33	0.17	0.03	0.19	0.11	0.00	0.22	0.20	0.21	0.21
3	0.14	0.21	0.44	0.18	0.35	0.44	0.67	0.60	0.25	0.39	0.62	0.26	0.17	0.34	0.42	0.36	0.67	0.36	0.30	0.42	0.22	0.37	0.39	0.38	0.40	0.41
4	0.00	0.32	0.29	0.68	0.36	0.59	0.59	0.97	0.32	0.79	1.14	0.34	0.28	0.41	0.48	0.56	1.14	0.76	0.29	0.45	0.56	0.49	0.55	0.59	0.63	0.64
5	0.00	0.17	0.25	0.12	0.45	0.22	0.45	0.99	0.44	1.35	1.40	0.47	0.25	0.49	0.53	0.81	1.27	0.47	0.56	0.50	0.61	0.55	0.64	0.74	0.77	0.79
6	0.00	0.18	0.05	0.24	0.28	0.39	0.64	1.13	0.85	1.28	0.84	0.45	0.30	0.43	0.77	0.84	1.34	0.48	0.54	0.47	0.59	0.55	0.64	0.72	0.75	0.75
7	0.10	0.09	0.10	0.08	0.32	0.44	0.68	1.35	0.74	0.91	0.88	0.36	0.31	0.70	0.96	0.54	1.30	0.58	0.51	0.45	0.61	0.56	0.65	0.73	0.75	0.73
8	0.00	0.28	0.00	0.17	0.28	0.58	0.79	1.26	0.50	0.80	0.76	0.32	0.28	0.78	0.76	0.95	0.63	0.48	0.45	0.41	0.52	0.51	0.58	0.64	0.65	0.62
9	0.00	0.10	0.22	0.13	0.35	0.87	0.78	0.47	0.47	0.83	0.92	0.35	0.33	0.59	0.55	0.80	0.65	0.52	0.52	0.45	0.49	0.53	0.62	0.70	0.67	0.67
10	0.00	0.00	0.18	0.33	0.51	0.64	1.07	0.71	0.43	0.59	0.68	0.51	0.30	0.53	1.00	0.85	0.73	0.64	0.70	0.55	0.61	0.58	0.72	0.76	0.75	0.78
11	0.00	0.21	0.50	0.15	0.55	0.38	0.48	0.77	0.38	0.54	0.25	0.35	0.21	0.71	0.80	0.66	0.58	0.60	0.62	0.51	0.50	0.51	0.60	0.61	0.60	0.60
12	0.12	0.00	0.07	0.44	0.49	0.39	0.63	0.37	0.24	0.15	0.27	0.23	0.41	0.78	0.88	0.75	0.64	0.75	0.78	0.63	0.64	0.58	0.65	0.80	0.79	0.80
13	0.00	0.00	0.22	0.29	0.34	0.37	0.52	0.28	0.32	0.16	0.40	0.56	0.46	0.82	0.91	0.83	0.69	0.79	0.76	0.69	0.73	0.61	0.74	0.86	0.79	0.81
14	0.00	0.00	0.16	0.25	0.16	0.49	0.48	0.30	0.23	0.35	0.66	0.54	0.43	0.81	0.82	0.82	0.60	0.69	0.73	0.68	0.64	0.60	0.72	0.83	0.76	0.78
15	0.00	0.14	0.33	0.20	0.18	0.23	0.28	0.00	0.17	0.57	0.60	0.50	0.39	0.73	0.75	0.71	0.47	0.63	0.60	0.56	0.52	0.55	0.62	0.69	0.69	0.71
16	0.00	0.00	0.09	0.07	0.22	0.16	0.30	0.22	0.50	0.52	0.54	0.44	0.36	0.68	0.67	0.51	0.41	0.52	0.54	0.48	0.47	0.51	0.57	0.62	0.55	0.64
17	0.16	0.00	0.10	0.08	0.00	0.06	0.00	0.62	0.45	0.46	0.49	0.39	0.32	0.62	0.58	0.44	0.35	0.40	0.49	0.45	0.42	0.48	0.52	0.48	0.48	0.49
18	0.00	0.35	0.00	0.10	0.07	0.09	0.49	0.53	0.41	0.42	0.45	0.36	0.28	0.52	0.51	0.37	0.31	0.35	0.36	0.37	0.37	0.38	0.49	0.42	0.42	0.43
19	0.00	0.00	0.13	0.10	0.21	0.29	0.44	0.47	0.39	0.39	0.41	0.34	0.25	0.48	0.44	0.33	0.28	0.33	0.33	0.30	0.34	0.28	0.31	0.37	0.37	0.38
20	0.00	0.00	0.00	0.00	0.37	0.24	0.40	0.41	0.37	0.36	0.38	0.29	0.23	0.44	0.40	0.30	0.27	0.31	0.19	0.28	0.32	0.26	0.28	0.34	0.34	0.35
21	0.00	0.00	0.21	0.38	0.30	0.23	0.38	0.37	0.31	0.34	0.36	0.27	0.21	0.30	0.37	0.28	0.26	0.30	0.16	0.27	0.30	0.24	0.26	0.31	0.31	0.32
22	0.28	0.00	0.50	0.37	0.19	0.23	0.36	0.34	0.30	0.32	0.33	0.23	0.19	0.27	0.35	0.26	0.07	0.19	0.13	0.26	0.29	0.23	0.24	0.29	0.30	0.30
23	0.00	0.31	0.49	0.37	0.17	0.23	0.35	0.31	0.28	0.30	0.31	0.22	0.18	0.25	0.23	0.25	0.06	0.09	0.11	0.18	0.28	0.22	0.23	0.28	0.29	0.29
24	0.22	0.28	0.49	0.27	0.17	0.23	0.15	0.28	0.27	0.28	0.29	0.22	0.18	0.23	0.12	0.25	0.05	0.07	0.10	0.18	0.27	0.21	0.22	0.28	0.28	0.29
25	0.20	0.26	0.26	0.27	0.16	0.24	0.13	0.25	0.26	0.26	0.28	0.22	0.17	0.22	0.10	0.25	0.04	0.06	0.08	0.17	0.27	0.21	0.22	0.28	0.28	0.29
26	0.19	0.24	0.24	0.27	0.15	0.20	0.11	0.22	0.20	0.25	0.27	0.18	0.17	0.21	0.08	0.05	0.03	0.05	0.07	0.17	0.27	0.21	0.22	0.29	0.29	0.29
27	0.17	0.22	0.22	0.27	0.15	0.20	0.10	0.19	0.13	0.24	0.26	0.18	0.15	0.21	0.07	0.04	0.03	0.04	0.06	0.17	0.28	0.21	0.22	0.07	0.07	0.07
28	0.16	0.21	0.21	0.27	0.15	0.21	0.08	0.17	0.12	0.23	0.25	0.12	0.14	0.20	0.06	0.04	0.02	0.03	0.05	0.17	0.28	0.22	0.23	0.06	0.06	0.06
29	0.14	0.19	0.19	0.10	0.15	0.21	0.07	0.15	0.11	0.22	0.25	0.12	0.14	0.20	0.05	0.03	0.02	0.03	0.04	0.18	0.29	0.23	0.24	0.05	0.05	0.05
30	0.13	0.17	0.17	0.09	0.15	0.22	0.06	0.13	0.10	0.21	0.07	0.13	0.14	0.20	0.04	0.02	0.01	0.02	0.04	0.18	0.05	0.24	0.04	0.04	0.04	0.04

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
65 - 80 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.01	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.06	0.05
2	0.06	0.17	0.07	0.06	0.10	0.26	0.58	0.96	0.14	0.38	0.20	0.19	0.25	0.19	0.15	0.16	0.13	0.07	0.13	0.10	0.14	0.02	0.16	0.15	0.15	0.14
3	0.23	0.16	0.13	0.13	0.26	0.49	1.71	1.96	0.51	0.99	1.18	0.96	0.52	0.55	0.43	0.42	0.58	0.62	0.44	0.38	0.50	0.39	0.48	0.45	0.46	0.46
4	0.25	0.25	0.16	0.17	0.14	0.94	1.47	2.33	0.79	2.18	2.72	1.13	0.68	0.70	0.68	0.62	0.91	0.78	0.67	0.69	0.53	0.55	0.71	0.70	0.73	0.73
5	0.24	0.24	0.03	0.14	0.44	0.57	1.80	2.18	1.28	2.99	2.13	0.95	0.68	0.94	0.81	1.08	1.14	0.96	0.70	0.50	0.55	0.59	0.79	0.80	0.83	0.82
6	0.08	0.34	0.03	0.16	0.32	0.84	1.45	2.80	2.23	2.54	1.78	0.83	0.63	0.82	1.02	1.11	1.06	1.13	0.39	0.43	0.50	0.54	0.73	0.72	0.74	0.70
7	0.05	0.03	0.03	0.16	0.18	0.65	2.47	4.05	1.79	2.28	1.49	0.80	0.59	0.95	1.26	0.90	0.86	0.50	0.36	0.41	0.49	0.53	0.72	0.71	0.71	0.67
8	0.06	0.03	0.09	0.32	0.45	0.78	2.73	2.11	1.34	1.47	1.38	0.74	0.63	1.06	0.99	1.01	0.92	0.61	0.51	0.53	0.65	0.70	0.94	0.98	0.97	0.92
9	0.14	0.09	0.13	0.14	0.37	1.23	1.55	1.42	1.13	1.44	1.30	0.84	0.61	0.80	0.87	1.12	0.88	0.61	0.53	0.54	0.68	0.71	0.94	0.98	0.97	0.92
10	0.12	0.06	0.08	0.26	0.52	1.15	1.06	1.24	1.16	1.41	1.17	0.88	0.50	0.75	1.25	1.09	0.91	0.66	0.61	0.60	0.74	0.76	0.99	1.06	1.04	1.00
11	0.15	0.10	0.10	0.27	0.41	0.64	1.04	0.96	0.81	1.12	1.27	0.88	0.47	1.04	1.24	1.11	0.95	0.70	0.65	0.63	0.78	0.78	1.02	1.09	1.08	1.03
12	0.06	0.17	0.07	0.20	0.47	0.57	1.05	0.85	0.84	0.80	1.01	0.56	0.53	0.98	1.22	1.10	0.98	0.75	0.71	0.65	0.80	0.80	1.04	1.14	1.12	1.08
13	0.03	0.08	0.07	0.14	0.38	0.44	0.95	0.99	0.66	0.82	1.13	0.40	0.45	0.89	1.11	1.01	0.92	0.70	0.66	0.59	0.74	0.72	0.94	1.04	1.03	0.99
14	0.07	0.12	0.18	0.05	0.26	0.57	0.26	0.57	0.59	0.51	0.92	0.43	0.50	0.99	1.25	1.14	1.02	0.76	0.72	0.65	0.81	0.79	1.04	1.14	1.13	1.09
15	0.00	0.00	0.05	0.26	0.30	0.36	0.22	0.34	0.16	0.88	0.83	0.39	0.45	0.93	1.18	1.05	0.95	0.71	0.68	0.60	0.76	0.73	0.96	1.07	1.06	1.01
16	0.21	0.05	0.12	0.09	0.28	0.14	0.56	0.24	0.56	0.79	0.73	0.35	0.40	0.85	1.07	0.93	0.85	0.64	0.64	0.54	0.70	0.66	0.86	0.97	0.96	0.92
17	0.00	0.05	0.13	0.17	0.22	0.37	0.12	0.68	0.49	0.68	0.61	0.31	0.35	0.75	0.93	0.80	0.75	0.57	0.58	0.48	0.64	0.59	0.75	0.87	0.86	0.82
18	0.00	0.11	0.04	0.08	0.28	0.23	0.37	0.56	0.44	0.62	0.57	0.27	0.30	0.65	0.81	0.69	0.69	0.52	0.55	0.44	0.59	0.53	0.67	0.79	0.79	0.74
19	0.10	0.06	0.04	0.09	0.05	0.20	0.32	0.49	0.41	0.59	0.42	0.25	0.26	0.58	0.72	0.62	0.64	0.49	0.53	0.40	0.50	0.48	0.61	0.74	0.73	0.68
20	0.00	0.00	0.04	0.00	0.27	0.18	0.29	0.43	0.39	0.56	0.39	0.22	0.23	0.52	0.66	0.56	0.61	0.47	0.49	0.38	0.47	0.45	0.57	0.63	0.66	0.64
21	0.07	0.00	0.00	0.30	0.26	0.18	0.26	0.38	0.36	0.54	0.36	0.20	0.20	0.47	0.62	0.52	0.55	0.46	0.45	0.36	0.45	0.43	0.53	0.61	0.60	0.61
22	0.00	0.00	0.33	0.30	0.26	0.17	0.25	0.35	0.34	0.41	0.33	0.19	0.18	0.44	0.59	0.49	0.50	0.45	0.45	0.35	0.44	0.42	0.51	0.59	0.59	0.60
23	0.00	0.17	0.30	0.31	0.27	0.17	0.24	0.32	0.33	0.33	0.31	0.18	0.16	0.42	0.56	0.47	0.49	0.42	0.42	0.34	0.44	0.41	0.50	0.44	0.53	0.52
24	0.13	0.17	0.32	0.33	0.27	0.17	0.23	0.29	0.32	0.31	0.30	0.17	0.15	0.40	0.55	0.46	0.49	0.39	0.38	0.34	0.44	0.41	0.47	0.43	0.43	0.52
25	0.13	0.18	0.35	0.35	0.28	0.17	0.21	0.27	0.31	0.29	0.29	0.17	0.14	0.38	0.54	0.45	0.43	0.40	0.27	0.34	0.40	0.41	0.43	0.37	0.42	0.52
26	0.13	0.18	0.19	0.32	0.29	0.17	0.21	0.24	0.31	0.28	0.28	0.16	0.13	0.37	0.53	0.45	0.36	0.41	0.27	0.34	0.27	0.38	0.43	0.36	0.35	0.48
27	0.13	0.19	0.15	0.34	0.30	0.17	0.20	0.22	0.30	0.26	0.27	0.16	0.12	0.36	0.49	0.44	0.25	0.37	0.27	0.35	0.26	0.36	0.43	0.35	0.35	0.38
28	0.14	0.20	0.16	0.36	0.28	0.17	0.07	0.20	0.30	0.25	0.26	0.16	0.12	0.35	0.48	0.44	0.25	0.27	0.28	0.35	0.26	0.36	0.43	0.34	0.34	0.32
29	0.15	0.21	0.16	0.32	0.29	0.17	0.06	0.19	0.29	0.24	0.25	0.16	0.11	0.34	0.44	0.41	0.24	0.21	0.29	0.30	0.25	0.36	0.39	0.34	0.34	0.31
30	0.15	0.05	0.17	0.28	0.26	0.17	0.06	0.17	0.29	0.23	0.25	0.15	0.10	0.33	0.39	0.41	0.24	0.21	0.30	0.30	0.25	0.33	0.39	0.34	0.34	0.31

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
80 - 90 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.02	0.02	0.00	0.01	0.01	0.00	0.02	0.05	0.01	0.01	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.02	0.02
2	0.19	0.22	0.12	0.12	0.14	0.30	0.66	1.25	0.28	0.53	0.60	0.24	0.23	0.29	0.25	0.19	0.25	0.17	0.15	0.14	0.24	0.11	0.19	0.16	0.16	0.16
3	0.28	0.32	0.27	0.24	0.45	0.76	1.86	2.53	1.04	2.62	2.41	1.11	0.76	0.78	0.73	0.70	0.83	0.70	0.60	0.55	0.94	0.51	0.60	0.58	0.62	0.65
4	0.38	0.35	0.21	0.31	0.38	0.85	2.32	3.18	1.44	3.69	4.65	1.55	0.95	1.10	1.12	1.18	1.48	1.16	0.83	0.95	0.81	0.74	0.95	1.03	1.14	1.18
5	0.25	0.35	0.12	0.27	0.41	0.89	2.19	3.38	2.32	5.58	4.18	1.50	1.01	1.25	1.46	1.52	1.83	1.25	1.16	0.77	0.84	0.84	1.14	1.31	1.41	1.45
6	0.21	0.18	0.16	0.23	0.33	0.75	2.26	5.11	3.35	4.51	3.17	1.45	1.05	1.36	1.93	1.87	1.57	1.44	0.65	0.65	0.76	0.79	1.12	1.22	1.30	1.28
7	0.14	0.14	0.11	0.26	0.38	0.97	2.80	4.72	3.07	3.23	2.52	1.25	0.96	1.49	2.12	1.49	1.61	0.80	0.53	0.57	0.71	0.75	1.04	1.13	1.17	1.11
8	0.14	0.16	0.12	0.20	0.50	1.21	3.84	3.38	2.10	2.56	2.46	1.16	1.02	1.74	1.65	1.56	1.15	0.65	0.44	0.52	0.67	0.69	0.95	0.99	0.98	0.90
9	0.14	0.08	0.07	0.19	0.61	1.65	2.59	2.10	1.78	2.34	2.34	1.36	1.00	1.35	1.49	1.28	1.07	0.63	0.46	0.54	0.70	0.71	0.95	0.96	0.93	0.86
10	0.13	0.13	0.13	0.26	0.57	1.32	2.32	1.81	1.67	2.18	2.32	1.35	0.90	1.46	1.53	1.23	1.10	0.70	0.54	0.62	0.79	0.77	1.01	1.02	0.98	0.93
11	0.05	0.15	0.12	0.39	0.70	1.13	1.98	1.36	1.72	1.54	1.63	1.00	0.81	1.26	1.32	1.09	1.02	0.68	0.52	0.59	0.74	0.70	0.90	0.91	0.89	0.85
12	0.04	0.07	0.14	0.28	0.60	0.97	1.54	1.59	1.34	1.79	1.01	0.94	0.62	1.07	1.15	0.97	0.96	0.66	0.52	0.56	0.69	0.64	0.81	0.84	0.83	0.80
13	0.07	0.13	0.14	0.25	0.55	0.78	1.28	1.06	1.12	1.18	1.27	0.51	0.46	0.85	0.94	0.81	0.81	0.55	0.43	0.45	0.55	0.51	0.65	0.68	0.68	0.65
14	0.13	0.11	0.20	0.13	0.38	0.55	1.00	0.33	0.58	0.99	1.22	0.51	0.46	0.89	1.00	0.86	0.85	0.57	0.44	0.45	0.56	0.51	0.66	0.70	0.69	0.68
15	0.08	0.12	0.13	0.14	0.43	0.57	0.71	0.85	0.67	1.32	1.13	0.45	0.42	0.82	0.93	0.78	0.77	0.50	0.39	0.40	0.50	0.46	0.59	0.63	0.63	0.62
16	0.12	0.14	0.19	0.14	0.37	0.68	0.49	0.48	0.89	1.17	0.99	0.39	0.38	0.75	0.84	0.68	0.66	0.43	0.34	0.35	0.44	0.41	0.52	0.56	0.56	0.55
17	0.07	0.10	0.09	0.14	0.20	0.37	0.40	1.23	0.76	0.97	0.91	0.35	0.33	0.66	0.72	0.57	0.55	0.37	0.30	0.30	0.39	0.35	0.45	0.49	0.49	0.48
18	0.06	0.12	0.15	0.07	0.24	0.34	0.78	1.03	0.67	0.88	0.81	0.31	0.28	0.57	0.62	0.49	0.47	0.32	0.26	0.26	0.34	0.31	0.40	0.43	0.43	0.42
19	0.06	0.09	0.07	0.10	0.15	0.25	0.71	0.89	0.61	0.73	0.76	0.28	0.24	0.49	0.54	0.42	0.41	0.28	0.24	0.23	0.31	0.27	0.35	0.39	0.39	0.38
20	0.00	0.13	0.09	0.12	0.20	0.21	0.49	0.79	0.57	0.67	0.63	0.25	0.20	0.42	0.48	0.38	0.37	0.25	0.22	0.21	0.28	0.25	0.31	0.35	0.35	0.34
21	0.11	0.03	0.06	0.18	0.19	0.19	0.33	0.71	0.54	0.62	0.53	0.22	0.17	0.37	0.44	0.34	0.34	0.23	0.21	0.19	0.26	0.22	0.28	0.32	0.32	0.32
22	0.09	0.00	0.18	0.18	0.18	0.18	0.30	0.65	0.51	0.57	0.41	0.19	0.15	0.33	0.41	0.32	0.32	0.22	0.20	0.18	0.24	0.21	0.26	0.30	0.30	0.30
23	0.04	0.21	0.19	0.18	0.18	0.17	0.26	0.60	0.48	0.52	0.37	0.18	0.13	0.30	0.38	0.30	0.30	0.20	0.19	0.17	0.23	0.19	0.24	0.28	0.29	0.28
24	0.19	0.22	0.19	0.18	0.17	0.16	0.24	0.54	0.45	0.39	0.34	0.16	0.12	0.28	0.37	0.29	0.29	0.20	0.19	0.16	0.22	0.18	0.22	0.27	0.27	0.27
25	0.20	0.23	0.21	0.19	0.17	0.15	0.21	0.48	0.43	0.35	0.31	0.15	0.11	0.26	0.35	0.28	0.28	0.19	0.19	0.15	0.21	0.17	0.21	0.26	0.27	0.26
26	0.21	0.24	0.22	0.19	0.17	0.15	0.18	0.42	0.41	0.32	0.29	0.15	0.10	0.25	0.35	0.27	0.27	0.19	0.19	0.14	0.20	0.16	0.20	0.26	0.26	0.25
27	0.22	0.26	0.23	0.20	0.17	0.14	0.16	0.38	0.39	0.29	0.27	0.14	0.09	0.23	0.34	0.27	0.27	0.18	0.19	0.14	0.20	0.16	0.19	0.25	0.26	0.25
28	0.24	0.28	0.23	0.21	0.17	0.13	0.13	0.33	0.37	0.25	0.25	0.13	0.08	0.22	0.33	0.27	0.27	0.18	0.20	0.13	0.19	0.15	0.18	0.25	0.26	0.25
29	0.22	0.30	0.24	0.19	0.17	0.13	0.11	0.30	0.36	0.23	0.24	0.13	0.08	0.21	0.33	0.27	0.26	0.18	0.21	0.13	0.19	0.14	0.18	0.25	0.26	0.25
30	0.24	0.29	0.26	0.20	0.17	0.13	0.10	0.26	0.35	0.20	0.22	0.13	0.07	0.20	0.33	0.27	0.27	0.18	0.22	0.12	0.19	0.14	0.17	0.25	0.26	0.25

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
90 - 93 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.02	0.01	0.01	0.02	0.00	0.01	0.05	0.06	0.02	0.05	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02
2	0.26	0.30	0.19	0.18	0.18	0.61	1.11	1.60	0.68	0.78	0.54	0.34	0.23	0.27	0.19	0.18	0.23	0.18	0.16	0.14	0.20	0.16	0.19	0.16	0.16	0.16
3	0.58	0.50	0.33	0.32	0.70	0.98	2.41	3.52	1.36	2.03	2.39	1.42	0.80	0.88	0.70	0.79	0.98	0.71	0.59	0.62	0.94	0.52	0.61	0.62	0.67	0.72
4	0.52	0.46	0.16	0.24	0.43	1.29	2.46	3.99	1.90	4.05	4.86	1.95	1.10	1.28	1.28	1.39	1.73	1.28	0.90	1.05	0.84	0.73	0.96	1.08	1.23	1.29
5	0.39	0.30	0.19	0.25	0.59	1.18	2.81	4.66	3.03	5.67	4.66	1.98	1.25	1.50	1.56	2.03	2.16	1.25	1.16	0.79	0.85	0.84	1.18	1.38	1.52	1.59
6	0.29	0.18	0.14	0.22	0.67	1.27	2.67	6.56	4.60	4.77	3.33	1.78	1.20	1.66	2.26	2.29	1.85	1.52	0.64	0.63	0.75	0.78	1.14	1.27	1.39	1.37
7	0.19	0.17	0.16	0.28	0.59	1.26	3.62	6.27	3.51	3.75	3.03	1.73	1.15	2.08	2.52	1.78	1.77	0.86	0.53	0.57	0.73	0.78	1.12	1.24	1.30	1.23
8	0.14	0.16	0.12	0.19	0.52	1.75	4.53	4.57	2.63	2.70	2.87	1.68	1.38	2.01	1.90	1.62	1.24	0.67	0.45	0.53	0.70	0.73	1.03	1.09	1.09	0.99
9	0.12	0.16	0.12	0.35	0.76	2.07	2.99	3.31	2.49	2.47	3.49	1.90	1.22	1.83	1.79	1.58	1.21	0.69	0.49	0.60	0.78	0.80	1.10	1.11	1.08	0.98
10	0.12	0.08	0.13	0.37	1.08	1.73	2.62	1.17	2.17	2.42	2.53	1.73	1.13	1.70	1.62	1.33	1.05	0.61	0.44	0.54	0.71	0.70	0.92	0.88	0.86	0.79
11	0.10	0.14	0.13	0.45	0.89	1.57	1.94	1.88	1.59	1.83	2.40	1.55	0.90	1.35	1.43	1.21	1.01	0.63	0.45	0.54	0.69	0.66	0.84	0.81	0.80	0.75
12	0.11	0.08	0.30	0.34	0.79	1.08	1.56	0.39	2.29	1.64	1.92	1.45	0.71	1.22	1.34	1.18	1.08	0.72	0.55	0.60	0.75	0.69	0.88	0.90	0.90	0.86
13	0.12	0.17	0.12	0.44	0.61	0.95	1.08	0.64	1.61	1.45	1.34	0.83	0.53	0.98	1.12	1.02	0.94	0.62	0.47	0.49	0.60	0.56	0.71	0.74	0.74	0.71
14	0.14	0.18	0.22	0.22	0.49	1.08	1.58	1.05	1.06	0.87	1.57	0.77	0.50	0.96	1.13	1.03	0.95	0.61	0.45	0.46	0.57	0.53	0.69	0.72	0.71	0.69
15	0.11	0.26	0.12	0.23	0.37	0.92	0.86	0.86	0.93	1.72	1.33	0.67	0.45	0.89	1.05	0.94	0.86	0.53	0.40	0.40	0.51	0.47	0.61	0.64	0.64	0.63
16	0.07	0.13	0.06	0.26	0.46	0.76	1.04	0.53	1.23	1.45	1.15	0.59	0.41	0.81	0.95	0.81	0.73	0.45	0.35	0.35	0.45	0.42	0.54	0.57	0.58	0.56
17	0.08	0.17	0.20	0.26	0.33	0.44	0.29	1.49	1.06	1.18	1.04	0.53	0.35	0.71	0.82	0.67	0.62	0.38	0.30	0.30	0.39	0.36	0.47	0.51	0.50	0.49
18	0.10	0.13	0.07	0.22	0.19	0.41	0.78	1.25	0.95	1.05	0.81	0.47	0.31	0.61	0.67	0.55	0.53	0.33	0.27	0.26	0.35	0.32	0.41	0.45	0.44	0.42
19	0.02	0.23	0.09	0.09	0.35	0.37	0.65	1.08	0.88	0.87	0.74	0.42	0.26	0.52	0.57	0.47	0.47	0.30	0.25	0.23	0.31	0.28	0.36	0.40	0.40	0.38
20	0.06	0.12	0.09	0.16	0.26	0.32	0.56	0.96	0.84	0.79	0.68	0.37	0.22	0.44	0.50	0.41	0.43	0.27	0.23	0.21	0.29	0.26	0.33	0.37	0.36	0.34
21	0.02	0.11	0.13	0.18	0.24	0.29	0.49	0.88	0.80	0.72	0.62	0.33	0.19	0.39	0.45	0.37	0.40	0.25	0.22	0.19	0.27	0.23	0.29	0.34	0.33	0.31
22	0.10	0.04	0.16	0.17	0.23	0.27	0.44	0.81	0.72	0.64	0.47	0.29	0.16	0.35	0.42	0.34	0.38	0.24	0.21	0.18	0.25	0.22	0.27	0.32	0.31	0.29
23	0.04	0.20	0.16	0.17	0.22	0.26	0.40	0.74	0.69	0.57	0.41	0.26	0.14	0.32	0.39	0.32	0.36	0.23	0.21	0.17	0.24	0.20	0.25	0.31	0.30	0.27
24	0.18	0.20	0.16	0.17	0.22	0.24	0.36	0.67	0.65	0.50	0.36	0.24	0.13	0.29	0.37	0.30	0.36	0.22	0.21	0.16	0.23	0.19	0.24	0.30	0.28	0.26
25	0.19	0.21	0.17	0.17	0.21	0.23	0.32	0.60	0.62	0.44	0.32	0.22	0.12	0.27	0.35	0.29	0.35	0.22	0.22	0.15	0.22	0.18	0.22	0.29	0.28	0.25
26	0.20	0.22	0.18	0.17	0.21	0.22	0.28	0.53	0.59	0.39	0.29	0.21	0.11	0.26	0.34	0.28	0.35	0.21	0.22	0.15	0.22	0.17	0.21	0.29	0.27	0.25
27	0.21	0.24	0.18	0.18	0.21	0.21	0.25	0.47	0.57	0.35	0.26	0.20	0.10	0.24	0.33	0.27	0.35	0.21	0.23	0.14	0.21	0.17	0.20	0.29	0.27	0.23
28	0.19	0.25	0.20	0.18	0.20	0.19	0.21	0.41	0.55	0.31	0.23	0.19	0.09	0.23	0.32	0.26	0.35	0.20	0.22	0.14	0.21	0.16	0.20	0.29	0.25	0.22
29	0.20	0.27	0.21	0.18	0.20	0.19	0.18	0.36	0.41	0.27	0.20	0.18	0.09	0.22	0.32	0.26	0.36	0.20	0.23	0.13	0.21	0.16	0.19	0.30	0.25	0.22
30	0.22	0.29	0.22	0.19	0.20	0.18	0.16	0.32	0.40	0.24	0.18	0.17	0.08	0.21	0.31	0.26	0.36	0.20	0.24	0.13	0.21	0.15	0.19	0.31	0.26	0.22

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
93 - 95 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.04	0.03	0.01	0.03	0.01	0.01	0.05	0.09	0.02	0.04	0.02	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01
2	0.31	0.35	0.19	0.27	0.25	0.61	1.02	1.50	0.52	0.83	0.68	0.35	0.31	0.34	0.26	0.21	0.26	0.17	0.13	0.16	0.24	0.18	0.20	0.17	0.17	0.17
3	0.64	0.42	0.40	0.37	0.70	1.18	2.84	3.98	1.60	2.19	2.54	1.51	0.94	0.94	0.92	0.94	1.02	0.68	0.56	0.65	0.93	0.53	0.63	0.62	0.68	0.72
4	0.58	0.44	0.31	0.37	0.81	1.52	2.48	4.70	2.27	3.90	4.99	2.15	1.20	1.42	1.46	1.54	1.82	1.22	0.93	0.94	0.86	0.75	1.00	1.11	1.26	1.31
5	0.46	0.28	0.24	0.34	0.78	1.35	2.99	5.04	3.52	5.95	5.06	2.11	1.22	1.71	1.94	2.15	2.15	1.20	1.12	0.80	0.87	0.85	1.20	1.41	1.56	1.61
6	0.37	0.21	0.16	0.29	0.75	1.40	3.35	7.30	4.81	5.26	4.25	2.13	1.46	1.69	2.39	2.19	1.87	1.33	0.66	0.66	0.80	0.82	1.21	1.36	1.49	1.45
7	0.28	0.16	0.22	0.24	0.71	1.36	4.79	7.11	4.02	3.62	3.53	1.95	1.44	2.23	2.53	1.83	1.97	0.93	0.57	0.62	0.80	0.84	1.22	1.37	1.44	1.34
8	0.12	0.26	0.15	0.30	0.68	1.87	5.12	4.70	3.13	3.47	3.37	1.89	1.52	2.21	2.13	1.92	1.50	0.82	0.57	0.64	0.86	0.88	1.27	1.39	1.39	1.27
9	0.14	0.16	0.16	0.27	0.81	1.99	3.24	3.43	2.65	2.85	3.02	2.08	1.43	1.84	2.00	1.61	1.31	0.76	0.56	0.65	0.86	0.87	1.21	1.28	1.25	1.14
10	0.14	0.03	0.16	0.35	1.05	2.02	2.45	2.13	2.07	2.11	3.16	2.06	1.33	1.63	1.60	1.27	1.03	0.58	0.40	0.51	0.67	0.65	0.87	0.85	0.83	0.76
11	0.09	0.09	0.17	0.43	0.95	1.52	2.14	2.62	2.33	2.72	3.32	1.80	1.36	1.65	1.60	1.33	1.13	0.67	0.47	0.58	0.76	0.70	0.91	0.90	0.88	0.82
12	0.15	0.18	0.24	0.30	0.81	1.33	2.13	2.29	2.08	1.87	2.33	1.53	0.86	1.48	1.49	1.28	1.17	0.75	0.55	0.62	0.79	0.71	0.93	0.96	0.95	0.90
13	0.15	0.16	0.22	0.39	0.57	1.12	1.62	1.35	1.93	2.12	1.32	0.77	0.60	1.11	1.15	1.02	0.95	0.60	0.43	0.47	0.59	0.53	0.70	0.73	0.73	0.69
14	0.13	0.18	0.22	0.35	0.64	0.94	1.50	0.82	1.35	0.89	1.59	0.67	0.53	1.03	1.09	0.97	0.90	0.55	0.39	0.42	0.53	0.48	0.64	0.67	0.67	0.64
15	0.16	0.16	0.20	0.25	0.57	0.99	1.75	1.29	1.41	2.00	1.36	0.59	0.48	0.95	1.00	0.87	0.80	0.47	0.34	0.36	0.47	0.42	0.56	0.60	0.60	0.58
16	0.13	0.10	0.16	0.20	0.47	1.10	0.56	0.83	1.35	1.55	1.21	0.51	0.43	0.85	0.89	0.74	0.67	0.40	0.29	0.31	0.41	0.37	0.49	0.52	0.53	0.51
17	0.12	0.18	0.08	0.32	0.33	0.44	0.82	2.00	1.16	1.30	1.02	0.45	0.37	0.74	0.75	0.60	0.55	0.33	0.25	0.26	0.35	0.31	0.41	0.45	0.45	0.43
18	0.11	0.14	0.14	0.13	0.48	0.40	0.92	1.66	1.03	1.13	0.84	0.40	0.32	0.63	0.62	0.49	0.46	0.27	0.22	0.23	0.30	0.27	0.36	0.39	0.39	0.37
19	0.23	0.08	0.06	0.07	0.27	0.36	0.75	1.43	0.95	1.01	0.68	0.35	0.27	0.52	0.52	0.41	0.40	0.24	0.19	0.20	0.27	0.23	0.31	0.35	0.34	0.32
20	0.09	0.16	0.07	0.04	0.25	0.31	0.63	1.26	0.90	0.91	0.60	0.31	0.23	0.44	0.45	0.35	0.35	0.21	0.17	0.17	0.24	0.21	0.27	0.31	0.30	0.28
21	0.15	0.06	0.07	0.16	0.23	0.28	0.55	1.14	0.81	0.82	0.53	0.27	0.19	0.37	0.39	0.31	0.32	0.19	0.16	0.16	0.22	0.19	0.24	0.28	0.27	0.26
22	0.03	0.13	0.13	0.15	0.21	0.26	0.48	1.04	0.77	0.73	0.46	0.24	0.16	0.33	0.36	0.28	0.30	0.17	0.15	0.14	0.20	0.17	0.22	0.26	0.25	0.23
23	0.04	0.16	0.13	0.15	0.20	0.25	0.43	0.94	0.73	0.64	0.39	0.22	0.14	0.29	0.32	0.25	0.28	0.16	0.15	0.13	0.19	0.15	0.20	0.24	0.23	0.21
24	0.16	0.16	0.13	0.15	0.20	0.24	0.38	0.84	0.69	0.56	0.34	0.20	0.13	0.26	0.30	0.24	0.27	0.15	0.14	0.12	0.17	0.14	0.18	0.23	0.22	0.20
25	0.17	0.17	0.13	0.14	0.19	0.22	0.33	0.74	0.65	0.49	0.30	0.18	0.12	0.24	0.28	0.22	0.26	0.15	0.14	0.11	0.16	0.13	0.17	0.22	0.21	0.19
26	0.17	0.17	0.14	0.14	0.19	0.21	0.29	0.65	0.63	0.44	0.27	0.17	0.10	0.22	0.27	0.21	0.25	0.14	0.14	0.11	0.16	0.12	0.16	0.20	0.20	0.18
27	0.18	0.18	0.14	0.14	0.18	0.20	0.25	0.58	0.61	0.39	0.24	0.16	0.10	0.20	0.26	0.20	0.24	0.14	0.14	0.10	0.15	0.12	0.15	0.19	0.19	0.17
28	0.19	0.19	0.15	0.15	0.18	0.19	0.21	0.51	0.59	0.34	0.21	0.16	0.09	0.19	0.25	0.19	0.24	0.13	0.14	0.10	0.14	0.11	0.14	0.18	0.18	0.16
29	0.20	0.20	0.15	0.15	0.18	0.19	0.18	0.45	0.46	0.30	0.18	0.15	0.08	0.18	0.24	0.18	0.24	0.13	0.15	0.09	0.14	0.10	0.13	0.18	0.18	0.15
30	0.21	0.21	0.16	0.15	0.18	0.18	0.15	0.39	0.39	0.27	0.16	0.15	0.08	0.16	0.23	0.18	0.24	0.12	0.15	0.09	0.14	0.10	0.13	0.18	0.16	0.15

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
95 - 97 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.03	0.01	0.02	0.03	0.02	0.03	0.06	0.15	0.03	0.06	0.03	0.02	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01
2	0.43	0.43	0.30	0.32	0.36	0.76	1.39	2.15	0.63	1.23	0.96	0.51	0.46	0.47	0.36	0.31	0.31	0.20	0.18	0.22	0.26	0.18	0.25	0.21	0.21	0.21
3	0.77	0.60	0.53	0.45	0.85	1.44	3.52	4.63	2.16	3.22	3.56	1.95	1.33	1.29	1.20	1.18	1.15	0.80	0.63	0.69	1.05	0.63	0.76	0.73	0.80	0.83
4	0.75	0.55	0.43	0.48	0.76	1.77	3.55	6.02	3.06	5.47	6.11	2.50	1.58	1.68	1.79	1.71	1.91	1.27	0.95	1.15	0.93	0.86	1.14	1.22	1.37	1.41
5	0.53	0.40	0.33	0.37	0.81	1.68	3.58	7.19	4.49	7.29	5.77	2.60	1.65	2.02	1.97	2.33	2.35	1.30	1.22	0.90	0.96	0.97	1.37	1.55	1.70	1.74
6	0.43	0.32	0.24	0.51	0.86	1.68	3.73	8.49	6.24	5.89	4.89	2.44	1.64	1.97	2.57	2.49	2.04	1.52	0.73	0.75	0.87	0.93	1.35	1.46	1.58	1.55
7	0.29	0.25	0.29	0.44	0.85	1.83	4.68	9.29	5.07	4.67	4.14	2.30	1.49	2.34	2.56	2.04	1.98	0.96	0.60	0.67	0.83	0.91	1.30	1.40	1.46	1.37
8	0.20	0.26	0.24	0.42	0.93	2.13	5.60	6.07	3.92	3.62	3.72	2.14	1.64	2.47	2.21	1.95	1.45	0.84	0.58	0.68	0.86	0.93	1.31	1.37	1.37	1.25
9	0.24	0.27	0.24	0.36	1.11	2.75	4.08	4.35	3.42	3.40	3.65	2.17	1.62	1.97	2.06	1.78	1.32	0.80	0.59	0.70	0.89	0.94	1.29	1.30	1.27	1.16
10	0.19	0.21	0.23	0.50	1.20	2.17	3.40	2.67	3.00	2.68	3.21	2.26	1.28	1.78	1.88	1.52	1.14	0.71	0.51	0.63	0.79	0.81	1.07	1.04	1.01	0.93
11	0.20	0.16	0.27	0.60	1.05	1.82	2.55	2.43	2.61	2.93	3.19	1.71	1.31	1.63	1.72	1.43	1.13	0.73	0.53	0.64	0.79	0.78	1.01	0.98	0.97	0.90
12	0.16	0.24	0.36	0.50	0.99	1.41	1.98	1.79	2.65	2.28	2.18	1.79	0.76	1.34	1.44	1.23	0.98	0.62	0.43	0.53	0.63	0.61	0.79	0.76	0.76	0.71
13	0.19	0.29	0.31	0.48	0.92	1.36	2.28	1.45	2.16	1.55	1.96	0.83	0.60	1.11	1.23	1.08	0.87	0.54	0.37	0.44	0.52	0.51	0.66	0.64	0.64	0.60
14	0.15	0.24	0.25	0.44	0.74	1.37	1.38	1.48	1.36	1.35	1.48	0.65	0.48	0.92	1.05	0.92	0.75	0.46	0.31	0.36	0.43	0.42	0.55	0.54	0.54	0.50
15	0.22	0.24	0.22	0.32	0.63	1.14	1.78	0.97	1.40	1.99	1.36	0.58	0.44	0.86	0.98	0.85	0.68	0.40	0.27	0.32	0.38	0.37	0.49	0.49	0.49	0.46
16	0.19	0.20	0.19	0.31	0.58	0.86	0.99	0.65	1.35	1.78	1.24	0.52	0.40	0.79	0.89	0.75	0.58	0.34	0.24	0.28	0.34	0.33	0.43	0.43	0.44	0.41
17	0.15	0.16	0.25	0.21	0.47	0.63	1.08	1.99	1.16	1.60	1.14	0.46	0.35	0.69	0.76	0.62	0.49	0.29	0.20	0.24	0.29	0.28	0.38	0.38	0.38	0.36
18	0.17	0.18	0.20	0.25	0.45	0.56	1.26	1.71	1.03	1.48	1.07	0.41	0.31	0.60	0.64	0.51	0.41	0.25	0.18	0.21	0.25	0.25	0.33	0.33	0.33	0.31
19	0.14	0.13	0.18	0.17	0.32	0.43	1.12	1.52	0.94	1.33	1.02	0.37	0.27	0.51	0.54	0.43	0.36	0.22	0.16	0.18	0.23	0.22	0.29	0.30	0.29	0.27
20	0.11	0.15	0.09	0.16	0.26	0.38	0.97	1.37	0.88	1.27	0.92	0.33	0.23	0.43	0.46	0.37	0.32	0.19	0.14	0.16	0.20	0.20	0.26	0.26	0.26	0.24
21	0.07	0.08	0.06	0.17	0.23	0.34	0.90	1.27	0.83	1.21	0.87	0.30	0.19	0.38	0.41	0.33	0.29	0.17	0.13	0.15	0.19	0.18	0.23	0.24	0.24	0.22
22	0.08	0.08	0.14	0.16	0.22	0.32	0.78	1.19	0.79	1.04	0.82	0.26	0.17	0.33	0.37	0.30	0.27	0.16	0.13	0.14	0.17	0.16	0.21	0.22	0.22	0.20
23	0.05	0.15	0.13	0.15	0.20	0.30	0.74	1.11	0.75	0.92	0.72	0.23	0.15	0.30	0.33	0.27	0.25	0.15	0.12	0.13	0.16	0.15	0.20	0.21	0.20	0.19
24	0.15	0.14	0.13	0.15	0.19	0.28	0.70	1.03	0.70	0.85	0.69	0.22	0.14	0.27	0.31	0.25	0.24	0.14	0.11	0.12	0.15	0.14	0.18	0.20	0.19	0.17
25	0.15	0.14	0.13	0.15	0.19	0.26	0.58	0.94	0.66	0.75	0.66	0.20	0.12	0.25	0.29	0.23	0.23	0.13	0.11	0.11	0.14	0.13	0.17	0.18	0.18	0.16
26	0.15	0.14	0.13	0.14	0.18	0.25	0.53	0.86	0.62	0.71	0.60	0.19	0.11	0.23	0.27	0.22	0.22	0.13	0.11	0.10	0.13	0.12	0.16	0.18	0.17	0.15
27	0.16	0.14	0.14	0.14	0.17	0.23	0.49	0.79	0.60	0.67	0.52	0.18	0.10	0.21	0.25	0.20	0.21	0.12	0.11	0.10	0.13	0.12	0.15	0.17	0.16	0.14
28	0.16	0.15	0.14	0.14	0.16	0.21	0.45	0.72	0.56	0.63	0.50	0.17	0.10	0.20	0.23	0.19	0.20	0.11	0.10	0.09	0.12	0.11	0.14	0.16	0.15	0.14
29	0.17	0.15	0.14	0.14	0.16	0.20	0.41	0.66	0.54	0.59	0.48	0.16	0.09	0.18	0.22	0.18	0.19	0.11	0.10	0.09	0.11	0.10	0.13	0.15	0.15	0.13
30	0.17	0.15	0.14	0.14	0.15	0.19	0.38	0.60	0.52	0.44	0.46	0.15	0.08	0.17	0.21	0.17	0.19	0.11	0.10	0.08	0.11	0.10	0.12	0.15	0.14	0.12

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
97 - 100 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.08	0.09	0.06	0.04	0.03	0.05	0.20	0.30	0.06	0.07	0.04	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2	1.11	1.09	0.67	0.54	0.62	1.42	2.71	4.06	1.14	1.73	1.23	0.72	0.57	0.59	0.53	0.47	0.47	0.34	0.21	0.21	0.37	0.20	0.34	0.28	0.28	0.28
3	1.60	1.24	0.83	0.77	1.21	2.29	5.86	6.96	3.12	4.15	4.27	2.42	1.56	1.58	1.59	1.51	1.45	1.08	0.66	0.75	1.14	0.70	0.87	0.84	0.92	0.97
4	1.21	0.90	0.60	0.66	1.07	2.55	5.05	7.98	3.92	6.36	6.97	3.05	1.84	2.04	2.09	2.11	2.15	1.55	0.91	1.15	0.90	0.83	1.15	1.23	1.41	1.47
5	0.79	0.47	0.47	0.53	1.24	2.24	5.06	8.28	5.13	8.14	6.43	2.87	1.79	2.26	2.25	2.66	2.57	1.26	1.17	0.77	0.82	0.86	1.27	1.43	1.60	1.65
6	0.45	0.38	0.39	0.61	1.06	2.19	4.56	8.27	6.65	6.58	4.98	2.60	1.78	2.23	2.70	2.75	2.13	1.32	0.63	0.64	0.76	0.84	1.29	1.42	1.58	1.55
7	0.33	0.33	0.41	0.49	1.04	2.10	5.16	8.37	5.15	4.95	4.20	2.27	1.67	2.49	2.88	2.24	2.22	0.92	0.53	0.59	0.75	0.86	1.29	1.42	1.50	1.40
8	0.24	0.33	0.31	0.48	1.11	2.51	5.69	5.52	3.85	3.96	3.70	2.08	1.80	2.63	2.38	2.21	1.34	0.82	0.54	0.62	0.81	0.90	1.35	1.45	1.46	1.35
9	0.33	0.32	0.35	0.54	1.20	2.93	4.44	3.81	3.22	3.44	3.50	2.23	1.82	2.15	2.28	2.16	1.22	0.81	0.56	0.66	0.85	0.94	1.35	1.39	1.37	1.27
10	0.27	0.26	0.34	0.58	1.53	2.49	3.47	3.20	2.93	3.01	3.32	2.29	1.50	2.11	2.21	1.83	1.04	0.70	0.47	0.58	0.75	0.80	1.09	1.05	1.04	0.97
11	0.28	0.27	0.38	0.78	1.38	2.12	2.92	2.22	2.51	2.95	3.37	1.86	1.52	1.80	2.08	1.81	1.07	0.77	0.52	0.62	0.78	0.80	1.07	1.03	1.03	0.99
12	0.24	0.28	0.50	0.81	1.13	1.85	2.18	1.53	2.29	2.50	2.33	1.75	0.76	1.47	1.78	1.62	1.00	0.74	0.50	0.57	0.69	0.69	0.93	0.91	0.93	0.90
13	0.26	0.37	0.56	0.68	1.08	1.56	1.79	2.12	2.04	2.20	2.27	0.94	0.62	1.29	1.62	1.53	0.95	0.70	0.46	0.51	0.61	0.61	0.82	0.81	0.84	0.81
14	0.33	0.39	0.54	0.62	0.93	1.46	1.73	1.65	1.46	1.73	1.35	0.76	0.52	1.12	1.45	1.39	0.85	0.62	0.39	0.43	0.51	0.52	0.71	0.70	0.72	0.71
15	0.35	0.44	0.47	0.48	0.77	1.35	1.61	0.90	1.48	1.54	1.18	0.66	0.46	1.03	1.36	1.27	0.75	0.54	0.34	0.37	0.45	0.46	0.62	0.62	0.64	0.64
16	0.33	0.33	0.42	0.42	0.70	1.13	1.01	0.77	1.03	1.30	1.04	0.58	0.42	0.93	1.21	1.09	0.62	0.45	0.29	0.31	0.38	0.39	0.54	0.54	0.56	0.56
17	0.25	0.32	0.32	0.40	0.64	0.77	0.92	1.30	0.85	1.12	0.92	0.50	0.36	0.80	1.00	0.87	0.49	0.37	0.24	0.26	0.32	0.33	0.45	0.45	0.47	0.47
18	0.25	0.30	0.23	0.32	0.44	0.62	1.17	1.07	0.73	0.99	0.85	0.44	0.31	0.67	0.81	0.70	0.40	0.32	0.21	0.22	0.27	0.28	0.39	0.39	0.40	0.40
19	0.26	0.19	0.21	0.24	0.37	0.45	1.02	0.92	0.65	0.91	0.79	0.39	0.26	0.55	0.66	0.57	0.33	0.27	0.18	0.19	0.24	0.25	0.34	0.33	0.35	0.34
20	0.24	0.20	0.21	0.20	0.29	0.38	0.83	0.81	0.60	0.85	0.74	0.34	0.21	0.46	0.55	0.48	0.28	0.24	0.16	0.17	0.21	0.22	0.29	0.29	0.30	0.30
21	0.21	0.13	0.16	0.18	0.25	0.33	0.77	0.74	0.56	0.79	0.69	0.29	0.18	0.38	0.47	0.41	0.25	0.22	0.15	0.15	0.19	0.19	0.26	0.26	0.27	0.27
22	0.08	0.08	0.15	0.16	0.22	0.30	0.72	0.68	0.53	0.74	0.64	0.25	0.15	0.33	0.41	0.36	0.22	0.20	0.14	0.14	0.17	0.17	0.23	0.23	0.24	0.24
23	0.10	0.15	0.14	0.15	0.20	0.28	0.69	0.63	0.49	0.68	0.60	0.22	0.13	0.29	0.36	0.32	0.20	0.19	0.13	0.12	0.16	0.16	0.21	0.21	0.22	0.22
24	0.14	0.14	0.13	0.14	0.19	0.26	0.66	0.57	0.45	0.63	0.57	0.20	0.12	0.26	0.32	0.29	0.18	0.18	0.12	0.11	0.15	0.15	0.20	0.20	0.20	0.20
25	0.13	0.13	0.13	0.14	0.18	0.24	0.58	0.51	0.42	0.59	0.54	0.18	0.10	0.23	0.29	0.26	0.16	0.17	0.12	0.11	0.14	0.14	0.18	0.18	0.18	0.18
26	0.13	0.13	0.13	0.13	0.17	0.22	0.54	0.45	0.39	0.56	0.53	0.16	0.09	0.21	0.26	0.24	0.15	0.16	0.11	0.10	0.13	0.13	0.17	0.17	0.17	0.17
27	0.13	0.13	0.13	0.12	0.16	0.20	0.50	0.40	0.36	0.53	0.51	0.15	0.09	0.19	0.24	0.21	0.14	0.15	0.11	0.09	0.12	0.12	0.16	0.16	0.16	0.16
28	0.12	0.12	0.12	0.12	0.14	0.18	0.47	0.36	0.34	0.50	0.50	0.14	0.08	0.17	0.22	0.19	0.13	0.14	0.11	0.09	0.11	0.11	0.15	0.15	0.15	0.15
29	0.12	0.12	0.12	0.11	0.13	0.17	0.43	0.32	0.32	0.48	0.49	0.13	0.07	0.15	0.20	0.17	0.12	0.14	0.11	0.08	0.11	0.10	0.14	0.14	0.14	0.14
30	0.12	0.12	0.12	0.10	0.12	0.15	0.40	0.28	0.31	0.46	0.48	0.12	0.06	0.14	0.18	0.16	0.11	0.13	0.11	0.08	0.10	0.10	0.13	0.13	0.13	0.13

= Actual Experience

Summary of Conditional Claim Rates
30-Year Fixed Rate Mortgages
Investors LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.01	0.00	0.01	0.01	0.00	0.01	0.03	0.13	0.01	0.02	0.04	0.01	0.01	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.05	0.04
2	0.24	0.40	0.28	0.23	0.25	0.50	1.85	2.88	0.66	1.20	1.48	0.73	0.39	0.46	0.30	0.24	0.22	0.21	0.07	0.15	0.23	0.09	0.24	0.21	0.21	0.21
3	0.87	0.88	0.50	0.44	0.69	1.16	4.47	5.75	1.93	3.42	4.86	2.68	1.29	1.34	1.12	0.84	1.07	0.72	0.57	0.57	0.67	0.67	0.81	0.79	0.84	0.87
4	0.90	0.84	0.47	0.59	0.66	1.60	4.31	6.23	2.62	5.08	8.08	2.96	1.46	1.80	1.57	1.46	2.02	1.54	0.85	1.05	0.94	0.89	1.20	1.28	1.41	1.44
5	0.77	0.64	0.33	0.44	0.74	1.55	4.11	6.35	3.42	6.72	6.76	2.33	1.50	1.88	1.85	2.10	3.05	1.59	1.17	0.81	0.86	0.89	1.26	1.40	1.53	1.53
6	0.59	0.42	0.36	0.49	0.68	1.66	3.80	6.30	4.58	7.78	4.77	2.06	1.37	1.90	2.50	2.56	2.75	1.96	0.69	0.69	0.81	0.86	1.25	1.38	1.48	1.43
7	0.44	0.38	0.22	0.36	0.79	1.42	3.99	5.43	5.81	4.26	4.07	1.84	1.26	2.19	2.83	2.11	3.54	0.86	0.57	0.61	0.75	0.81	1.17	1.29	1.33	1.25
8	0.27	0.34	0.30	0.42	0.61	1.44	3.60	4.54	3.00	2.93	3.47	1.63	1.28	2.36	2.25	2.45	1.39	0.91	0.74	0.72	0.92	0.98	1.39	1.62	1.62	1.53
9	0.44	0.25	0.26	0.34	0.67	1.88	2.63	2.74	2.29	2.62	3.22	1.77	1.25	2.07	2.30	1.53	1.25	0.87	0.75	0.73	0.94	0.96	1.33	1.53	1.52	1.44
10	0.25	0.20	0.18	0.37	1.06	1.73	2.25	2.08	2.30	2.22	3.35	1.86	1.12	1.85	1.68	1.36	1.18	0.85	0.75	0.72	0.93	0.91	1.23	1.40	1.40	1.33
11	0.29	0.24	0.27	0.49	0.87	1.31	1.77	1.59	2.01	2.33	2.69	1.40	1.19	1.56	1.60	1.35	1.22	0.92	0.81	0.77	0.97	0.92	1.22	1.41	1.42	1.37
12	0.23	0.27	0.30	0.43	0.76	0.99	1.34	1.38	1.83	1.73	2.12	1.35	0.72	1.23	1.30	1.11	1.03	0.75	0.63	0.60	0.75	0.69	0.91	1.03	1.05	1.01
13	0.17	0.28	0.22	0.34	0.55	0.97	1.32	1.16	1.74	1.33	2.30	0.80	0.52	0.96	1.04	0.89	0.88	0.64	0.53	0.48	0.60	0.54	0.72	0.83	0.85	0.82
14	0.26	0.17	0.20	0.49	0.54	0.81	1.31	1.00	1.03	2.04	1.62	0.84	0.56	1.08	1.17	1.01	0.98	0.69	0.58	0.51	0.65	0.58	0.77	0.90	0.93	0.90
15	0.34	0.23	0.18	0.28	0.50	0.91	1.19	0.61	1.04	1.80	1.39	0.73	0.50	0.98	1.07	0.90	0.89	0.63	0.53	0.45	0.58	0.51	0.68	0.81	0.84	0.82
16	0.24	0.16	0.19	0.27	0.52	0.90	0.97	0.96	1.03	1.53	1.21	0.63	0.44	0.87	0.93	0.76	0.79	0.56	0.49	0.40	0.52	0.45	0.59	0.71	0.75	0.73
17	0.25	0.24	0.19	0.24	0.52	0.43	0.66	1.54	0.84	1.31	1.05	0.54	0.37	0.75	0.78	0.61	0.66	0.50	0.45	0.35	0.46	0.38	0.51	0.63	0.66	0.64
18	0.19	0.13	0.23	0.12	0.48	0.49	0.67	1.23	0.72	1.16	0.94	0.47	0.31	0.63	0.65	0.51	0.56	0.47	0.43	0.31	0.42	0.34	0.45	0.56	0.59	0.57
19	0.21	0.31	0.15	0.15	0.34	0.24	0.58	1.04	0.63	1.05	0.85	0.40	0.26	0.52	0.55	0.43	0.47	0.42	0.39	0.28	0.39	0.30	0.40	0.51	0.54	0.53
20	0.16	0.21	0.20	0.27	0.22	0.20	0.52	0.89	0.57	0.97	0.77	0.35	0.22	0.44	0.48	0.37	0.38	0.41	0.36	0.27	0.37	0.28	0.36	0.48	0.51	0.50
21	0.15	0.18	0.06	0.19	0.19	0.18	0.48	0.79	0.52	0.90	0.70	0.30	0.18	0.39	0.44	0.33	0.36	0.37	0.37	0.25	0.36	0.26	0.34	0.43	0.46	0.48
22	0.09	0.20	0.23	0.18	0.18	0.17	0.45	0.71	0.48	0.83	0.64	0.26	0.15	0.34	0.40	0.31	0.34	0.27	0.27	0.25	0.33	0.25	0.32	0.39	0.42	0.44
23	0.00	0.22	0.23	0.18	0.17	0.16	0.44	0.63	0.44	0.77	0.59	0.23	0.13	0.31	0.37	0.29	0.27	0.27	0.22	0.25	0.30	0.25	0.32	0.38	0.41	0.40
24	0.22	0.22	0.23	0.18	0.17	0.15	0.38	0.55	0.40	0.71	0.55	0.20	0.12	0.28	0.36	0.27	0.26	0.27	0.22	0.25	0.30	0.25	0.31	0.34	0.36	0.40
25	0.20	0.23	0.25	0.18	0.17	0.15	0.31	0.48	0.37	0.67	0.52	0.19	0.10	0.26	0.34	0.26	0.19	0.22	0.23	0.25	0.22	0.25	0.31	0.34	0.37	0.36
26	0.21	0.24	0.26	0.18	0.16	0.14	0.29	0.42	0.35	0.55	0.49	0.17	0.09	0.24	0.34	0.26	0.18	0.22	0.25	0.26	0.22	0.26	0.32	0.29	0.31	0.31
27	0.22	0.26	0.28	0.19	0.16	0.13	0.28	0.37	0.32	0.52	0.47	0.15	0.09	0.23	0.33	0.25	0.18	0.23	0.27	0.27	0.22	0.27	0.26	0.23	0.25	0.25
28	0.20	0.27	0.26	0.19	0.16	0.13	0.27	0.32	0.31	0.49	0.46	0.14	0.08	0.21	0.33	0.25	0.18	0.24	0.17	0.25	0.17	0.28	0.27	0.24	0.25	0.25
29	0.22	0.21	0.24	0.20	0.16	0.13	0.26	0.29	0.29	0.42	0.44	0.14	0.07	0.20	0.33	0.25	0.18	0.25	0.18	0.26	0.17	0.22	0.28	0.24	0.26	0.26
30	0.23	0.22	0.26	0.21	0.17	0.13	0.26	0.25	0.28	0.35	0.43	0.13	0.07	0.19	0.33	0.26	0.18	0.15	0.04	0.24	0.18	0.20	0.20	0.25	0.27	0.26

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
Unknown LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.15	0.45	0.32	0.24	0.45	0.26	0.22	0.37	0.22	0.34	1.11	5.71	9.09	5.20	6.82	4.57	1.69	1.12	13.72	14.51	24.66	1.80	0.00	0.45	0.44	0.46
2	1.75	3.84	2.66	1.88	0.94	0.54	0.36	16.93	0.73	1.84	21.91	24.95	4.54	17.32	18.43	19.89	15.12	11.71	26.78	9.17	24.55	12.11	3.44	4.32	4.86	4.77
3	6.05	8.23	5.07	1.64	0.71	0.24	4.73	9.24	1.72	23.66	35.77	5.84	3.29	6.17	16.98	33.61	28.79	21.52	8.02	5.32	13.17	7.88	8.10	12.22	12.34	11.50
4	9.07	8.50	3.17	1.06	0.37	1.73	3.74	12.15	15.88	26.96	9.94	5.85	1.34	4.93	27.88	40.50	31.35	7.52	8.20	4.99	13.55	10.86	12.38	16.53	15.51	14.87
5	7.85	4.61	1.65	0.62	1.56	2.02	5.10	25.92	26.46	9.71	7.92	3.23	2.90	15.61	33.25	37.65	8.17	12.16	4.42	10.19	14.18	13.08	13.53	16.80	16.07	16.00
6	4.06	2.57	0.85	1.88	1.74	2.90	18.71	22.87	10.73	7.44	7.05	7.27	6.23	21.54	33.68	12.38	13.10	8.53	13.37	9.63	14.63	12.78	12.10	15.00	14.78	14.93
7	2.25	1.18	2.63	1.97	2.06	11.15	20.97	9.79	8.56	8.74	8.84	10.43	15.95	27.78	13.35	16.60	8.59	14.13	12.37	9.65	12.88	10.75	10.26	13.10	13.13	13.17
8	1.17	3.10	2.78	2.23	4.97	16.77	9.63	6.91	10.13	8.70	15.00	19.00	23.16	11.51	15.56	11.59	12.84	12.39	12.05	9.00	11.28	9.63	9.26	11.85	11.76	11.67
9	3.34	3.29	2.79	5.16	7.81	8.40	6.73	5.42	12.45	11.05	16.64	33.77	6.92	13.22	15.80	10.29	11.84	12.84	11.89	8.49	10.63	9.36	8.94	11.37	11.19	11.09
10	3.32	3.44	5.25	7.86	5.71	6.67	7.23	4.55	19.94	12.60	21.28	9.74	10.78	2.69	9.52	9.64	12.11	12.09	10.69	7.98	10.03	9.05	8.38	10.45	10.27	10.19
11	3.45	5.52	6.97	5.58	5.39	7.38	7.17	6.05	19.78	14.42	10.27	13.02	6.78	7.96	8.05	8.86	10.50	10.26	9.43	7.18	8.98	8.11	7.31	9.15	9.02	8.93
12	5.82	7.36	5.68	5.21	5.53	8.08	11.12	7.01	19.37	5.56	9.63	11.69	6.80	7.38	8.13	8.37	9.30	8.98	8.28	6.64	8.13	7.34	6.49	8.01	7.87	7.74
13	7.26	5.39	4.88	5.38	5.30	14.97	13.63	6.42	7.71	6.86	4.96	7.75	5.93	6.92	7.15	7.15	8.07	8.08	7.65	6.09	7.29	6.62	5.79	7.14	7.01	6.90
14	5.24	4.97	5.08	5.27	8.34	17.28	13.60	3.53	8.47	4.32	8.48	7.35	6.20	6.69	6.72	6.87	7.91	8.15	7.72	6.12	7.21	6.62	5.69	7.03	6.90	6.91
15	5.05	4.98	4.76	7.07	13.14	17.04	6.45	3.55	6.76	7.72	7.83	7.70	6.18	6.41	6.52	6.57	7.98	8.27	7.85	6.23	7.26	6.71	5.69	7.04	7.00	7.00
16	4.95	4.75	6.07	10.55	14.23	7.21	7.42	3.50	7.59	7.06	7.84	7.55	6.01	6.22	6.43	6.57	7.97	8.35	7.96	6.36	7.28	6.78	5.68	7.13	7.06	7.07
17	5.08	6.71	8.38	12.18	7.63	9.53	6.99	9.40	6.80	6.85	7.23	7.02	5.77	6.01	6.25	6.25	7.68	7.87	7.80	6.22	7.04	6.57	5.65	7.00	6.93	6.92
18	6.89	9.08	9.79	7.33	9.24	8.18	5.42	7.97	6.67	6.25	6.53	6.71	5.67	5.87	6.06	6.08	7.41	7.65	7.76	6.20	6.92	6.60	5.65	6.96	6.88	6.88
19	9.02	10.02	6.88	9.49	8.03	4.84	4.79	7.33	6.14	5.60	5.99	6.50	5.60	5.68	5.86	5.91	7.24	7.41	7.72	6.19	6.89	6.59	5.64	6.91	6.83	6.86
20	10.36	7.08	8.58	8.49	5.49	4.49	4.59	6.34	5.58	5.09	5.58	6.32	5.49	5.49	5.66	5.76	6.85	7.32	7.68	6.24	6.83	6.59	5.61	6.85	6.79	6.85
21	8.47	9.65	9.04	6.18	5.23	4.48	4.14	5.41	5.14	4.70	5.22	6.10	5.37	5.31	5.48	5.62	6.49	7.22	7.71	6.25	6.78	6.57	5.59	6.82	6.76	6.83
22	8.48	7.78	7.14	5.97	5.35	4.26	3.79	4.82	4.88	4.44	4.92	5.93	5.27	5.18	5.34	5.51	6.37	7.21	7.70	6.27	6.73	6.54	5.58	6.79	6.74	6.82
23	8.25	6.85	6.95	6.15	5.15	4.00	3.45	4.25	4.59	4.10	4.59	5.73	5.17	5.02	5.19	5.38	6.28	6.96	7.71	6.28	6.67	6.54	5.58	6.77	6.71	6.85
24	6.49	6.62	7.19	5.99	4.97	3.81	3.19	3.78	4.31	3.81	4.30	5.57	5.08	4.88	5.04	5.31	6.18	6.93	7.71	6.28	6.63	6.55	5.58	6.74	6.74	6.89
25	6.28	6.81	7.03	5.86	4.84	3.68	2.98	3.37	4.06	3.56	4.06	5.42	4.99	4.76	4.95	5.23	6.10	6.90	7.69	6.30	6.60	6.56	5.58	6.76	6.75	6.92
26	6.45	6.62	6.92	5.78	4.76	3.55	2.78	3.04	3.85	3.36	3.85	5.28	4.91	4.68	4.85	4.86	5.89	6.86	7.69	6.32	6.58	6.56	5.61	6.77	6.77	6.95
27	6.28	6.51	6.86	5.75	4.70	3.45	2.65	2.82	3.72	3.22	3.71	5.19	4.88	4.61	4.80	4.82	5.84	6.84	7.70	6.34	6.57	6.59	5.63	6.78	6.79	6.97
28	6.19	6.44	6.85	5.71	4.60	3.35	2.52	2.61	3.59	3.08	3.57	5.11	4.83	4.55	4.74	4.76	5.79	6.84	7.71	6.35	6.57	6.62	5.65	6.80	6.80	7.00
29	6.12	6.42	6.82	5.64	4.54	3.27	2.42	2.46	3.48	2.97	3.47	5.04	4.80	4.51	4.69	4.72	5.78	6.58	7.71	6.38	6.58	6.65	5.67	6.81	6.81	7.02
30	6.09	6.36	6.74	5.58	4.47	3.21	2.35	2.34	3.39	2.89	3.38	4.98	4.76	4.45	4.63	4.68	5.74	6.53	7.69	6.37	6.56	6.64	5.67	6.78	6.79	7.00

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
0 - 65 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	1.16	1.71	1.69	1.36	0.95	0.67	0.75	1.08	0.95	0.74	1.01	1.13	0.69	1.32	0.86	1.17	1.10	0.95	1.62	1.09	2.47	1.31	1.61	1.16	1.15	1.17
2	5.69	7.95	6.45	5.79	2.42	1.77	1.54	29.24	2.85	3.96	19.65	6.89	2.70	3.98	4.43	4.07	12.47	10.12	7.46	3.44	8.65	4.64	4.36	5.00	5.52	5.47
3	10.89	10.75	8.14	3.66	2.05	1.19	15.75	15.93	5.34	28.17	32.94	4.88	3.67	5.32	6.93	12.63	23.36	19.30	5.95	7.22	6.92	5.45	6.40	8.04	8.53	7.43
4	11.07	7.50	4.07	2.09	0.58	4.52	9.66	19.11	26.72	32.63	13.44	4.99	4.43	6.96	16.60	25.81	26.78	7.80	8.77	6.84	6.16	5.69	7.21	8.78	8.06	7.35
5	8.15	3.68	2.50	0.82	3.32	4.14	10.13	36.17	34.85	13.65	9.43	5.99	5.02	17.45	24.62	27.90	7.79	11.38	6.53	4.87	6.20	6.39	7.72	8.40	7.95	7.58
6	5.53	2.49	1.39	3.40	2.95	4.61	26.68	29.62	13.41	9.76	10.94	7.36	11.84	26.96	26.12	8.65	10.77	9.68	8.90	6.11	8.62	8.40	8.99	10.68	10.40	10.30
7	2.73	1.92	2.92	2.95	3.68	12.51	27.96	13.88	9.72	9.50	14.26	19.21	23.44	25.89	9.63	11.35	8.48	14.86	15.33	10.61	13.47	12.14	13.15	15.96	15.79	15.48
8	1.87	3.83	3.82	3.21	6.82	17.57	12.14	9.82	10.37	10.74	25.09	31.47	24.97	8.83	12.79	9.78	19.65	18.47	21.77	13.78	15.75	15.08	16.43	20.74	20.16	19.75
9	3.92	3.99	3.92	6.65	9.95	8.88	8.63	6.42	13.10	18.64	22.91	28.84	8.19	11.07	9.74	12.93	14.77	15.30	17.41	10.52	11.73	11.51	12.72	15.70	14.90	14.87
10	4.30	5.18	5.90	8.11	6.63	8.90	9.31	7.40	23.65	17.52	20.86	8.97	11.26	8.75	10.12	10.16	11.82	11.13	10.85	7.39	8.24	7.91	8.74	9.74	9.41	9.36
11	3.46	6.21	8.33	5.69	6.23	7.80	11.10	10.49	20.48	18.59	7.14	11.66	8.51	7.66	8.50	9.24	10.51	9.59	9.53	6.59	7.17	6.95	7.49	8.31	8.06	7.91
12	5.01	8.81	6.88	5.50	6.72	8.80	12.92	9.83	16.80	7.17	8.37	9.45	7.35	7.20	8.69	9.41	10.57	10.98	11.99	7.59	8.06	7.73	8.25	9.90	9.54	9.54
13	8.30	6.02	6.01	5.61	6.75	17.61	11.81	8.59	6.86	6.94	6.21	9.55	7.08	7.18	8.38	8.69	9.93	10.48	11.25	7.37	7.71	7.39	8.00	9.35	8.87	8.98
14	5.49	6.54	5.86	6.33	10.84	18.55	13.35	5.02	7.23	6.13	8.14	9.32	7.49	7.32	7.86	8.51	9.65	10.24	11.27	7.37	7.46	7.39	7.95	9.23	8.79	9.04
15	5.66	6.14	6.23	8.49	15.69	15.61	6.22	2.41	5.71	5.99	7.44	9.52	7.60	6.82	7.49	8.09	9.16	10.02	10.80	7.09	7.06	7.26	7.65	8.86	8.71	8.94
16	5.85	5.64	8.81	10.59	14.76	7.96	6.80	4.61	6.81	5.41	7.26	9.46	7.28	6.51	7.18	7.57	8.80	9.54	10.63	6.92	6.86	7.13	7.52	8.76	8.32	8.80
17	6.21	8.89	12.30	15.48	9.82	9.68	3.57	10.63	6.60	5.53	7.31	9.29	7.37	6.58	7.27	7.62	8.84	9.59	11.02	7.21	7.12	7.47	7.92	8.89	8.67	8.83
18	10.99	11.88	13.60	7.16	9.41	5.84	5.80	9.27	6.53	5.30	6.71	9.04	7.32	6.36	7.06	7.40	8.65	9.58	10.70	7.20	7.17	7.50	8.06	8.97	8.70	8.92
19	9.80	12.93	7.23	9.89	8.42	5.73	5.30	8.56	6.32	4.82	6.24	8.83	7.26	6.17	6.81	7.21	8.50	9.52	10.79	7.16	7.28	7.40	7.76	8.99	8.76	9.02
20	12.17	6.26	8.91	8.65	7.54	5.45	5.11	7.72	5.83	4.44	5.85	8.57	7.14	5.96	6.60	7.05	8.33	9.48	10.65	7.30	7.36	7.50	7.82	9.05	8.84	9.11
21	13.12	13.86	12.84	8.28	7.34	5.48	4.83	6.66	5.40	4.13	5.49	8.32	7.00	5.59	6.42	6.88	8.17	9.46	10.78	7.42	7.41	7.57	7.89	9.12	8.91	9.18
22	7.98	8.85	10.60	8.29	7.32	5.45	4.47	6.00	5.16	3.91	5.21	8.07	6.90	5.47	6.28	6.76	7.68	9.17	10.88	7.50	7.43	7.64	7.96	9.18	8.97	9.25
23	5.65	9.21	10.62	8.60	7.36	5.19	4.13	5.31	4.88	3.63	4.87	7.84	6.80	5.32	5.92	6.63	7.61	9.03	10.94	7.35	7.46	7.73	8.03	9.24	9.03	9.37
24	8.79	9.20	10.97	8.59	7.17	5.01	3.60	4.73	4.60	3.38	4.58	7.64	6.70	5.18	5.66	6.57	7.53	9.02	10.97	7.42	7.50	7.80	8.09	9.30	9.13	9.48
25	8.79	9.47	10.27	8.50	7.07	4.87	3.36	4.22	4.35	3.17	4.33	7.45	6.61	5.07	5.57	6.50	7.44	8.98	11.01	7.49	7.54	7.87	8.14	9.40	9.23	9.58
26	9.05	9.60	10.22	8.49	6.99	4.68	3.14	3.79	4.07	2.99	4.12	7.21	6.54	5.01	5.48	6.07	7.34	8.96	11.05	7.56	7.58	7.93	8.23	9.50	9.32	9.67
27	9.18	9.53	10.24	8.50	6.94	4.58	2.99	3.52	3.86	2.87	3.98	7.11	6.51	4.96	5.41	6.00	7.28	8.96	11.08	7.61	7.61	8.02	8.31	9.10	8.92	9.28
28	9.12	9.52	10.28	8.50	6.85	4.46	2.84	3.25	3.71	2.75	3.85	6.94	6.45	4.90	5.33	5.93	7.22	8.94	11.10	7.66	7.68	8.10	8.38	9.13	8.95	9.31
29	9.13	9.54	10.30	8.00	6.77	4.39	2.72	3.05	3.60	2.67	3.76	6.88	6.42	4.85	5.26	5.88	7.17	8.93	11.11	7.74	7.75	8.17	8.45	9.15	8.96	9.32
30	9.17	9.56	10.29	7.99	6.74	4.35	2.65	2.91	3.54	2.62	3.49	6.84	6.41	4.83	5.24	5.86	7.16	8.95	11.19	7.83	7.40	8.27	8.16	9.20	9.01	9.37

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
65 - 80 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.69	0.86	1.09	1.50	0.72	0.66	0.31	0.51	0.53	0.38	0.74	0.93	0.58	0.77	0.72	0.79	0.69	0.82	1.56	1.20	2.47	1.22	1.40	1.00	0.97	0.99
2	4.03	5.81	5.39	5.25	1.67	1.63	1.01	26.67	1.65	2.59	18.33	5.99	1.91	2.70	2.81	3.01	7.27	9.07	6.43	3.39	9.19	4.25	3.18	3.69	4.14	4.01
3	8.20	6.93	7.49	3.20	1.13	0.55	13.47	14.38	3.54	27.72	31.81	3.85	2.67	3.89	4.92	11.64	24.76	17.28	4.82	6.80	6.92	4.26	4.92	6.50	6.89	5.82
4	9.98	6.18	3.75	1.73	0.44	2.75	8.61	16.76	25.08	34.12	12.46	3.98	3.46	5.14	16.35	26.95	27.52	6.86	7.91	6.67	5.25	4.78	6.09	7.70	7.00	6.22
5	8.28	5.01	2.00	0.93	2.21	3.08	9.82	36.13	35.11	12.90	9.35	4.81	3.99	16.01	27.80	27.63	8.03	10.55	6.73	3.95	5.33	5.52	6.57	7.41	6.97	6.52
6	4.42	2.14	1.05	2.98	2.14	3.80	26.28	29.49	12.99	9.54	10.53	6.12	9.92	26.80	27.49	8.45	11.40	8.33	7.09	4.59	7.09	6.70	7.08	8.62	8.42	8.20
7	2.19	1.06	3.30	2.51	2.66	12.24	28.27	11.65	9.58	10.54	13.59	17.78	23.07	26.86	8.96	11.71	8.93	12.18	12.47	8.35	11.48	9.99	10.69	13.37	13.33	12.84
8	1.05	2.31	2.78	3.20	6.50	18.49	12.17	8.09	10.42	11.65	24.47	31.42	23.70	7.95	12.18	8.95	15.78	13.69	15.95	9.82	12.54	11.32	12.25	15.77	15.44	14.74
9	3.19	3.25	3.64	6.44	9.83	8.44	8.80	6.33	13.58	17.99	26.10	28.80	7.27	11.33	9.54	10.41	11.86	11.77	12.82	7.57	9.62	8.89	9.71	12.20	11.76	11.30
10	3.39	3.55	6.68	8.43	6.31	6.96	8.01	6.27	21.80	18.87	21.39	8.41	10.71	9.47	8.48	8.17	10.23	9.54	9.48	5.91	7.47	6.98	7.54	9.08	8.79	8.48
11	4.02	6.03	8.06	6.22	6.24	7.48	8.64	8.38	20.60	18.86	7.74	11.83	8.72	6.31	7.44	8.06	9.65	8.52	8.78	5.53	6.93	6.43	6.85	8.22	8.01	7.72
12	6.42	7.43	6.42	5.84	6.31	9.28	13.20	6.70	19.15	6.62	9.46	9.83	6.07	5.67	7.49	7.87	9.32	9.22	10.58	6.10	7.46	6.95	7.37	9.32	9.01	8.85
13	8.77	6.53	5.37	6.08	6.14	17.31	12.16	6.03	6.86	7.36	7.51	8.56	5.80	5.83	7.34	7.25	8.80	9.02	10.47	5.99	7.12	6.77	7.16	8.96	8.66	8.61
14	5.77	6.19	6.42	5.76	11.60	19.10	13.86	2.55	7.57	6.47	7.90	8.41	6.40	6.00	7.06	7.16	8.85	9.30	10.74	6.15	7.15	6.94	7.28	9.02	8.77	8.89
15	5.15	7.17	5.51	9.62	17.78	18.26	5.68	2.88	6.49	5.79	6.96	8.72	6.46	5.56	6.66	6.90	8.62	9.12	10.61	6.10	6.98	6.86	7.14	8.83	8.75	8.85
16	6.54	5.83	8.74	12.31	18.55	8.26	6.27	1.59	6.35	5.10	6.71	8.59	6.15	5.25	6.36	6.67	8.27	8.86	10.49	6.07	6.77	6.77	7.05	8.78	8.67	8.77
17	6.00	9.04	11.58	14.76	7.86	8.92	6.33	10.98	5.76	4.95	6.28	8.02	5.94	5.09	6.20	6.47	7.99	8.71	10.48	6.08	6.71	6.77	7.12	8.80	8.65	8.73
18	8.63	10.86	11.87	8.01	10.29	7.21	4.85	9.00	5.60	4.53	5.53	7.57	5.80	4.90	5.90	6.15	7.67	8.56	10.42	6.07	6.60	6.81	7.12	8.73	8.53	8.68
19	13.19	12.50	6.82	9.95	9.22	4.73	4.22	7.99	5.19	3.96	4.77	7.24	5.68	4.65	5.57	5.88	7.39	8.39	10.36	6.06	6.46	6.82	7.11	8.62	8.44	8.64
20	12.43	8.67	9.58	9.50	6.34	4.38	3.96	6.79	4.62	3.53	4.34	6.95	5.50	4.40	5.29	5.64	7.13	8.23	10.19	6.11	6.43	6.82	7.07	8.33	8.30	8.61
21	10.28	11.40	10.59	7.54	6.09	4.35	3.57	5.53	4.17	3.19	3.96	6.61	5.31	4.19	5.06	5.42	6.80	8.10	10.10	6.14	6.37	6.80	7.04	8.28	8.16	8.58
22	9.05	10.57	9.81	7.40	6.25	4.20	3.20	4.77	3.90	2.85	3.67	6.33	5.17	4.04	4.87	5.24	6.54	8.08	10.11	6.15	6.30	6.78	7.02	8.24	8.12	8.55
23	9.40	8.85	9.52	7.67	6.15	3.90	2.85	4.03	3.60	2.50	3.33	6.04	5.02	3.86	4.67	5.07	6.42	7.93	9.90	6.15	6.24	6.78	7.01	7.84	7.99	8.37
24	8.16	8.65	9.84	7.66	5.91	3.68	2.57	3.44	3.31	2.26	3.06	5.79	4.88	3.71	4.50	4.96	6.30	7.77	9.74	6.14	6.20	6.77	6.94	7.80	7.72	8.39
25	7.99	8.89	9.85	7.50	5.76	3.51	2.34	2.94	3.07	2.06	2.83	5.56	4.76	3.58	4.39	4.85	6.07	7.69	9.36	6.15	6.07	6.77	6.85	7.67	7.73	8.40
26	8.21	8.82	9.24	7.35	5.65	3.36	2.14	2.55	2.87	1.90	2.64	5.37	4.66	3.50	4.29	4.75	5.85	7.63	9.35	6.16	5.78	6.69	6.87	7.67	7.58	8.25
27	8.16	8.64	9.10	7.32	5.58	3.24	2.01	2.30	2.74	1.80	2.51	5.24	4.62	3.43	4.16	4.67	5.55	7.46	9.35	6.16	5.75	6.64	6.88	7.67	7.58	8.01
28	8.01	8.55	9.07	7.29	5.42	3.12	1.74	2.07	2.61	1.69	2.39	5.14	4.56	3.36	4.07	4.59	5.48	7.20	9.35	6.16	5.75	6.66	6.89	7.67	7.58	7.85
29	7.95	8.50	9.01	7.09	5.34	3.03	1.65	1.89	2.51	1.61	2.31	5.05	4.51	3.30	3.95	4.48	5.42	7.03	9.34	6.06	5.75	6.67	6.79	7.66	7.57	7.84
30	7.91	7.95	8.92	6.95	5.22	2.97	1.58	1.78	2.44	1.57	2.25	4.99	4.47	3.26	3.85	4.45	5.38	7.01	9.37	6.08	5.76	6.58	6.81	7.67	7.57	7.84

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
80 - 90 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.31	0.49	0.54	0.67	0.25	0.33	0.14	0.20	0.27	0.20	0.33	0.61	0.30	0.48	0.44	0.37	0.49	0.50	0.95	0.53	2.00	0.64	0.62	0.61	0.59	0.61
2	2.79	4.30	3.74	3.34	0.93	0.60	0.47	21.08	0.98	1.62	14.73	4.26	1.25	1.66	2.03	2.07	6.79	8.70	5.33	2.51	9.07	2.60	2.65	3.29	3.71	3.64
3	7.72	8.47	6.14	2.35	0.68	0.32	10.40	10.81	2.58	23.53	27.34	2.97	1.98	3.29	4.62	11.77	28.08	17.57	4.37	6.11	6.68	4.32	5.02	7.18	7.70	6.48
4	10.16	7.88	3.39	1.22	0.38	1.99	5.80	15.49	22.14	29.90	11.09	3.34	3.00	4.93	17.62	32.35	30.10	6.22	7.03	5.37	5.68	5.06	6.49	8.86	8.01	7.06
5	8.35	3.81	1.56	0.69	1.78	2.37	8.34	36.91	31.87	11.98	9.29	4.63	3.57	16.27	30.86	30.88	7.95	10.38	6.32	4.03	5.62	5.70	6.86	8.15	7.64	7.10
6	3.93	1.98	0.56	2.26	1.88	3.06	24.31	30.65	12.33	9.42	10.93	5.62	8.87	28.98	29.05	8.09	12.61	7.84	6.26	4.07	6.60	6.03	6.40	7.94	7.75	7.44
7	1.90	0.74	2.79	2.25	2.37	11.18	25.28	12.68	9.68	10.75	14.10	16.09	20.81	27.59	8.20	12.38	9.47	10.02	10.03	6.78	9.90	8.22	8.81	11.24	11.25	10.63
8	0.73	3.04	2.75	2.91	5.76	16.48	10.61	8.82	10.51	11.90	25.91	29.62	22.31	7.95	12.44	9.72	14.04	11.44	13.06	8.13	10.95	9.46	10.27	13.51	13.24	12.36
9	2.94	2.93	3.28	6.64	8.92	8.14	8.45	7.38	13.22	17.91	26.24	27.74	6.71	12.10	9.34	10.05	11.03	10.45	11.09	6.59	8.82	7.81	8.57	10.99	10.57	9.93
10	3.74	3.49	6.03	8.56	6.35	6.57	6.82	8.40	21.64	18.48	23.87	8.03	10.14	9.48	8.93	8.51	10.82	10.24	10.47	6.14	8.17	7.31	7.93	10.11	9.76	9.31
11	3.58	6.42	8.88	6.24	5.80	7.12	8.04	9.14	19.73	19.84	8.87	12.01	8.53	6.66	8.02	8.70	10.56	9.38	9.99	5.93	7.83	6.95	7.41	9.42	9.16	8.71
12	5.92	8.64	6.32	5.63	5.80	8.44	12.52	6.97	20.21	7.43	10.14	9.52	5.68	5.82	7.88	8.22	9.30	8.80	9.81	5.71	7.36	6.54	6.93	8.94	8.64	8.29
13	8.49	6.00	6.04	5.45	5.77	16.05	14.61	7.32	7.47	8.47	7.58	8.63	5.52	6.13	7.90	7.65	8.90	8.78	9.92	5.73	7.16	6.51	6.87	8.76	8.47	8.24
14	6.28	5.29	5.39	5.37	11.00	17.97	12.89	2.39	8.55	8.02	9.09	8.39	6.09	6.30	7.48	7.48	8.85	9.02	10.16	5.87	7.16	6.66	6.95	8.79	8.56	8.51
15	5.26	5.99	5.88	8.64	17.24	18.54	5.81	3.21	6.59	6.35	7.97	8.70	6.16	5.78	7.00	7.17	8.56	8.83	10.05	5.84	6.98	6.58	6.82	8.60	8.56	8.48
16	5.14	5.83	8.08	12.03	17.14	7.70	7.08	2.84	6.83	5.47	7.61	8.55	5.82	5.41	6.62	6.89	8.14	8.53	9.94	5.81	6.77	6.51	6.73	8.58	8.50	8.41
17	5.83	8.29	10.84	14.04	7.65	9.44	6.64	14.31	6.17	5.26	7.23	7.97	5.64	5.22	6.43	6.65	7.82	8.38	9.95	5.83	6.67	6.51	6.80	8.60	8.46	8.38
18	8.15	11.84	11.65	6.99	10.13	8.03	6.00	11.48	5.94	4.77	6.17	7.48	5.48	4.98	6.06	6.27	7.43	8.21	9.90	5.82	6.55	6.56	6.81	8.52	8.34	8.33
19	11.58	12.16	7.24	9.03	8.03	4.80	5.16	9.99	5.46	3.98	5.46	7.10	5.35	4.70	5.67	5.94	7.11	8.02	9.85	5.82	6.53	6.57	6.79	8.40	8.25	8.31
20	11.86	7.92	9.03	9.83	6.05	4.40	4.58	8.32	4.78	3.46	4.78	6.78	5.17	4.41	5.33	5.66	6.79	7.84	9.81	5.87	6.48	6.57	6.75	8.31	8.20	8.28
21	8.67	9.61	10.11	6.99	5.80	4.34	3.91	6.59	4.26	3.06	4.23	6.40	4.96	4.15	5.05	5.40	6.50	7.69	9.86	5.90	6.41	6.55	6.72	8.25	8.16	8.25
22	8.44	8.24	9.13	6.87	5.95	4.18	3.43	5.55	3.94	2.79	3.77	6.10	4.81	3.98	4.83	5.19	6.30	7.66	9.86	5.91	6.32	6.53	6.70	8.20	8.12	8.21
23	7.45	8.65	9.01	7.14	5.84	3.83	2.99	4.56	3.59	2.47	3.37	5.77	4.66	3.78	4.59	4.99	6.14	7.58	9.86	5.92	6.25	6.52	6.69	8.16	8.08	8.24
24	7.86	8.50	9.34	7.14	5.58	3.58	2.64	3.79	3.27	2.11	3.05	5.50	4.52	3.60	4.40	4.86	5.98	7.50	9.82	5.92	6.19	6.52	6.67	8.12	8.10	8.26
25	7.74	8.79	9.39	6.98	5.41	3.39	2.36	3.16	2.99	1.89	2.78	5.26	4.39	3.45	4.26	4.72	5.83	7.40	9.79	5.93	6.14	6.51	6.65	8.12	8.10	8.27
26	8.00	8.77	9.26	6.91	5.28	3.21	2.11	2.68	2.77	1.72	2.56	5.05	4.29	3.35	4.13	4.60	5.68	7.31	9.78	5.93	6.10	6.50	6.66	8.12	8.11	8.27
27	7.99	8.63	9.23	6.88	5.19	3.08	1.95	2.38	2.62	1.60	2.41	4.91	4.24	3.28	4.04	4.51	5.57	7.26	9.75	5.93	6.06	6.51	6.66	8.12	8.10	8.27
28	7.88	8.57	9.21	6.84	5.07	2.94	1.79	2.10	2.48	1.49	2.27	4.80	4.18	3.20	3.94	4.41	5.48	7.21	9.73	5.93	6.05	6.52	6.66	8.11	8.10	8.26
29	7.81	8.55	9.19	6.74	4.97	2.84	1.67	1.89	2.37	1.40	2.17	4.71	4.13	3.13	3.87	4.35	5.40	7.16	9.70	5.95	6.04	6.53	6.66	8.09	8.08	8.24
30	7.80	8.46	9.13	6.69	4.90	2.77	1.59	1.76	2.30	1.35	2.11	4.64	4.08	3.08	3.83	4.31	5.36	7.14	9.72	5.97	6.04	6.54	6.66	8.09	8.08	8.24

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
90 - 93 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.23	0.29	0.37	0.44	0.26	0.15	0.07	0.10	0.14	0.16	0.21	0.39	0.16	0.27	0.30	0.23	0.24	0.35	0.65	0.21	1.78	0.33	0.37	0.40	0.38	0.39
2	2.14	3.70	3.25	2.88	0.70	0.61	0.20	16.40	0.67	1.44	12.19	3.19	0.83	1.19	1.68	1.59	5.49	7.38	4.20	1.92	8.49	1.86	2.21	2.77	3.07	3.05
3	6.77	7.84	6.00	2.23	0.55	0.29	8.07	8.52	1.95	22.40	25.69	2.44	1.60	2.87	4.23	11.02	28.58	17.10	3.87	5.64	5.96	4.18	4.82	6.91	7.45	6.25
4	10.10	8.69	3.17	1.11	0.43	1.73	5.17	13.08	19.63	29.27	11.20	3.14	2.81	4.77	17.15	32.84	32.13	6.07	7.25	5.35	6.21	5.53	6.97	9.86	8.87	7.83
5	8.67	4.20	1.41	0.66	1.33	2.00	6.35	34.84	28.39	12.34	8.56	4.36	3.37	16.11	32.05	31.79	7.93	10.80	6.16	4.39	6.21	6.19	7.42	9.13	8.51	7.91
6	4.34	1.95	0.69	2.04	1.57	2.89	21.09	28.64	11.69	9.68	11.22	5.44	8.71	29.41	29.38	8.47	13.13	8.24	7.29	4.49	7.35	6.59	6.99	8.92	8.67	8.34
7	1.92	0.82	2.58	2.01	1.99	9.84	21.87	11.68	8.74	10.89	12.97	14.91	20.74	27.66	8.26	12.40	9.64	9.56	9.91	6.31	9.59	7.74	8.29	10.88	10.85	10.27
8	0.81	3.10	2.82	2.20	5.25	16.13	9.57	8.75	10.37	11.40	24.27	27.43	22.04	8.35	12.60	9.72	13.05	10.33	11.75	7.15	9.97	8.38	9.11	12.16	11.89	11.04
9	2.89	3.07	3.17	5.85	8.32	7.65	6.88	6.78	13.30	17.99	24.39	26.00	6.58	12.63	9.85	10.06	11.24	10.35	10.93	6.33	8.75	7.56	8.34	10.85	10.37	9.70
10	3.01	3.59	6.45	8.76	5.78	6.01	7.09	5.11	21.43	18.75	24.24	7.29	10.16	9.53	8.97	8.56	11.34	10.81	11.29	6.23	8.56	7.48	8.18	10.75	10.29	9.83
11	3.76	7.16	9.19	6.45	5.30	6.82	7.99	6.97	20.55	20.09	8.21	11.63	7.95	6.68	8.21	8.91	11.35	10.07	10.99	6.13	8.39	7.28	7.80	10.21	9.85	9.38
12	6.55	8.81	6.12	5.56	6.03	7.90	12.61	8.04	20.76	6.98	10.11	8.89	5.53	5.88	8.07	8.44	9.67	8.90	9.81	5.59	7.49	6.49	6.91	8.97	8.60	8.23
13	8.33	6.67	5.82	5.93	5.88	14.75	14.35	7.49	7.55	7.55	9.05	8.93	5.52	6.31	8.29	7.97	9.40	9.07	10.18	5.77	7.46	6.62	7.01	8.99	8.61	8.38
14	6.56	5.76	6.17	5.78	10.14	17.99	14.87	3.81	8.37	6.70	10.26	8.89	6.22	6.65	7.97	7.93	9.54	9.55	10.69	6.06	7.63	6.94	7.25	9.21	8.89	8.85
15	5.39	5.48	5.52	8.31	16.35	17.62	5.26	4.89	6.60	7.21	8.77	9.18	6.33	6.06	7.41	7.57	9.24	9.40	10.64	6.06	7.47	6.89	7.14	9.03	8.92	8.86
16	5.86	5.95	8.31	12.21	17.91	8.17	7.10	4.36	7.56	6.04	8.23	9.05	5.96	5.65	6.99	7.26	8.81	9.11	10.58	6.06	7.26	6.84	7.07	9.04	8.90	8.83
17	5.74	7.93	10.91	13.80	8.36	9.56	6.75	17.10	6.78	5.68	7.73	8.34	5.73	5.40	6.74	6.97	8.40	8.89	10.55	6.04	7.10	6.81	7.11	9.02	8.82	8.76
18	8.28	11.85	12.20	7.28	10.13	8.50	6.12	13.51	6.45	5.09	6.29	7.77	5.55	5.13	6.30	6.53	7.95	8.70	10.50	6.04	6.96	6.85	7.11	8.93	8.67	8.72
19	10.40	13.00	7.87	9.34	8.68	5.01	5.16	11.49	5.90	4.14	5.46	7.32	5.40	4.82	5.85	6.15	7.57	8.47	10.45	6.04	6.93	6.87	7.10	8.79	8.59	8.70
20	12.15	8.09	8.48	7.93	6.25	4.58	4.69	9.40	5.10	3.53	4.81	6.95	5.21	4.49	5.47	5.83	7.20	8.27	10.42	6.09	6.87	6.86	7.06	8.70	8.53	8.68
21	9.37	10.73	8.96	7.17	5.98	4.47	4.11	7.26	4.51	3.06	4.27	6.53	4.98	4.20	5.14	5.52	6.87	8.10	10.47	6.12	6.79	6.84	7.03	8.63	8.50	8.65
22	9.46	9.07	9.49	7.07	6.10	4.29	3.56	6.00	4.09	2.76	3.76	6.19	4.82	4.01	4.89	5.29	6.63	8.06	10.48	6.13	6.68	6.82	7.01	8.58	8.46	8.62
23	8.84	8.93	9.39	7.30	5.98	3.90	3.05	4.81	3.70	2.40	3.31	5.82	4.65	3.78	4.62	5.06	6.45	7.97	10.48	6.13	6.60	6.82	6.99	8.55	8.43	8.66
24	8.01	8.80	9.67	7.32	5.70	3.62	2.65	3.91	3.35	2.10	2.95	5.52	4.49	3.59	4.40	4.90	6.27	7.87	10.46	6.13	6.54	6.81	6.98	8.51	8.45	8.69
25	7.91	9.04	9.74	7.14	5.50	3.39	2.33	3.20	3.05	1.86	2.65	5.25	4.35	3.43	4.24	4.75	6.09	7.77	10.44	6.15	6.49	6.81	6.96	8.53	8.47	8.71
26	8.12	9.03	9.60	7.05	5.35	3.20	2.06	2.65	2.81	1.67	2.41	5.02	4.24	3.32	4.10	4.61	5.93	7.68	10.44	6.16	6.45	6.80	6.98	8.53	8.48	8.73
27	8.12	8.88	9.56	7.01	5.24	3.06	1.89	2.32	2.66	1.54	2.25	4.87	4.19	3.24	3.99	4.50	5.82	7.63	10.43	6.16	6.41	6.82	6.99	8.54	8.49	8.72
28	7.97	8.80	9.54	6.95	5.11	2.91	1.72	2.02	2.51	1.42	2.10	4.75	4.12	3.15	3.88	4.40	5.72	7.56	10.40	6.17	6.41	6.84	6.99	8.54	8.47	8.73
29	7.91	8.77	9.52	6.87	5.00	2.80	1.59	1.80	2.27	1.33	2.00	4.64	4.06	3.08	3.80	4.33	5.64	7.51	10.38	6.19	6.40	6.85	7.00	8.54	8.46	8.72
30	7.88	8.73	9.45	6.81	4.92	2.72	1.51	1.66	2.19	1.27	1.92	4.56	4.02	3.03	3.75	4.28	5.60	7.48	10.40	6.21	6.40	6.85	7.00	8.54	8.46	8.72

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
93 - 95 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.15	0.17	0.31	0.38	0.14	0.17	0.06	0.04	0.13	0.13	0.11	0.35	0.09	0.20	0.24	0.18	0.25	0.28	0.56	0.23	1.83	0.30	0.37	0.33	0.32	0.32
2	1.84	3.56	3.20	2.42	0.58	0.30	0.29	13.29	0.61	1.17	10.46	2.98	0.61	1.09	1.43	1.37	4.68	7.11	4.11	1.88	8.80	1.77	2.02	2.58	2.86	2.81
3	7.21	8.16	6.17	1.96	0.56	0.26	7.22	7.47	1.73	19.85	23.72	2.32	1.44	2.68	3.57	9.24	27.56	17.41	4.00	6.02	5.94	4.07	4.63	6.80	7.21	6.02
4	9.85	9.03	3.29	1.28	0.33	1.59	4.41	11.36	17.51	26.88	10.76	2.92	2.65	4.34	15.39	31.85	31.63	6.31	7.33	5.25	5.89	5.25	6.58	9.29	8.24	7.23
5	9.00	4.55	1.54	0.69	1.10	1.79	5.72	33.20	26.07	11.90	8.36	4.24	3.08	14.39	30.51	30.96	7.74	10.86	6.66	4.19	5.88	5.92	6.95	8.58	7.91	7.33
6	4.34	2.06	0.64	1.85	1.65	2.44	20.72	27.89	10.35	9.01	10.10	5.09	8.26	26.27	28.99	8.46	12.74	8.63	6.66	4.08	6.74	5.97	6.24	7.88	7.61	7.30
7	1.99	0.68	2.64	1.99	1.99	9.18	22.94	11.72	8.42	11.00	13.02	13.73	19.52	27.22	7.98	12.59	9.62	8.37	8.68	5.55	8.40	6.73	7.11	9.27	9.22	8.71
8	0.79	3.25	2.81	2.27	5.30	14.34	9.17	7.29	10.11	11.49	22.32	26.08	20.86	7.68	12.06	9.52	11.22	8.85	10.20	6.11	8.52	7.13	7.68	10.24	9.97	9.25
9	3.33	3.59	3.01	5.81	8.68	7.49	7.09	6.77	11.66	17.98	24.02	24.58	6.25	11.68	9.53	8.78	9.84	9.16	9.61	5.52	7.64	6.59	7.24	9.41	8.95	8.35
10	3.09	3.83	6.45	8.42	6.00	6.03	6.29	6.57	19.35	19.37	23.39	7.39	9.67	9.18	8.18	7.74	10.44	9.91	10.35	5.65	7.81	6.83	7.44	9.78	9.30	8.86
11	3.93	7.07	8.23	6.17	5.44	6.57	6.68	7.97	19.85	19.37	8.92	11.26	7.78	5.93	7.31	7.97	10.16	9.02	9.87	5.47	7.55	6.55	7.00	9.15	8.76	8.31
12	6.54	9.65	6.53	5.43	5.71	7.45	11.40	8.82	19.71	7.89	10.34	9.40	5.16	5.46	7.62	7.86	9.04	8.34	9.24	5.25	7.09	6.16	6.51	8.43	8.02	7.65
13	8.57	6.74	5.57	5.82	5.58	14.37	14.75	8.58	7.18	9.27	7.91	8.12	4.85	5.60	7.35	7.01	8.31	8.07	9.11	5.15	6.72	5.97	6.28	8.03	7.62	7.38
14	6.47	6.00	5.83	5.67	9.99	16.18	12.63	4.49	9.53	7.37	9.42	8.10	5.56	5.90	7.10	7.01	8.51	8.60	9.69	5.48	6.95	6.33	6.57	8.32	7.94	7.87
15	5.72	6.01	5.61	7.70	15.07	17.16	6.92	4.74	8.50	6.67	8.04	8.47	5.64	5.38	6.61	6.72	8.31	8.54	9.73	5.52	6.85	6.34	6.51	8.21	8.02	7.92
16	5.96	5.91	8.22	11.28	16.13	8.02	6.30	5.99	7.06	5.37	7.74	8.31	5.32	5.02	6.27	6.51	7.98	8.35	9.76	5.57	6.71	6.34	6.50	8.28	8.05	7.95
17	5.70	8.23	11.00	13.62	8.43	10.27	5.63	16.40	6.22	5.15	6.98	7.55	5.06	4.77	6.01	6.21	7.55	8.07	9.64	5.50	6.49	6.24	6.46	8.18	7.90	7.83
18	8.33	10.90	12.60	7.56	9.87	7.66	5.76	12.76	5.93	4.54	5.75	7.00	4.90	4.53	5.64	5.82	7.14	7.88	9.58	5.48	6.34	6.26	6.45	8.09	7.77	7.79
19	11.58	13.05	8.04	9.64	9.12	4.62	4.80	10.83	5.36	3.77	4.82	6.58	4.77	4.24	5.24	5.47	6.79	7.68	9.53	5.47	6.30	6.26	6.43	7.97	7.69	7.76
20	11.77	7.51	8.67	8.44	5.63	4.18	4.36	8.72	4.62	3.20	4.22	6.24	4.59	3.95	4.89	5.18	6.44	7.48	9.48	5.50	6.23	6.25	6.40	7.88	7.63	7.74
21	9.18	9.81	9.03	6.50	5.34	4.09	3.77	6.66	4.01	2.76	3.73	5.85	4.39	3.70	4.59	4.90	6.13	7.31	9.51	5.52	6.15	6.23	6.36	7.82	7.60	7.72
22	8.07	8.50	8.67	6.35	5.47	3.88	3.24	5.46	3.68	2.48	3.36	5.54	4.25	3.52	4.36	4.69	5.91	7.27	9.51	5.52	6.05	6.20	6.34	7.77	7.57	7.70
23	7.90	8.29	8.50	6.59	5.31	3.52	2.76	4.35	3.33	2.15	2.95	5.21	4.10	3.32	4.12	4.48	5.74	7.18	9.51	5.52	5.97	6.19	6.33	7.74	7.54	7.73
24	7.39	8.09	8.79	6.53	5.03	3.25	2.39	3.51	3.01	1.87	2.62	4.93	3.95	3.14	3.91	4.33	5.56	7.09	9.49	5.52	5.91	6.19	6.32	7.72	7.56	7.75
25	7.23	8.33	8.76	6.36	4.84	3.04	2.09	2.85	2.74	1.65	2.35	4.68	3.83	3.00	3.77	4.19	5.40	6.99	9.46	5.53	5.86	6.18	6.30	7.74	7.58	7.78
26	7.44	8.23	8.61	6.26	4.71	2.87	1.84	2.35	2.53	1.48	2.13	4.47	3.73	2.90	3.64	4.07	5.26	6.90	9.45	5.54	5.82	6.18	6.32	7.74	7.60	7.80
27	7.37	8.07	8.54	6.22	4.61	2.74	1.68	2.05	2.40	1.36	1.99	4.33	3.68	2.82	3.55	3.97	5.15	6.85	9.44	5.54	5.79	6.19	6.33	7.74	7.61	7.81
28	7.24	7.97	8.52	6.16	4.48	2.60	1.53	1.78	2.27	1.25	1.85	4.22	3.62	2.75	3.45	3.88	5.06	6.80	9.44	5.55	5.79	6.21	6.34	7.75	7.62	7.82
29	7.17	7.92	8.48	6.07	4.38	2.50	1.41	1.58	2.05	1.17	1.75	4.12	3.57	2.68	3.37	3.82	4.99	6.77	9.43	5.57	5.79	6.22	6.35	7.76	7.63	7.83
30	7.14	7.86	8.39	6.01	4.30	2.43	1.34	1.45	1.92	1.12	1.68	4.05	3.53	2.63	3.32	3.77	4.94	6.72	9.43	5.57	5.78	6.22	6.34	7.75	7.60	7.82

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
95 - 97 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.18	0.13	0.31	0.34	0.17	0.10	0.11	0.15	0.13	0.09	0.13	0.27	0.13	0.20	0.26	0.19	0.22	0.29	0.61	0.21	1.75	0.28	0.33	0.32	0.30	0.31
2	1.71	3.26	3.33	2.41	0.55	0.34	0.25	11.76	0.47	0.77	8.92	2.66	0.59	1.09	1.57	1.50	4.63	7.77	4.11	1.82	8.94	1.60	2.00	2.59	2.87	2.85
3	7.28	8.89	6.36	1.91	0.46	0.25	5.55	6.29	1.37	16.73	20.74	2.08	1.33	2.57	3.71	8.91	27.01	18.35	3.88	6.23	5.94	3.96	4.51	6.81	7.21	6.08
4	11.13	9.82	3.56	1.17	0.29	1.38	3.95	9.67	14.56	24.23	9.76	2.72	2.46	4.20	14.39	29.88	31.45	6.53	7.45	5.46	5.65	5.07	6.40	9.21	8.17	7.24
5	9.93	4.62	1.71	0.65	1.13	1.57	5.27	30.40	22.95	10.45	8.03	4.12	3.15	13.84	28.69	29.98	8.12	11.25	6.62	4.04	5.63	5.73	6.75	8.40	7.74	7.23
6	4.44	2.32	0.67	1.89	1.40	2.14	18.38	26.05	9.27	8.47	10.11	5.08	7.91	26.76	27.92	8.24	13.51	8.65	6.98	4.10	6.77	6.03	6.33	8.17	7.88	7.63
7	2.26	0.84	2.66	2.13	1.76	8.32	19.85	11.45	7.58	9.33	11.92	13.11	18.69	25.77	8.02	12.72	9.45	8.80	9.53	5.86	8.80	7.11	7.54	10.03	9.95	9.48
8	1.16	3.37	2.74	2.40	4.76	12.70	8.41	8.86	9.00	10.46	20.69	24.31	20.05	7.78	12.13	9.33	11.31	9.19	11.12	6.38	8.87	7.48	8.08	10.97	10.65	9.98
9	3.19	3.34	3.25	5.31	7.18	6.46	6.38	6.48	10.09	17.12	23.40	24.07	6.36	12.07	9.63	8.38	9.62	9.28	10.17	5.62	7.76	6.74	7.41	9.77	9.27	8.75
10	3.50	3.80	6.22	7.98	5.24	5.27	6.63	6.53	17.53	18.79	23.38	6.97	10.06	9.49	8.07	7.68	10.46	10.00	10.61	5.75	7.92	6.97	7.60	9.95	9.45	9.08
11	3.68	6.74	8.09	5.65	4.88	6.16	6.84	7.24	18.57	19.72	8.69	10.89	8.19	5.80	7.14	7.88	10.10	9.05	10.05	5.53	7.59	6.62	7.09	9.22	8.82	8.45
12	5.95	8.67	5.94	5.28	5.47	7.01	11.04	9.09	20.92	8.02	10.15	8.82	4.96	5.23	7.32	7.60	8.72	7.99	8.84	5.06	6.81	5.95	6.30	8.04	7.65	7.35
13	8.13	6.05	5.53	5.47	5.39	13.11	12.69	9.44	8.32	9.71	8.96	8.08	4.82	5.57	7.30	7.02	8.31	8.02	9.02	5.14	6.67	5.97	6.30	7.92	7.53	7.36
14	6.16	5.75	5.75	5.17	8.96	15.41	14.19	3.95	9.51	6.87	9.46	8.07	5.56	5.88	7.08	7.06	8.54	8.56	9.60	5.48	6.92	6.35	6.61	8.23	7.86	7.86
15	5.09	6.07	5.46	7.38	14.25	16.63	7.01	5.38	8.02	6.96	8.13	8.44	5.61	5.36	6.58	6.76	8.30	8.45	9.59	5.50	6.80	6.34	6.53	8.09	7.91	7.89
16	5.83	5.74	7.59	10.16	16.11	8.07	7.26	4.13	6.69	5.91	7.84	8.24	5.28	4.98	6.22	6.51	7.93	8.22	9.58	5.52	6.64	6.32	6.50	8.13	7.91	7.89
17	5.74	7.79	10.19	12.72	7.91	9.15	6.07	16.32	5.91	5.73	7.26	7.54	5.05	4.75	5.97	6.22	7.52	7.98	9.49	5.47	6.44	6.25	6.49	8.07	7.80	7.80
18	7.97	11.20	11.24	7.03	9.45	9.52	6.14	12.70	5.65	5.10	6.14	6.99	4.89	4.51	5.59	5.83	7.10	7.79	9.44	5.46	6.30	6.27	6.48	7.98	7.67	7.76
19	10.44	11.43	7.33	9.27	8.77	4.52	5.14	10.84	5.09	4.21	5.33	6.59	4.76	4.22	5.18	5.47	6.75	7.59	9.38	5.45	6.27	6.27	6.47	7.86	7.58	7.73
20	11.63	7.51	9.37	8.60	5.58	4.08	4.65	8.74	4.36	3.63	4.63	6.24	4.58	3.93	4.83	5.18	6.41	7.39	9.34	5.48	6.20	6.27	6.43	7.76	7.52	7.71
21	9.88	10.19	10.18	6.34	5.28	4.01	4.05	6.70	3.83	3.19	4.13	5.85	4.38	3.67	4.53	4.90	6.10	7.22	9.37	5.50	6.12	6.25	6.40	7.70	7.49	7.68
22	8.67	8.55	8.23	6.18	5.43	3.80	3.44	5.51	3.50	2.79	3.75	5.54	4.23	3.49	4.30	4.68	5.87	7.18	9.36	5.51	6.02	6.22	6.38	7.65	7.46	7.65
23	9.14	7.96	8.05	6.44	5.26	3.45	2.95	4.40	3.15	2.39	3.26	5.20	4.08	3.29	4.05	4.47	5.70	7.09	9.35	5.51	5.94	6.21	6.36	7.62	7.43	7.68
24	7.11	7.75	8.36	6.38	4.99	3.18	2.59	3.57	2.83	2.12	2.93	4.92	3.94	3.11	3.84	4.32	5.52	7.00	9.33	5.50	5.87	6.21	6.35	7.59	7.44	7.70
25	6.95	8.01	8.33	6.21	4.80	2.98	2.21	2.90	2.56	1.84	2.67	4.68	3.81	2.97	3.70	4.17	5.36	6.89	9.29	5.50	5.82	6.20	6.33	7.60	7.45	7.72
26	7.18	7.91	8.19	6.12	4.67	2.80	1.96	2.40	2.35	1.67	2.40	4.47	3.71	2.87	3.56	4.05	5.20	6.80	9.27	5.51	5.78	6.19	6.35	7.61	7.46	7.73
27	7.10	7.74	8.14	6.08	4.57	2.67	1.80	2.10	2.21	1.56	2.20	4.32	3.66	2.79	3.47	3.95	5.09	6.75	9.26	5.51	5.74	6.21	6.36	7.61	7.46	7.73
28	6.97	7.65	8.12	6.02	4.44	2.53	1.64	1.82	2.08	1.46	2.07	4.21	3.60	2.71	3.37	3.85	4.99	6.70	9.24	5.51	5.74	6.22	6.36	7.61	7.46	7.73
29	6.91	7.61	8.09	5.94	4.33	2.43	1.53	1.62	1.98	1.38	1.98	4.11	3.55	2.65	3.28	3.78	4.92	6.66	9.22	5.53	5.73	6.23	6.37	7.60	7.45	7.73
30	6.88	7.55	8.01	5.87	4.26	2.36	1.46	1.49	1.91	1.21	1.92	4.04	3.51	2.60	3.23	3.73	4.87	6.62	9.22	5.54	5.72	6.23	6.36	7.59	7.44	7.71

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
97 - 100 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.13	0.17	0.28	0.21	0.18	0.17	0.10	0.12	0.13	0.11	0.14	0.24	0.13	0.28	0.40	0.31	0.28	0.23	0.40	0.23	1.42	0.35	0.31	0.31	0.30	0.31
2	1.53	2.86	3.15	2.24	0.68	0.49	0.27	10.87	0.39	0.74	7.95	2.48	0.69	1.28	1.91	1.74	4.36	4.32	3.04	1.95	7.45	1.52	1.99	2.45	2.66	2.65
3	6.76	8.66	6.56	2.10	0.63	0.28	5.47	6.12	1.34	14.23	19.10	2.14	1.41	3.03	3.92	8.54	24.20	11.19	3.81	5.92	5.47	4.24	4.71	6.75	7.16	6.17
4	10.49	9.58	3.93	1.45	0.33	1.34	3.47	8.83	13.28	21.72	10.00	2.90	2.77	4.55	13.80	27.87	28.71	6.06	6.98	5.44	7.06	6.26	7.51	10.99	9.90	8.95
5	9.95	5.33	2.11	0.82	1.21	1.58	4.67	22.29	21.07	10.63	8.53	4.48	3.40	13.29	27.35	28.16	7.75	9.57	6.68	5.28	7.21	7.01	8.07	10.36	9.64	9.09
6	5.15	2.67	0.87	1.95	1.43	2.07	16.16	25.37	9.45	9.22	10.51	5.51	8.28	25.71	26.77	8.18	12.56	8.00	8.75	5.24	8.20	7.16	7.47	9.80	9.46	9.20
7	2.77	1.07	2.73	2.00	1.80	7.13	18.42	11.98	7.65	9.64	12.26	13.01	18.42	25.49	8.10	12.47	9.58	8.93	10.10	6.32	9.44	7.49	7.88	10.61	10.50	10.06
8	1.33	3.45	2.66	2.30	4.20	11.16	8.72	8.26	8.95	9.91	20.37	23.98	19.55	7.77	11.89	9.26	11.67	9.34	11.67	6.88	9.49	7.84	8.40	11.61	11.27	10.59
9	3.57	3.35	3.16	4.94	6.80	6.02	6.85	7.28	10.54	14.60	21.98	23.44	6.26	11.81	9.46	9.04	10.58	9.80	11.31	6.40	8.74	7.44	8.13	10.98	10.38	9.81
10	3.41	3.55	5.41	7.00	6.00	5.15	6.49	6.17	16.64	16.99	22.43	7.30	10.07	9.60	8.78	8.19	11.01	10.10	11.14	6.26	8.53	7.37	8.02	10.64	10.06	9.63
11	3.49	5.70	6.93	5.27	4.76	5.88	6.50	6.61	17.56	18.58	8.83	11.15	8.18	6.61	7.88	8.32	10.68	9.18	10.57	6.03	8.20	7.05	7.52	9.92	9.43	9.00
12	5.75	7.29	5.20	4.92	5.28	6.13	9.65	7.16	18.72	8.00	10.57	9.11	5.48	6.02	7.94	8.00	9.09	7.83	8.85	5.37	7.15	6.16	6.50	8.32	7.85	7.49
13	7.37	5.57	4.86	5.22	4.94	11.33	11.69	8.70	8.18	9.14	9.28	8.57	5.26	6.20	7.78	7.25	8.47	7.66	8.85	5.35	6.88	6.06	6.36	8.04	7.57	7.34
14	5.47	5.00	5.14	5.17	8.15	14.28	12.97	4.84	9.16	7.92	11.58	9.14	6.34	6.95	8.01	7.71	9.19	8.60	9.94	6.03	7.53	6.80	7.05	8.80	8.33	8.24
15	5.09	5.15	5.05	6.94	12.82	15.83	6.67	4.52	8.25	8.60	10.05	9.46	6.44	6.36	7.46	7.40	8.99	8.51	9.99	6.08	7.42	6.81	6.99	8.69	8.40	8.28
16	5.21	5.14	6.31	10.05	14.82	7.38	6.97	4.01	8.06	7.32	9.57	9.30	6.10	5.93	7.07	7.17	8.65	8.30	10.02	6.13	7.27	6.81	6.98	8.75	8.42	8.30
17	5.40	6.85	8.65	11.97	7.47	9.32	6.66	17.77	7.10	6.93	8.77	8.46	5.79	5.63	6.78	6.85	8.18	8.06	9.90	6.05	7.03	6.71	6.94	8.65	8.27	8.19
18	7.05	9.40	10.42	7.52	9.60	8.82	7.03	13.93	6.67	6.11	7.37	7.83	5.60	5.34	6.36	6.43	7.73	7.87	9.84	6.04	6.88	6.72	6.92	8.55	8.13	8.15
19	9.22	10.24	7.24	9.07	8.84	4.93	5.89	11.73	6.00	5.08	6.34	7.36	5.46	5.02	5.91	6.05	7.35	7.67	9.79	6.03	6.83	6.72	6.90	8.42	8.05	8.12
20	10.39	7.46	8.79	8.75	5.90	4.48	5.15	9.46	5.13	4.32	5.55	6.97	5.27	4.68	5.52	5.73	6.98	7.48	9.75	6.06	6.75	6.71	6.86	8.33	7.99	8.10
21	9.25	9.98	9.75	6.56	5.63	4.33	4.48	7.26	4.48	3.75	4.92	6.55	5.04	4.38	5.18	5.42	6.64	7.32	9.77	6.07	6.65	6.69	6.83	8.26	7.95	8.08
22	8.25	7.91	8.12	6.44	5.70	4.11	3.89	5.96	4.08	3.38	4.46	6.21	4.88	4.17	4.92	5.18	6.39	7.26	9.75	6.08	6.55	6.66	6.81	8.21	7.92	8.05
23	8.11	7.73	8.01	6.61	5.53	3.73	3.34	4.75	3.66	2.96	3.95	5.83	4.71	3.93	4.63	4.94	6.19	7.17	9.74	6.08	6.46	6.65	6.79	8.17	7.89	8.07
24	7.03	7.59	8.21	6.56	5.26	3.44	2.92	3.84	3.28	2.61	3.53	5.52	4.55	3.72	4.40	4.78	5.99	7.07	9.72	6.08	6.40	6.65	6.78	8.15	7.90	8.09
25	6.92	7.75	8.20	6.40	5.05	3.21	2.55	3.13	2.95	2.33	3.20	5.24	4.41	3.55	4.23	4.62	5.81	6.97	9.69	6.08	6.34	6.64	6.77	8.15	7.90	8.11
26	7.06	7.68	8.09	6.30	4.90	3.02	2.27	2.59	2.70	2.12	2.94	5.01	4.29	3.42	4.07	4.47	5.64	6.89	9.68	6.09	6.29	6.64	6.78	8.15	7.91	8.12
27	7.00	7.54	8.03	6.24	4.79	2.87	2.10	2.26	2.53	1.98	2.77	4.85	4.23	3.33	3.96	4.37	5.53	6.81	9.66	6.09	6.25	6.65	6.78	8.15	7.91	8.12
28	6.89	7.45	8.00	6.18	4.66	2.73	1.93	1.96	2.37	1.85	2.60	4.71	4.16	3.24	3.85	4.26	5.42	6.76	9.65	6.09	6.24	6.66	6.79	8.15	7.91	8.13
29	6.83	7.40	7.97	6.10	4.55	2.62	1.79	1.75	2.25	1.75	2.49	4.60	4.10	3.16	3.76	4.19	5.34	6.72	9.63	6.11	6.23	6.66	6.79	8.15	7.90	8.13
30	6.79	7.34	7.90	6.03	4.46	2.54	1.71	1.61	2.16	1.69	2.41	4.51	4.05	3.10	3.69	4.13	5.27	6.69	9.62	6.11	6.21	6.66	6.78	8.13	7.88	8.11

= Actual Experience

Summary of Conditional Prepayment Rates
30-Year Fixed Rate Mortgages
Investors LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.39	0.30	0.41	0.54	0.43	1.48	0.15	0.74	0.41	0.30	0.35	0.70	0.32	0.85	1.03	0.51	0.35	0.39	0.54	0.18	1.98	0.33	0.72	0.53	0.52	0.53
2	1.90	2.89	2.84	2.60	1.09	4.01	0.51	19.43	1.25	1.88	10.04	4.37	1.31	2.57	2.81	2.47	5.17	6.22	3.68	1.35	10.42	2.53	2.45	2.77	3.07	3.04
3	4.97	6.19	4.88	2.13	0.88	0.52	8.21	11.43	2.49	16.64	22.62	2.95	1.88	3.79	4.70	10.47	23.05	15.53	2.81	5.54	6.65	3.57	4.08	5.25	5.66	4.93
4	7.03	6.15	2.50	1.52	0.45	1.93	6.29	12.43	13.85	25.70	10.54	3.14	2.72	4.83	15.26	28.96	26.92	4.84	5.54	4.44	4.84	4.37	5.43	7.01	6.53	5.94
5	6.41	3.31	1.86	1.00	1.79	2.56	6.87	23.36	24.66	11.69	8.02	4.29	3.12	14.65	28.24	29.60	6.55	9.81	5.28	4.21	5.58	5.61	6.69	7.91	7.58	7.18
6	3.25	1.95	1.06	1.98	2.17	3.04	17.79	24.00	10.65	9.43	9.59	5.10	7.61	27.05	27.64	8.13	11.92	7.38	6.93	4.66	7.04	6.52	7.02	8.76	8.59	8.35
7	2.12	1.20	2.42	2.43	2.89	9.04	23.16	12.98	7.85	9.91	10.89	13.46	18.75	26.15	8.69	12.37	9.63	10.49	10.80	7.53	10.63	9.07	9.83	12.45	12.36	11.80
8	1.34	2.86	3.17	2.94	4.75	14.44	12.23	9.02	9.47	10.16	18.94	25.40	21.16	8.06	12.45	9.21	14.75	12.58	14.72	9.50	12.55	11.05	12.02	15.66	15.18	14.40
9	2.97	3.75	3.47	4.72	7.51	8.57	8.80	7.19	10.15	16.01	21.41	25.38	6.15	11.87	9.85	10.31	11.53	11.23	12.40	7.72	10.13	9.05	9.87	12.50	11.93	11.42
10	3.32	3.53	5.38	7.51	5.84	6.35	8.24	6.69	17.74	15.81	22.23	7.64	9.99	9.50	9.20	8.79	11.07	10.65	11.15	7.01	9.12	8.16	8.80	10.91	10.47	10.15
11	3.56	6.05	7.63	5.90	5.64	7.01	8.13	6.88	18.63	17.19	7.97	11.63	8.45	7.21	8.48	9.10	11.15	10.16	11.00	6.94	8.95	7.92	8.41	10.41	10.07	9.75
12	5.09	7.58	5.66	5.17	5.49	7.15	10.24	6.90	19.30	7.93	9.72	9.76	6.22	6.40	8.37	8.81	10.38	10.19	11.70	7.03	8.89	7.87	8.32	10.59	10.19	10.00
13	7.07	6.50	5.13	5.46	5.08	13.87	10.70	6.98	7.97	8.92	8.67	8.72	6.07	6.69	8.45	8.35	10.08	10.21	11.81	7.05	8.69	7.85	8.28	10.44	10.04	9.99
14	5.61	5.81	5.79	5.03	7.69	16.46	12.19	4.28	9.93	7.35	8.68	8.77	6.80	7.11	8.37	8.48	10.36	10.71	12.31	7.37	8.94	8.25	8.61	10.75	10.41	10.56
15	5.95	5.87	4.88	6.31	12.30	15.99	5.89	4.29	7.90	6.32	7.60	8.90	6.81	6.53	7.79	8.02	9.88	10.31	11.97	7.22	8.64	8.07	8.36	10.42	10.28	10.39
16	5.35	5.12	6.59	9.84	13.52	7.25	6.68	3.45	6.28	5.46	7.26	8.70	6.42	6.09	7.29	7.57	9.28	9.84	11.69	7.10	8.33	7.90	8.18	10.27	10.09	10.19
17	5.47	7.56	8.87	11.28	7.05	8.90	6.40	11.94	5.97	5.57	7.23	8.53	6.47	6.06	7.25	7.48	9.07	9.98	12.09	7.35	8.49	8.17	8.52	10.61	10.36	10.45
18	6.76	9.76	10.39	7.08	8.82	8.94	5.60	9.91	5.83	5.18	6.44	8.17	6.36	5.81	6.85	7.09	8.62	9.89	12.16	7.41	8.44	8.30	8.60	10.61	10.29	10.47
19	9.58	10.62	8.97	8.38	8.68	4.76	4.92	8.83	5.49	4.57	5.82	7.86	6.23	5.51	6.45	6.76	8.23	9.67	12.08	7.47	8.49	8.38	8.64	10.53	10.26	10.51
20	11.20	8.01	8.86	8.81	6.21	4.46	4.64	7.60	4.94	4.10	5.31	7.56	6.05	5.20	6.10	6.49	7.84	9.56	11.99	7.59	8.51	8.45	8.65	10.49	10.27	10.55
21	12.76	12.56	12.63	7.30	6.03	4.44	4.23	6.26	4.51	3.71	4.86	7.21	5.84	4.93	5.82	6.23	7.60	9.36	12.15	7.68	8.50	8.48	8.67	10.38	10.18	10.57
22	8.21	9.46	9.71	7.26	6.20	4.33	3.83	5.43	4.23	3.45	4.51	6.92	5.70	4.75	5.60	6.04	7.43	9.13	11.88	7.74	8.37	8.50	8.69	10.24	10.05	10.46
23	8.51	9.15	9.70	7.55	6.16	4.06	3.44	4.59	3.90	3.13	4.10	6.61	5.55	4.54	5.36	5.84	7.16	9.11	11.73	7.78	8.25	8.55	8.72	10.24	10.05	10.39
24	8.36	9.11	10.08	7.62	5.96	3.85	3.07	3.91	3.59	2.85	3.77	6.36	5.41	4.36	5.16	5.70	7.03	9.07	11.76	7.83	8.23	8.59	8.74	10.11	9.97	10.44
25	8.32	9.44	10.23	7.54	5.84	3.68	2.75	3.34	3.32	2.62	3.50	6.13	5.29	4.20	5.02	5.56	6.74	8.83	11.79	7.88	8.04	8.62	8.75	10.15	10.00	10.34
26	8.61	9.51	10.20	7.51	5.74	3.52	2.52	2.89	3.10	2.35	3.28	5.93	5.19	4.10	4.88	5.43	6.60	8.78	11.83	7.93	8.02	8.65	8.80	10.00	9.83	10.17
27	8.69	9.46	10.24	7.51	5.67	3.40	2.36	2.61	2.96	2.23	3.13	5.79	5.14	4.01	4.78	5.33	6.51	8.75	11.86	7.96	8.00	8.70	8.64	9.82	9.65	9.99
28	8.57	9.46	10.17	7.49	5.56	3.28	2.21	2.34	2.81	2.11	2.98	5.68	5.08	3.92	4.66	5.22	6.42	8.73	11.36	7.92	7.89	8.74	8.66	9.81	9.65	9.98
29	8.59	9.26	10.09	7.45	5.47	3.18	2.10	2.14	2.70	1.96	2.88	5.58	5.02	3.84	4.57	5.14	6.34	8.71	11.38	7.96	7.90	8.59	8.68	9.80	9.63	9.97
30	8.66	9.30	10.12	7.45	5.44	3.14	2.04	2.01	2.64	1.87	2.83	5.54	5.00	3.80	4.54	5.12	6.33	8.45	11.07	7.95	7.95	8.57	8.53	9.84	9.68	10.02

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
Unknown LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.11	0.36	0.15	0.05	0.05	0.03	0.13	0.23	0.01	0.02	0.19	0.09	0.11	0.00	0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.07
2	1.53	2.28	1.41	0.75	0.77	0.57	1.66	3.02	0.46	2.43	4.05	2.75	2.17	0.83	1.12	0.73	0.40	1.32	0.18	0.20	0.68	1.23	0.79	0.79	0.79	0.82
3	3.20	3.76	2.52	1.59	1.78	1.71	4.69	6.83	2.07	6.06	10.57	9.05	4.85	1.87	4.93	2.22	1.99	3.34	0.90	1.96	2.55	2.01	2.06	1.94	2.03	2.13
4	4.18	4.66	3.13	2.27	2.61	3.26	7.14	10.41	4.23	12.86	15.68	12.49	6.02	4.78	7.14	3.49	3.60	4.90	1.99	3.56	3.07	2.72	3.44	3.22	3.46	3.62
5	4.75	5.17	3.58	2.77	3.42	4.56	9.62	13.50	6.76	17.22	18.86	13.37	9.09	5.82	9.32	4.34	4.82	6.31	3.46	4.28	3.55	3.45	4.97	4.65	5.04	5.27
6	5.04	5.43	3.85	3.33	4.11	5.77	11.72	15.79	9.28	19.69	20.14	15.81	10.54	7.07	10.41	4.86	5.58	7.54	4.04	4.90	4.02	4.17	6.54	6.11	6.63	6.87
7	5.25	5.68	4.17	3.77	4.82	6.85	13.71	17.26	11.09	20.78	21.30	16.21	11.37	7.90	10.95	5.15	6.19	8.20	4.54	5.51	4.50	4.92	8.17	7.54	8.13	8.31
8	5.43	5.92	4.39	4.29	5.47	8.05	15.40	18.07	12.21	21.77	21.76	16.52	12.10	8.32	11.34	5.37	6.62	8.72	5.06	6.16	5.02	5.69	9.84	8.97	9.56	9.69
9	5.65	6.10	4.66	4.71	6.22	9.16	16.57	18.55	13.08	22.55	22.08	16.97	13.10	8.52	11.60	5.66	6.94	9.15	5.54	6.79	5.51	6.40	11.35	10.15	10.71	10.81
10	5.83	6.27	4.93	5.09	7.01	10.00	17.33	18.99	13.73	23.09	22.38	17.60	14.10	9.09	11.83	5.88	7.19	9.51	5.98	7.38	5.95	7.00	12.61	11.08	11.62	11.72
11	5.99	6.46	5.19	5.62	7.67	10.57	17.87	19.34	14.14	23.49	22.65	18.45	14.10	9.67	11.99	6.04	7.38	9.82	6.37	7.92	6.34	7.49	13.67	11.82	12.36	12.46
12	6.15	6.64	5.56	6.13	8.19	11.18	18.37	19.61	14.48	23.82	22.89	18.84	14.68	10.16	12.14	6.20	7.57	10.12	6.81	8.48	6.72	7.96	14.74	12.54	13.09	13.22
13	6.30	6.93	5.92	6.52	8.62	11.62	18.71	19.82	14.70	23.99	23.04	18.99	15.13	10.57	12.27	6.34	7.73	10.38	7.19	8.97	7.04	8.34	15.65	13.14	13.70	13.85
14	6.51	7.24	6.27	6.85	8.98	12.01	18.99	19.98	14.85	24.26	23.13	19.10	15.50	10.90	12.37	6.45	7.87	10.60	7.49	9.36	7.29	8.64	16.40	13.62	14.19	14.36
15	6.69	7.47	6.49	7.12	9.25	12.28	19.21	20.08	14.95	24.37	23.19	19.19	15.80	11.17	12.45	6.54	7.98	10.76	7.71	9.66	7.48	8.87	17.00	13.99	14.57	14.76
16	6.88	7.64	6.70	7.34	9.48	12.48	19.35	20.19	15.03	24.44	23.24	19.25	16.04	11.38	12.52	6.61	8.06	10.89	7.88	9.90	7.64	9.05	17.47	14.27	14.86	15.06
17	7.04	7.79	6.84	7.49	9.68	12.57	19.47	20.31	15.08	24.49	23.27	19.30	16.24	11.55	12.56	6.66	8.12	10.98	8.01	10.08	7.75	9.17	17.83	14.48	15.07	15.29
18	7.20	7.93	6.95	7.61	9.77	12.65	19.54	20.40	15.12	24.54	23.30	19.34	16.39	11.67	12.60	6.69	8.17	11.05	8.10	10.21	7.83	9.27	18.11	14.63	15.23	15.46
19	7.29	8.05	7.10	7.70	9.88	12.69	19.59	20.46	15.16	24.57	23.32	19.38	16.50	11.76	12.62	6.72	8.21	11.09	8.17	10.32	7.90	9.34	18.33	14.75	15.35	15.59
20	7.34	8.13	7.16	7.77	9.93	12.72	19.63	20.51	15.18	24.59	23.34	19.40	16.59	11.83	12.64	6.74	8.24	11.13	8.22	10.41	7.96	9.40	18.50	14.84	15.45	15.69
21	7.40	8.17	7.24	7.82	9.99	12.75	19.67	20.55	15.21	24.62	23.36	19.42	16.66	11.88	12.66	6.76	8.26	11.16	8.27	10.48	8.00	9.44	18.65	14.91	15.52	15.77
22	7.43	8.22	7.30	7.87	10.04	12.78	19.70	20.59	15.23	24.63	23.37	19.43	16.72	11.92	12.67	6.77	8.27	11.19	8.30	10.53	8.04	9.48	18.76	14.97	15.58	15.83
23	7.46	8.28	7.36	7.90	10.08	12.80	19.73	20.62	15.24	24.65	23.38	19.45	16.76	11.96	12.68	6.78	8.29	11.20	8.33	10.58	8.07	9.50	18.86	15.02	15.62	15.88
24	7.50	8.32	7.41	7.94	10.12	12.82	19.75	20.64	15.26	24.66	23.38	19.46	16.80	11.98	12.68	6.79	8.30	11.22	8.35	10.62	8.09	9.53	18.94	15.05	15.66	15.92
25	7.54	8.36	7.45	7.97	10.15	12.84	19.77	20.66	15.27	24.67	23.39	19.46	16.83	12.01	12.69	6.80	8.31	11.23	8.37	10.65	8.11	9.54	19.01	15.09	15.69	15.95
26	7.57	8.40	7.49	8.00	10.18	12.85	19.79	20.68	15.28	24.67	23.40	19.47	16.86	12.02	12.69	6.81	8.32	11.25	8.39	10.68	8.13	9.56	19.07	15.11	15.72	15.98
27	7.60	8.43	7.53	8.02	10.20	12.87	19.81	20.69	15.30	24.68	23.40	19.47	16.88	12.04	12.70	6.81	8.33	11.26	8.40	10.71	8.14	9.57	19.12	15.13	15.74	16.00
28	7.63	8.46	7.57	8.04	10.22	12.88	19.83	20.70	15.31	24.68	23.40	19.48	16.90	12.05	12.70	6.81	8.33	11.27	8.41	10.73	8.16	9.58	19.16	15.15	15.76	16.02
29	7.65	8.48	7.60	8.06	10.24	12.89	19.84	20.71	15.31	24.69	23.41	19.48	16.91	12.06	12.70	6.82	8.34	11.27	8.42	10.74	8.17	9.59	19.19	15.16	15.77	16.03
30	7.67	8.51	7.63	8.08	10.26	12.91	19.86	20.72	15.32	24.69	23.41	19.49	16.92	12.07	12.71	6.82	8.34	11.27	8.43	10.76	8.18	9.59	19.22	15.17	15.78	16.05

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
0 - 65 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.04	0.03	0.00	0.00	0.04	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.13	0.14	0.14
2	0.06	0.13	0.20	0.07	0.23	0.25	0.46	0.23	0.09	0.24	0.16	0.05	0.06	0.10	0.11	0.15	0.35	0.17	0.05	0.19	0.11	0.00	0.22	0.33	0.35	0.35
3	0.19	0.32	0.60	0.24	0.57	0.68	1.11	0.65	0.33	0.61	0.65	0.29	0.22	0.43	0.51	0.50	0.93	0.49	0.32	0.58	0.31	0.35	0.58	0.69	0.72	0.73
4	0.19	0.57	0.84	0.85	0.90	1.24	1.59	1.21	0.62	1.14	1.25	0.58	0.48	0.79	0.92	0.96	1.67	1.03	0.57	0.98	0.77	0.79	1.06	1.19	1.25	1.28
5	0.19	0.70	1.04	0.95	1.33	1.44	1.91	1.67	0.92	1.75	1.88	0.97	0.70	1.20	1.31	1.45	2.27	1.34	1.00	1.39	1.24	1.24	1.57	1.76	1.84	1.91
6	0.19	0.83	1.08	1.15	1.58	1.78	2.33	2.00	1.28	2.24	2.21	1.32	0.96	1.49	1.72	1.81	2.85	1.61	1.39	1.75	1.66	1.67	2.05	2.27	2.37	2.45
7	0.26	0.89	1.16	1.22	1.85	2.15	2.66	2.28	1.56	2.55	2.53	1.58	1.19	1.84	2.11	2.02	3.34	1.92	1.72	2.08	2.06	2.06	2.48	2.73	2.84	2.92
8	0.26	1.08	1.16	1.38	2.08	2.56	2.92	2.49	1.72	2.80	2.76	1.76	1.34	2.12	2.38	2.35	3.56	2.13	1.97	2.34	2.35	2.38	2.81	3.06	3.18	3.26
9	0.26	1.14	1.32	1.46	2.36	3.07	3.15	2.57	1.86	3.02	2.96	1.90	1.48	2.31	2.55	2.60	3.73	2.31	2.19	2.59	2.58	2.66	3.11	3.35	3.46	3.55
10	0.26	1.14	1.45	1.70	2.71	3.41	3.44	2.67	1.97	3.15	3.08	2.04	1.60	2.48	2.82	2.82	3.90	2.50	2.43	2.86	2.83	2.92	3.41	3.61	3.72	3.83
11	0.26	1.27	1.77	1.80	3.07	3.60	3.55	2.77	2.04	3.25	3.11	2.13	1.67	2.65	3.02	2.98	4.01	2.66	2.62	3.09	3.02	3.13	3.64	3.79	3.91	4.02
12	0.32	1.27	1.81	2.07	3.37	3.78	3.69	2.81	2.08	3.27	3.14	2.18	1.79	2.84	3.21	3.14	4.13	2.84	2.84	3.36	3.24	3.36	3.86	4.01	4.14	4.26
13	0.32	1.27	1.93	2.24	3.56	3.93	3.78	2.84	2.12	3.29	3.19	2.29	1.93	3.02	3.40	3.30	4.24	3.00	3.03	3.62	3.47	3.57	4.09	4.23	4.34	4.48
14	0.32	1.27	2.01	2.38	3.64	4.09	3.86	2.87	2.14	3.33	3.26	2.39	2.04	3.19	3.55	3.44	4.32	3.13	3.18	3.86	3.66	3.77	4.30	4.41	4.52	4.66
15	0.32	1.33	2.17	2.48	3.72	4.15	3.90	2.87	2.16	3.40	3.31	2.47	2.14	3.32	3.67	3.55	4.38	3.23	3.30	4.04	3.80	3.93	4.46	4.55	4.66	4.82
16	0.32	1.33	2.21	2.51	3.81	4.19	3.94	2.89	2.21	3.46	3.36	2.53	2.22	3.44	3.77	3.62	4.43	3.31	3.39	4.19	3.91	4.08	4.60	4.67	4.77	4.94
17	0.39	1.33	2.25	2.55	3.81	4.20	3.94	2.94	2.26	3.51	3.40	2.58	2.28	3.54	3.85	3.68	4.47	3.36	3.46	4.31	4.01	4.20	4.72	4.75	4.85	5.03
18	0.39	1.46	2.25	2.58	3.83	4.22	3.99	2.98	2.29	3.55	3.44	2.63	2.34	3.62	3.92	3.73	4.49	3.41	3.50	4.41	4.09	4.29	4.82	4.81	4.92	5.10
19	0.39	1.46	2.29	2.61	3.89	4.27	4.04	3.01	2.32	3.58	3.46	2.66	2.38	3.68	3.97	3.76	4.52	3.44	3.54	4.48	4.15	4.35	4.87	4.86	4.97	5.16
20	0.39	1.46	2.29	2.61	3.98	4.31	4.08	3.04	2.35	3.61	3.49	2.69	2.42	3.74	4.02	3.79	4.54	3.47	3.56	4.54	4.21	4.40	4.92	4.90	5.02	5.20
21	0.39	1.46	2.34	2.72	4.05	4.35	4.12	3.06	2.37	3.64	3.51	2.71	2.45	3.78	4.06	3.82	4.56	3.50	3.58	4.60	4.26	4.44	4.96	4.93	5.05	5.24
22	0.45	1.46	2.46	2.81	4.09	4.38	4.15	3.07	2.39	3.66	3.53	2.73	2.47	3.81	4.09	3.84	4.56	3.51	3.59	4.64	4.30	4.48	5.00	4.96	5.08	5.27
23	0.45	1.52	2.56	2.90	4.12	4.42	4.18	3.09	2.41	3.69	3.55	2.75	2.50	3.83	4.11	3.86	4.57	3.52	3.60	4.68	4.34	4.52	5.03	4.99	5.11	5.30
24	0.50	1.57	2.65	2.95	4.15	4.45	4.19	3.10	2.43	3.71	3.56	2.76	2.52	3.86	4.12	3.88	4.57	3.52	3.60	4.70	4.38	4.55	5.05	5.01	5.14	5.33
25	0.53	1.62	2.69	3.00	4.18	4.48	4.20	3.11	2.44	3.73	3.58	2.78	2.54	3.88	4.13	3.90	4.57	3.53	3.61	4.73	4.41	4.57	5.08	5.03	5.16	5.35
26	0.56	1.65	2.72	3.05	4.20	4.50	4.21	3.12	2.45	3.74	3.59	2.79	2.56	3.90	4.13	3.90	4.57	3.53	3.61	4.75	4.44	4.60	5.10	5.05	5.18	5.37
27	0.59	1.68	2.75	3.09	4.22	4.52	4.22	3.13	2.46	3.76	3.60	2.80	2.57	3.92	4.14	3.91	4.57	3.53	3.61	4.77	4.47	4.62	5.12	5.06	5.19	5.38
28	0.61	1.71	2.78	3.13	4.24	4.55	4.23	3.14	2.47	3.77	3.61	2.80	2.59	3.93	4.14	3.91	4.58	3.53	3.62	4.79	4.50	4.65	5.14	5.06	5.19	5.38
29	0.63	1.73	2.80	3.14	4.26	4.57	4.23	3.14	2.47	3.78	3.62	2.81	2.60	3.95	4.14	3.91	4.58	3.53	3.62	4.81	4.52	4.67	5.16	5.06	5.19	5.38
30	0.64	1.75	2.81	3.15	4.28	4.59	4.24	3.15	2.48	3.80	3.62	2.81	2.61	3.96	4.15	3.91	4.58	3.53	3.62	4.83	4.53	4.69	5.16	5.06	5.19	5.38

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
65 - 80 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.01	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.06	0.05
2	0.06	0.17	0.07	0.06	0.10	0.26	0.60	0.98	0.14	0.39	0.21	0.19	0.28	0.20	0.16	0.16	0.13	0.07	0.12	0.11	0.13	0.02	0.16	0.20	0.21	0.19
3	0.28	0.32	0.20	0.18	0.35	0.74	2.28	2.39	0.64	1.34	1.16	1.07	0.78	0.73	0.57	0.57	0.67	0.63	0.53	0.47	0.57	0.39	0.61	0.63	0.64	0.62
4	0.50	0.53	0.34	0.33	0.49	1.65	3.50	3.79	1.38	2.84	2.64	2.08	1.42	1.37	1.19	1.09	1.29	1.20	1.12	1.08	1.01	0.88	1.26	1.25	1.29	1.27
5	0.69	0.71	0.36	0.46	0.91	2.17	4.85	4.85	2.27	4.15	3.62	2.87	2.03	2.19	1.81	1.75	1.85	1.86	1.67	1.49	1.43	1.39	1.92	1.90	1.96	1.94
6	0.74	0.97	0.39	0.60	1.21	2.92	5.81	5.69	3.26	5.09	4.35	3.53	2.57	2.78	2.36	2.24	2.32	2.54	1.97	1.83	1.79	1.82	2.48	2.44	2.51	2.48
7	0.78	0.99	0.42	0.74	1.38	3.48	6.99	6.52	3.93	5.83	4.88	4.12	3.02	3.28	2.85	2.59	2.66	2.81	2.21	2.13	2.12	2.22	3.00	2.92	2.99	2.95
8	0.81	1.01	0.49	1.00	1.77	4.08	7.89	6.88	4.37	6.25	5.30	4.56	3.39	3.68	3.19	2.94	2.98	3.10	2.52	2.49	2.50	2.68	3.60	3.48	3.56	3.50
9	0.91	1.07	0.59	1.11	2.07	4.80	8.33	7.10	4.70	6.60	5.59	4.90	3.66	3.95	3.45	3.29	3.24	3.35	2.79	2.82	2.85	3.10	4.12	3.96	4.03	3.97
10	0.98	1.11	0.64	1.31	2.46	5.42	8.60	7.28	4.99	6.88	5.78	5.15	3.87	4.18	3.79	3.59	3.48	3.59	3.05	3.15	3.19	3.50	4.61	4.40	4.47	4.41
11	1.07	1.18	0.71	1.49	2.74	5.74	8.84	7.40	5.15	7.06	5.94	5.38	4.04	4.46	4.09	3.86	3.69	3.82	3.30	3.48	3.52	3.88	5.06	4.81	4.89	4.83
12	1.11	1.28	0.75	1.61	3.04	6.00	9.05	7.50	5.28	7.16	6.06	5.51	4.22	4.70	4.36	4.11	3.89	4.04	3.55	3.80	3.83	4.24	5.50	5.20	5.28	5.23
13	1.13	1.32	0.80	1.69	3.27	6.18	9.22	7.61	5.36	7.28	6.17	5.59	4.36	4.91	4.59	4.32	4.06	4.22	3.75	4.07	4.10	4.54	5.86	5.52	5.60	5.56
14	1.17	1.39	0.89	1.72	3.42	6.37	9.26	7.67	5.42	7.31	6.26	5.67	4.50	5.13	4.82	4.53	4.23	4.40	3.95	4.34	4.36	4.85	6.22	5.83	5.92	5.89
15	1.17	1.39	0.92	1.86	3.56	6.47	9.29	7.70	5.44	7.40	6.33	5.74	4.62	5.32	5.02	4.72	4.37	4.55	4.12	4.58	4.60	5.11	6.52	6.10	6.19	6.16
16	1.26	1.41	0.98	1.90	3.68	6.50	9.36	7.73	5.49	7.47	6.39	5.79	4.72	5.48	5.19	4.87	4.48	4.68	4.26	4.79	4.79	5.33	6.78	6.31	6.41	6.39
17	1.26	1.43	1.03	1.97	3.75	6.58	9.37	7.79	5.54	7.53	6.43	5.83	4.80	5.61	5.32	4.98	4.57	4.78	4.37	4.95	4.96	5.51	6.98	6.49	6.59	6.57
18	1.26	1.47	1.05	2.00	3.83	6.62	9.41	7.84	5.57	7.58	6.47	5.87	4.87	5.72	5.43	5.08	4.65	4.86	4.47	5.10	5.10	5.66	7.15	6.63	6.74	6.71
19	1.30	1.49	1.06	2.03	3.85	6.65	9.45	7.87	5.61	7.63	6.50	5.90	4.92	5.81	5.52	5.16	4.72	4.93	4.55	5.22	5.21	5.78	7.29	6.75	6.86	6.83
20	1.30	1.49	1.07	2.03	3.91	6.68	9.48	7.90	5.64	7.67	6.52	5.92	4.97	5.89	5.60	5.22	4.77	4.99	4.61	5.32	5.31	5.89	7.41	6.85	6.96	6.94
21	1.31	1.49	1.07	2.11	3.97	6.71	9.50	7.93	5.66	7.71	6.54	5.94	5.01	5.96	5.67	5.28	4.82	5.05	4.67	5.42	5.39	5.99	7.52	6.93	7.05	7.03
22	1.31	1.49	1.16	2.18	4.03	6.73	9.52	7.95	5.68	7.74	6.56	5.96	5.04	6.02	5.73	5.33	4.86	5.10	4.72	5.51	5.47	6.08	7.61	7.00	7.12	7.11
23	1.31	1.53	1.23	2.25	4.08	6.76	9.54	7.97	5.71	7.76	6.58	5.98	5.06	6.07	5.79	5.38	4.90	5.14	4.76	5.58	5.55	6.16	7.69	7.05	7.19	7.17
24	1.34	1.56	1.30	2.32	4.14	6.78	9.56	7.98	5.73	7.78	6.59	5.99	5.09	6.12	5.84	5.42	4.93	5.17	4.79	5.66	5.62	6.23	7.77	7.09	7.23	7.23
25	1.36	1.60	1.36	2.39	4.19	6.80	9.58	8.00	5.74	7.80	6.61	6.00	5.11	6.16	5.89	5.46	4.96	5.21	4.81	5.73	5.67	6.30	7.83	7.13	7.27	7.28
26	1.39	1.63	1.40	2.44	4.23	6.82	9.60	8.01	5.76	7.82	6.62	6.01	5.13	6.21	5.93	5.50	4.98	5.24	4.83	5.79	5.71	6.36	7.88	7.16	7.31	7.33
27	1.41	1.65	1.42	2.50	4.28	6.84	9.61	8.02	5.78	7.83	6.63	6.03	5.14	6.25	5.97	5.54	4.99	5.27	4.85	5.85	5.74	6.41	7.94	7.19	7.33	7.36
28	1.43	1.68	1.44	2.55	4.32	6.86	9.62	8.03	5.79	7.85	6.64	6.04	5.16	6.28	6.01	5.57	5.01	5.28	4.86	5.91	5.77	6.46	7.99	7.21	7.36	7.38
29	1.45	1.71	1.46	2.60	4.36	6.88	9.62	8.04	5.81	7.86	6.65	6.05	5.17	6.32	6.04	5.60	5.02	5.30	4.88	5.96	5.80	6.50	8.03	7.24	7.38	7.41
30	1.46	1.71	1.48	2.63	4.40	6.90	9.63	8.05	5.82	7.87	6.67	6.05	5.18	6.35	6.07	5.63	5.03	5.31	4.89	6.00	5.83	6.54	8.07	7.26	7.41	7.43

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
80 - 90 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.02	0.02	0.00	0.01	0.01	0.00	0.02	0.05	0.01	0.01	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.02	0.02
2	0.22	0.24	0.12	0.13	0.14	0.30	0.68	1.30	0.29	0.54	0.62	0.24	0.24	0.30	0.25	0.20	0.25	0.17	0.15	0.14	0.24	0.11	0.18	0.18	0.18	0.18
3	0.49	0.54	0.38	0.36	0.58	1.05	2.51	3.26	1.32	3.10	2.65	1.29	0.99	1.05	0.96	0.88	1.02	0.80	0.72	0.67	1.08	0.60	0.76	0.74	0.78	0.81
4	0.83	0.85	0.57	0.65	0.96	1.88	4.52	5.40	2.69	5.76	5.41	2.70	1.89	2.08	1.99	1.89	1.99	1.67	1.46	1.53	1.74	1.28	1.63	1.65	1.77	1.85
5	1.03	1.13	0.67	0.90	1.36	2.72	6.26	7.24	4.37	8.43	7.49	4.00	2.82	3.18	3.09	2.75	2.81	2.52	2.42	2.18	2.38	2.00	2.60	2.70	2.89	3.03
6	1.19	1.27	0.80	1.11	1.67	3.40	7.88	8.91	5.97	10.21	8.86	5.18	3.74	4.17	4.06	3.47	3.45	3.40	2.91	2.70	2.93	2.64	3.47	3.58	3.83	3.98
7	1.29	1.37	0.89	1.34	2.02	4.26	9.34	9.90	7.20	11.31	9.80	6.13	4.50	4.93	4.80	3.98	4.01	3.84	3.28	3.14	3.40	3.21	4.21	4.32	4.60	4.74
8	1.38	1.49	0.99	1.51	2.47	5.20	10.78	10.48	7.94	12.06	10.56	6.85	5.13	5.55	5.32	4.44	4.37	4.16	3.56	3.51	3.80	3.68	4.83	4.89	5.17	5.28
9	1.47	1.55	1.04	1.67	2.98	6.25	11.62	10.80	8.49	12.64	11.08	7.44	5.60	5.99	5.72	4.78	4.65	4.43	3.81	3.86	4.17	4.12	5.37	5.36	5.63	5.73
10	1.56	1.64	1.14	1.87	3.42	7.01	12.28	11.05	8.93	13.07	11.45	7.85	5.99	6.40	6.09	5.07	4.90	4.70	4.07	4.24	4.54	4.55	5.90	5.80	6.06	6.16
11	1.59	1.74	1.23	2.15	3.91	7.61	12.79	11.22	9.27	13.32	11.64	8.13	6.31	6.71	6.37	5.29	5.11	4.93	4.29	4.57	4.87	4.92	6.32	6.15	6.41	6.51
12	1.61	1.78	1.32	2.33	4.32	8.08	13.16	11.40	9.48	13.54	11.74	8.36	6.53	6.96	6.60	5.48	5.28	5.13	4.49	4.86	5.14	5.22	6.67	6.44	6.70	6.81
13	1.65	1.86	1.41	2.49	4.66	8.43	13.41	11.51	9.62	13.67	11.86	8.47	6.68	7.14	6.76	5.62	5.41	5.29	4.64	5.08	5.34	5.45	6.93	6.65	6.91	7.04
14	1.72	1.92	1.52	2.57	4.88	8.63	13.58	11.54	9.68	13.78	11.97	8.57	6.82	7.31	6.93	5.76	5.54	5.43	4.78	5.29	5.53	5.66	7.18	6.85	7.11	7.25
15	1.76	1.98	1.59	2.65	5.10	8.80	13.69	11.62	9.75	13.90	12.05	8.65	6.94	7.47	7.06	5.87	5.64	5.55	4.89	5.46	5.68	5.84	7.38	7.01	7.28	7.42
16	1.81	2.05	1.69	2.72	5.25	8.96	13.75	11.66	9.84	14.00	12.12	8.71	7.05	7.59	7.18	5.96	5.72	5.64	4.97	5.61	5.81	5.99	7.55	7.14	7.41	7.57
17	1.85	2.09	1.73	2.78	5.32	9.04	13.80	11.77	9.90	14.08	12.18	8.76	7.13	7.70	7.27	6.03	5.78	5.71	5.04	5.72	5.91	6.10	7.68	7.24	7.52	7.68
18	1.87	2.14	1.80	2.81	5.40	9.11	13.89	11.84	9.96	14.14	12.22	8.81	7.20	7.79	7.34	6.09	5.82	5.76	5.09	5.82	6.00	6.20	7.79	7.32	7.61	7.77
19	1.89	2.17	1.82	2.85	5.45	9.16	13.97	11.90	10.00	14.19	12.27	8.84	7.25	7.86	7.40	6.13	5.86	5.80	5.13	5.89	6.07	6.28	7.87	7.39	7.67	7.84
20	1.89	2.22	1.85	2.89	5.50	9.19	14.02	11.94	10.04	14.24	12.30	8.87	7.29	7.91	7.45	6.17	5.89	5.84	5.17	5.96	6.13	6.34	7.95	7.45	7.73	7.90
21	1.92	2.23	1.87	2.94	5.55	9.23	14.05	11.98	10.08	14.28	12.32	8.89	7.33	7.96	7.49	6.20	5.92	5.87	5.20	6.02	6.18	6.40	8.01	7.49	7.78	7.96
22	1.95	2.23	1.92	2.99	5.59	9.25	14.08	12.01	10.11	14.32	12.34	8.91	7.36	8.00	7.53	6.23	5.94	5.90	5.22	6.07	6.23	6.45	8.06	7.53	7.82	8.00
23	1.96	2.28	1.97	3.03	5.63	9.28	14.10	12.04	10.14	14.35	12.36	8.93	7.38	8.04	7.56	6.25	5.96	5.92	5.25	6.11	6.27	6.49	8.11	7.57	7.86	8.04
24	2.00	2.32	2.01	3.08	5.67	9.30	14.12	12.06	10.17	14.37	12.37	8.94	7.40	8.07	7.59	6.28	5.98	5.94	5.27	6.15	6.30	6.53	8.15	7.60	7.89	8.07
25	2.04	2.37	2.06	3.12	5.70	9.32	14.14	12.08	10.19	14.39	12.38	8.96	7.42	8.10	7.62	6.30	6.00	5.96	5.29	6.19	6.34	6.56	8.18	7.63	7.92	8.10
26	2.08	2.41	2.10	3.16	5.73	9.34	14.16	12.09	10.22	14.41	12.40	8.97	7.44	8.13	7.64	6.32	6.02	5.97	5.30	6.22	6.36	6.59	8.21	7.65	7.94	8.13
27	2.12	2.46	2.14	3.19	5.76	9.36	14.17	12.11	10.24	14.42	12.41	8.98	7.45	8.15	7.67	6.34	6.03	5.99	5.32	6.24	6.39	6.61	8.24	7.67	7.97	8.15
28	2.16	2.50	2.17	3.23	5.79	9.38	14.18	12.12	10.26	14.44	12.42	8.99	7.46	8.17	7.69	6.35	6.04	6.00	5.33	6.27	6.42	6.64	8.26	7.69	7.99	8.17
29	2.19	2.54	2.20	3.26	5.81	9.39	14.19	12.13	10.27	14.45	12.42	9.00	7.47	8.19	7.71	6.37	6.06	6.02	5.34	6.29	6.44	6.66	8.29	7.71	8.01	8.19
30	2.23	2.58	2.24	3.29	5.84	9.41	14.20	12.14	10.29	14.46	12.43	9.00	7.48	8.21	7.73	6.39	6.07	6.03	5.36	6.31	6.46	6.68	8.30	7.72	8.02	8.21

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
90 - 93 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.02	0.01	0.01	0.02	0.00	0.01	0.05	0.06	0.02	0.05	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02
2	0.28	0.30	0.20	0.20	0.18	0.61	1.16	1.66	0.70	0.84	0.55	0.35	0.24	0.28	0.20	0.17	0.24	0.19	0.17	0.14	0.20	0.16	0.19	0.18	0.18	0.18
3	0.84	0.78	0.52	0.51	0.87	1.58	3.54	4.54	2.04	2.82	2.64	1.72	1.03	1.14	0.88	0.95	1.16	0.84	0.73	0.75	1.04	0.67	0.78	0.78	0.83	0.88
4	1.31	1.19	0.67	0.73	1.29	2.83	5.71	7.41	3.85	5.81	5.68	3.52	2.09	2.35	2.07	2.15	2.31	1.81	1.55	1.71	1.73	1.35	1.67	1.75	1.92	2.03
5	1.63	1.43	0.84	0.96	1.86	3.95	8.00	10.20	6.12	8.59	8.13	5.26	3.24	3.69	3.25	3.31	3.25	2.69	2.52	2.39	2.40	2.08	2.67	2.85	3.13	3.32
6	1.84	1.57	0.96	1.17	2.50	5.12	9.97	12.57	8.47	10.52	9.65	6.72	4.31	4.90	4.39	4.17	3.98	3.62	3.01	2.90	2.94	2.71	3.55	3.75	4.13	4.34
7	1.97	1.70	1.10	1.42	3.04	6.22	12.01	14.03	9.98	11.81	10.83	8.04	5.22	5.95	5.26	4.76	4.58	4.10	3.39	3.34	3.43	3.30	4.34	4.54	4.97	5.15
8	2.07	1.81	1.19	1.59	3.52	7.58	13.92	14.91	10.97	12.60	11.77	9.10	6.08	6.68	5.84	5.23	4.94	4.43	3.68	3.72	3.84	3.80	5.01	5.16	5.59	5.74
9	2.15	1.92	1.29	1.88	4.16	8.90	15.00	15.46	11.78	13.23	12.60	9.96	6.66	7.24	6.31	5.63	5.25	4.74	3.95	4.12	4.26	4.30	5.64	5.70	6.12	6.25
10	2.23	1.98	1.39	2.18	5.00	9.90	15.85	15.64	12.38	13.71	13.04	10.52	7.16	7.71	6.69	5.93	5.49	4.98	4.17	4.45	4.60	4.70	6.12	6.08	6.49	6.62
11	2.29	2.07	1.48	2.51	5.64	10.74	16.42	15.90	12.72	14.00	13.34	10.98	7.51	8.03	6.99	6.18	5.68	5.20	4.37	4.77	4.90	5.05	6.52	6.39	6.80	6.92
12	2.36	2.12	1.68	2.74	6.17	11.27	16.84	15.95	13.09	14.21	13.55	11.35	7.76	8.30	7.24	6.39	5.87	5.43	4.58	5.09	5.20	5.39	6.91	6.69	7.11	7.24
13	2.43	2.22	1.75	3.02	6.56	11.69	17.08	16.03	13.29	14.37	13.69	11.54	7.93	8.50	7.43	6.56	6.01	5.60	4.75	5.34	5.42	5.64	7.19	6.92	7.34	7.48
14	2.50	2.32	1.88	3.15	6.85	12.10	17.39	16.14	13.42	14.46	13.83	11.70	8.09	8.69	7.60	6.72	6.14	5.76	4.89	5.56	5.61	5.86	7.45	7.11	7.55	7.70
15	2.56	2.44	1.95	3.28	7.04	12.38	17.52	16.23	13.51	14.62	13.93	11.82	8.22	8.84	7.75	6.84	6.25	5.88	5.00	5.74	5.76	6.04	7.66	7.27	7.71	7.87
16	2.59	2.50	1.98	3.41	7.25	12.56	17.68	16.28	13.63	14.75	14.01	11.92	8.33	8.98	7.87	6.95	6.33	5.98	5.08	5.88	5.89	6.19	7.83	7.40	7.85	8.01
17	2.63	2.58	2.07	3.53	7.36	12.68	17.72	16.42	13.72	14.84	14.08	12.00	8.42	9.09	7.97	7.02	6.39	6.05	5.15	6.00	5.99	6.31	7.96	7.50	7.95	8.12
18	2.67	2.63	2.10	3.62	7.43	12.74	17.82	16.51	13.80	14.92	14.12	12.07	8.49	9.17	8.04	7.08	6.44	6.10	5.20	6.09	6.08	6.41	8.07	7.59	8.04	8.21
19	2.67	2.71	2.14	3.65	7.53	12.81	17.90	16.58	13.87	14.98	14.16	12.12	8.55	9.25	8.10	7.13	6.48	6.15	5.24	6.17	6.15	6.49	8.16	7.65	8.10	8.28
20	2.70	2.75	2.17	3.70	7.60	12.87	17.96	16.63	13.92	15.03	14.20	12.17	8.60	9.30	8.14	7.17	6.51	6.19	5.28	6.24	6.21	6.56	8.24	7.71	8.16	8.34
21	2.70	2.78	2.21	3.75	7.66	12.92	18.02	16.68	13.98	15.08	14.23	12.20	8.64	9.35	8.18	7.20	6.54	6.22	5.31	6.30	6.26	6.61	8.30	7.75	8.21	8.39
22	2.73	2.79	2.25	3.80	7.71	12.96	18.06	16.71	14.02	15.12	14.25	12.23	8.67	9.39	8.22	7.23	6.56	6.25	5.33	6.35	6.30	6.66	8.35	7.79	8.25	8.43
23	2.74	2.83	2.29	3.85	7.76	13.00	18.10	16.75	14.06	15.15	14.27	12.26	8.70	9.43	8.25	7.25	6.58	6.27	5.36	6.39	6.34	6.71	8.40	7.83	8.28	8.47
24	2.78	2.87	2.33	3.89	7.81	13.03	18.13	16.77	14.10	15.18	14.28	12.28	8.72	9.46	8.28	7.27	6.60	6.29	5.38	6.43	6.38	6.74	8.44	7.86	8.32	8.50
25	2.82	2.91	2.36	3.92	7.85	13.06	18.16	16.80	14.13	15.21	14.30	12.30	8.74	9.48	8.30	7.29	6.62	6.31	5.40	6.47	6.41	6.78	8.48	7.89	8.34	8.52
26	2.85	2.95	2.39	3.96	7.88	13.09	18.19	16.82	14.16	15.23	14.31	12.31	8.75	9.51	8.33	7.31	6.64	6.33	5.41	6.50	6.44	6.81	8.51	7.91	8.37	8.55
27	2.89	2.99	2.42	3.99	7.92	13.12	18.21	16.83	14.19	15.25	14.32	12.33	8.77	9.53	8.35	7.33	6.66	6.35	5.43	6.53	6.47	6.83	8.54	7.94	8.39	8.57
28	2.92	3.02	2.45	4.02	7.95	13.14	18.23	16.85	14.22	15.26	14.33	12.34	8.78	9.55	8.37	7.34	6.67	6.36	5.44	6.55	6.49	6.86	8.56	7.96	8.41	8.58
29	2.95	3.06	2.48	4.05	7.99	13.17	18.24	16.86	14.24	15.28	14.33	12.35	8.80	9.57	8.39	7.36	6.69	6.37	5.46	6.58	6.51	6.88	8.58	7.98	8.43	8.60
30	2.98	3.09	2.51	4.08	8.02	13.19	18.26	16.87	14.26	15.29	14.34	12.37	8.81	9.59	8.41	7.37	6.70	6.39	5.47	6.60	6.54	6.90	8.60	7.99	8.44	8.62

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
93 - 95 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.04	0.03	0.01	0.03	0.01	0.01	0.05	0.09	0.02	0.04	0.02	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01
2	0.34	0.38	0.19	0.31	0.26	0.62	1.06	1.59	0.54	0.87	0.70	0.35	0.32	0.35	0.26	0.22	0.27	0.18	0.13	0.16	0.23	0.18	0.20	0.19	0.19	0.19
3	0.97	0.79	0.57	0.66	0.95	1.79	3.86	4.97	2.11	3.01	2.96	1.80	1.25	1.28	1.16	1.14	1.23	0.81	0.67	0.79	1.06	0.70	0.82	0.79	0.84	0.88
4	1.49	1.18	0.85	1.01	1.74	3.27	6.07	8.52	4.28	5.98	6.22	3.80	2.41	2.62	2.53	2.50	2.47	1.73	1.51	1.65	1.77	1.40	1.74	1.79	1.97	2.06
5	1.86	1.40	1.06	1.33	2.49	4.55	8.53	11.70	6.97	9.12	9.02	5.65	3.54	4.15	4.04	3.77	3.43	2.56	2.44	2.33	2.45	2.14	2.76	2.92	3.23	3.39
6	2.13	1.56	1.19	1.60	3.20	5.83	11.06	14.56	9.57	11.40	11.04	7.40	4.85	5.42	5.30	4.63	4.19	3.38	2.96	2.87	3.02	2.81	3.71	3.91	4.31	4.49
7	2.33	1.68	1.38	1.82	3.86	7.03	13.80	16.36	11.40	12.75	12.48	8.89	6.00	6.59	6.21	5.27	4.88	3.90	3.36	3.34	3.56	3.46	4.60	4.81	5.27	5.40
8	2.41	1.87	1.51	2.08	4.47	8.50	15.91	17.32	12.66	13.85	13.63	10.11	6.97	7.41	6.90	5.85	5.34	4.31	3.72	3.81	4.08	4.07	5.44	5.62	6.09	6.19
9	2.50	1.98	1.64	2.32	5.16	9.81	17.06	17.94	13.58	14.62	14.40	11.08	7.67	8.02	7.45	6.27	5.69	4.65	4.05	4.24	4.55	4.64	6.17	6.29	6.75	6.81
10	2.59	2.00	1.76	2.60	5.96	11.02	17.84	18.29	14.19	15.07	14.98	11.78	8.28	8.49	7.85	6.58	5.93	4.89	4.26	4.57	4.89	5.03	6.65	6.68	7.14	7.19
11	2.65	2.06	1.89	2.92	6.64	11.85	18.46	18.71	14.74	15.53	15.43	12.33	8.83	8.92	8.20	6.87	6.17	5.14	4.48	4.91	5.24	5.42	7.12	7.06	7.51	7.56
12	2.74	2.17	2.05	3.12	7.18	12.52	19.02	19.01	15.12	15.77	15.71	12.74	9.14	9.27	8.50	7.12	6.39	5.38	4.70	5.26	5.57	5.78	7.55	7.41	7.87	7.93
13	2.83	2.26	2.18	3.38	7.54	13.04	19.39	19.17	15.39	16.02	15.85	12.93	9.35	9.52	8.71	7.30	6.55	5.56	4.87	5.51	5.80	6.04	7.86	7.66	8.13	8.19
14	2.89	2.35	2.31	3.59	7.91	13.40	19.68	19.25	15.57	16.11	16.00	13.07	9.52	9.73	8.90	7.46	6.68	5.71	5.00	5.72	5.99	6.25	8.11	7.87	8.34	8.41
15	2.97	2.43	2.42	3.74	8.21	13.72	19.97	19.38	15.73	16.30	16.11	13.19	9.67	9.91	9.05	7.59	6.79	5.83	5.10	5.89	6.15	6.43	8.32	8.03	8.52	8.59
16	3.03	2.47	2.50	3.84	8.42	14.01	20.05	19.46	15.87	16.44	16.20	13.28	9.79	10.06	9.18	7.70	6.88	5.92	5.18	6.02	6.27	6.57	8.49	8.17	8.66	8.74
17	3.08	2.55	2.54	3.99	8.54	14.12	20.17	19.64	15.98	16.55	16.27	13.36	9.89	10.19	9.28	7.77	6.94	5.99	5.24	6.13	6.37	6.68	8.62	8.27	8.77	8.85
18	3.12	2.60	2.60	4.05	8.69	14.20	20.29	19.76	16.07	16.63	16.33	13.42	9.97	10.29	9.35	7.83	6.99	6.04	5.29	6.22	6.45	6.77	8.73	8.36	8.85	8.94
19	3.21	2.63	2.62	4.07	8.77	14.27	20.38	19.84	16.15	16.71	16.37	13.47	10.04	10.37	9.41	7.88	7.03	6.08	5.33	6.29	6.52	6.85	8.82	8.42	8.92	9.01
20	3.24	2.68	2.64	4.09	8.84	14.33	20.45	19.91	16.22	16.77	16.40	13.51	10.09	10.43	9.46	7.92	7.06	6.12	5.36	6.35	6.58	6.91	8.89	8.48	8.98	9.07
21	3.28	2.70	2.67	4.14	8.90	14.38	20.51	19.97	16.28	16.82	16.43	13.54	10.13	10.48	9.50	7.95	7.09	6.14	5.39	6.41	6.62	6.96	8.95	8.52	9.03	9.12
22	3.29	2.73	2.70	4.18	8.95	14.43	20.56	20.01	16.33	16.87	16.45	13.57	10.17	10.53	9.54	7.97	7.11	6.17	5.41	6.45	6.67	7.01	9.00	8.56	9.07	9.16
23	3.30	2.76	2.74	4.22	9.00	14.47	20.61	20.05	16.38	16.91	16.47	13.59	10.20	10.56	9.57	8.00	7.13	6.19	5.43	6.49	6.70	7.04	9.04	8.60	9.10	9.20
24	3.33	2.80	2.77	4.26	9.04	14.51	20.64	20.09	16.42	16.94	16.49	13.61	10.22	10.60	9.59	8.02	7.15	6.21	5.45	6.52	6.73	7.07	9.08	8.63	9.13	9.22
25	3.37	2.83	2.79	4.29	9.08	14.54	20.68	20.11	16.46	16.97	16.50	13.63	10.24	10.63	9.62	8.04	7.17	6.22	5.46	6.55	6.76	7.10	9.11	8.65	9.16	9.25
26	3.40	2.86	2.82	4.32	9.12	14.57	20.70	20.14	16.50	16.99	16.52	13.64	10.26	10.65	9.64	8.05	7.18	6.24	5.48	6.58	6.78	7.13	9.14	8.67	9.18	9.27
27	3.43	2.89	2.85	4.35	9.15	14.60	20.72	20.16	16.53	17.02	16.53	13.66	10.28	10.67	9.66	8.07	7.20	6.25	5.49	6.60	6.81	7.15	9.16	8.69	9.20	9.29
28	3.46	2.92	2.87	4.38	9.18	14.63	20.74	20.18	16.57	17.03	16.54	13.67	10.29	10.69	9.68	8.08	7.21	6.26	5.50	6.62	6.83	7.17	9.18	8.71	9.22	9.31
29	3.49	2.94	2.89	4.40	9.21	14.65	20.76	20.19	16.59	17.05	16.54	13.68	10.31	10.71	9.69	8.09	7.22	6.27	5.51	6.64	6.85	7.19	9.20	8.72	9.24	9.32
30	3.52	2.97	2.91	4.43	9.24	14.68	20.77	20.20	16.61	17.07	16.55	13.69	10.32	10.73	9.71	8.11	7.24	6.28	5.52	6.66	6.86	7.20	9.22	8.74	9.25	9.34

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
95 - 97 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.03	0.01	0.02	0.03	0.02	0.03	0.06	0.15	0.03	0.06	0.03	0.02	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01
2	0.46	0.44	0.32	0.35	0.38	0.79	1.45	2.29	0.65	1.29	0.98	0.54	0.47	0.49	0.37	0.32	0.32	0.20	0.19	0.22	0.26	0.19	0.25	0.22	0.22	0.22
3	1.21	1.02	0.83	0.79	1.22	2.21	4.91	6.26	2.78	4.44	4.18	2.42	1.78	1.76	1.54	1.47	1.41	0.93	0.79	0.90	1.20	0.81	1.00	0.93	0.99	1.02
4	1.88	1.50	1.21	1.24	1.96	3.93	8.07	10.86	5.70	8.73	8.34	4.74	3.30	3.35	3.21	2.98	2.71	1.88	1.65	1.94	1.97	1.61	2.04	2.03	2.21	2.29
5	2.30	1.81	1.49	1.59	2.74	5.51	11.03	15.49	9.22	12.74	11.65	7.02	4.82	5.15	4.74	4.38	3.78	2.77	2.66	2.70	2.71	2.47	3.21	3.27	3.57	3.72
6	2.61	2.05	1.69	2.05	3.55	7.03	13.83	18.91	12.78	15.41	14.07	9.02	6.26	6.62	6.13	5.40	4.61	3.67	3.22	3.31	3.34	3.23	4.27	4.33	4.72	4.88
7	2.80	2.23	1.93	2.45	4.34	8.63	16.58	21.36	16.22	17.22	15.81	10.76	7.45	7.86	7.09	6.14	5.29	4.19	3.65	3.83	3.90	3.93	5.21	5.24	5.69	5.81
8	2.93	2.41	2.13	2.82	5.18	10.31	19.06	22.63	16.86	18.43	17.12	12.14	8.49	8.81	7.83	6.75	5.73	4.59	4.02	4.31	4.42	4.58	6.07	6.03	6.49	6.57
9	3.09	2.60	2.31	3.13	6.12	12.15	20.61	23.40	18.11	19.41	18.09	13.16	9.29	9.49	8.43	7.24	6.08	4.94	4.35	4.78	4.91	5.18	6.84	6.69	7.15	7.19
10	3.21	2.73	2.48	3.53	7.05	13.47	21.77	23.82	19.06	20.02	18.72	13.94	9.88	10.01	8.90	7.62	6.35	5.22	4.60	5.18	5.30	5.67	7.43	7.16	7.61	7.64
11	3.32	2.84	2.68	3.97	7.82	14.50	22.55	24.17	19.72	20.54	19.17	14.48	10.41	10.44	9.30	7.94	6.58	5.48	4.84	5.56	5.66	6.09	7.93	7.55	8.01	8.03
12	3.42	2.98	2.91	4.32	8.50	15.23	23.10	24.40	20.24	20.86	19.45	14.98	10.69	10.77	9.60	8.19	6.76	5.67	5.01	5.85	5.92	6.40	8.30	7.82	8.29	8.31
13	3.52	3.13	3.10	4.63	9.09	15.87	23.65	24.57	20.57	21.05	19.66	15.18	10.90	11.02	9.83	8.39	6.91	5.83	5.14	6.08	6.12	6.64	8.58	8.03	8.51	8.53
14	3.59	3.26	3.24	4.90	9.53	16.43	23.93	24.72	20.75	21.20	19.81	15.33	11.05	11.22	10.01	8.55	7.02	5.95	5.24	6.25	6.28	6.83	8.79	8.20	8.68	8.70
15	3.69	3.37	3.36	5.09	9.87	16.81	24.24	24.82	20.92	21.40	19.93	15.45	11.19	11.39	10.17	8.68	7.11	6.05	5.32	6.40	6.40	6.98	8.98	8.33	8.82	8.84
16	3.78	3.46	3.45	5.25	10.14	17.05	24.40	24.88	21.07	21.56	20.02	15.54	11.30	11.53	10.30	8.79	7.19	6.12	5.39	6.52	6.51	7.11	9.12	8.44	8.93	8.96
17	3.84	3.53	3.57	5.35	10.32	17.21	24.56	25.05	21.19	21.70	20.11	15.62	11.40	11.65	10.41	8.87	7.24	6.18	5.44	6.61	6.59	7.21	9.24	8.53	9.02	9.05
18	3.91	3.60	3.65	5.46	10.48	17.34	24.73	25.17	21.28	21.82	20.18	15.69	11.48	11.75	10.49	8.94	7.29	6.22	5.47	6.69	6.66	7.30	9.34	8.60	9.10	9.12
19	3.96	3.64	3.72	5.53	10.58	17.43	24.87	25.26	21.37	21.91	20.24	15.74	11.54	11.83	10.55	8.99	7.32	6.26	5.50	6.76	6.71	7.37	9.42	8.65	9.16	9.18
20	3.99	3.69	3.75	5.58	10.65	17.50	24.98	25.34	21.44	22.00	20.29	15.79	11.60	11.89	10.60	9.03	7.35	6.29	5.53	6.82	6.76	7.42	9.49	8.70	9.21	9.23
21	4.01	3.71	3.77	5.64	10.72	17.56	25.08	25.40	21.50	22.08	20.34	15.82	11.64	11.95	10.65	9.06	7.38	6.32	5.55	6.86	6.80	7.47	9.54	8.74	9.25	9.27
22	4.03	3.73	3.81	5.69	10.77	17.62	25.16	25.45	21.56	22.15	20.38	15.86	11.67	11.99	10.69	9.09	7.40	6.34	5.57	6.91	6.84	7.51	9.59	8.77	9.28	9.30
23	4.04	3.76	3.84	5.73	10.82	17.67	25.24	25.50	21.62	22.20	20.42	15.88	11.70	12.03	10.72	9.12	7.42	6.36	5.59	6.94	6.87	7.55	9.63	8.80	9.31	9.33
24	4.07	3.79	3.88	5.77	10.87	17.72	25.31	25.54	21.66	22.25	20.45	15.90	11.73	12.07	10.75	9.14	7.43	6.37	5.60	6.97	6.89	7.58	9.67	8.82	9.34	9.36
25	4.10	3.82	3.90	5.80	10.91	17.76	25.36	25.57	21.71	22.30	20.48	15.92	11.75	12.10	10.77	9.16	7.45	6.39	5.61	7.00	6.92	7.61	9.70	8.85	9.36	9.38
26	4.13	3.84	3.93	5.84	10.94	17.80	25.41	25.60	21.75	22.34	20.50	15.94	11.77	12.13	10.79	9.18	7.46	6.40	5.62	7.03	6.94	7.64	9.73	8.87	9.38	9.40
27	4.16	3.87	3.96	5.87	10.98	17.83	25.45	25.63	21.78	22.37	20.53	15.96	11.79	12.15	10.82	9.19	7.47	6.41	5.63	7.05	6.96	7.66	9.75	8.88	9.40	9.41
28	4.18	3.89	3.98	5.89	11.01	17.86	25.49	25.65	21.82	22.40	20.55	15.97	11.81	12.17	10.83	9.21	7.49	6.42	5.64	7.07	6.98	7.68	9.77	8.90	9.41	9.43
29	4.21	3.91	4.00	5.92	11.04	17.89	25.53	25.68	21.85	22.44	20.57	15.99	11.82	12.19	10.85	9.22	7.50	6.43	5.65	7.09	6.99	7.69	9.79	8.91	9.43	9.44
30	4.23	3.93	4.02	5.94	11.06	17.92	25.56	25.69	21.88	22.46	20.59	16.00	11.83	12.21	10.87	9.23	7.51	6.44	5.65	7.10	7.00	7.71	9.81	8.92	9.44	9.45

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
97 - 100 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.08	0.09	0.06	0.04	0.03	0.05	0.20	0.30	0.06	0.07	0.04	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2	1.19	1.18	0.73	0.57	0.65	1.47	2.90	4.34	1.20	1.80	1.27	0.73	0.59	0.61	0.55	0.48	0.48	0.35	0.21	0.21	0.37	0.20	0.34	0.29	0.29	0.29
3	2.74	2.36	1.52	1.32	1.84	3.71	8.57	10.24	4.26	5.83	5.14	3.07	2.13	2.16	2.10	1.95	1.85	1.38	0.85	0.94	1.40	0.89	1.18	1.10	1.18	1.24
4	3.81	3.14	2.05	1.95	2.88	6.14	12.90	16.11	7.94	10.89	9.99	5.88	3.89	4.06	4.01	3.81	3.37	2.67	1.69	1.99	2.17	1.66	2.24	2.20	2.44	2.55
5	4.43	3.51	2.45	2.44	4.06	8.20	16.87	21.18	11.93	15.54	13.69	8.37	5.53	6.03	5.75	5.44	4.62	3.64	2.68	2.65	2.81	2.41	3.31	3.32	3.70	3.88
6	4.75	3.79	2.77	3.00	5.05	10.12	20.10	24.70	15.75	18.60	16.14	10.46	7.07	7.67	7.21	6.60	5.55	4.54	3.18	3.16	3.36	3.08	4.29	4.31	4.81	4.99
7	4.97	4.02	3.11	3.44	5.99	11.89	23.00	27.06	18.23	20.54	17.88	12.13	8.37	9.00	8.32	7.45	6.38	5.11	3.55	3.60	3.85	3.71	5.19	5.18	5.74	5.89
8	5.12	4.25	3.35	3.85	6.97	13.81	25.44	28.30	19.84	21.86	19.16	13.43	9.49	10.00	9.13	8.16	6.82	5.57	3.89	4.04	4.32	4.31	6.04	5.97	6.54	6.66
9	5.33	4.46	3.62	4.31	7.97	15.75	27.08	29.04	21.02	22.85	20.08	14.46	10.38	10.74	9.80	8.78	7.17	5.98	4.21	4.46	4.77	4.89	6.81	6.62	7.20	7.29
10	5.49	4.63	3.87	4.77	9.15	17.25	28.21	29.59	21.95	23.56	20.73	15.25	11.05	11.36	10.37	9.25	7.43	6.30	4.44	4.81	5.13	5.34	7.38	7.06	7.64	7.73
11	5.66	4.80	4.14	5.34	10.14	18.43	29.06	29.94	22.59	24.11	21.22	15.82	11.66	11.83	10.84	9.66	7.67	6.61	4.66	5.16	5.47	5.75	7.88	7.43	8.02	8.12
12	5.79	4.97	4.46	5.90	10.90	19.38	29.64	30.16	23.05	24.48	21.52	16.30	11.93	12.17	11.21	9.99	7.86	6.88	4.85	5.46	5.74	6.08	8.27	7.73	8.34	8.44
13	5.93	5.16	4.80	6.34	11.58	20.11	30.06	30.43	23.38	24.77	21.77	16.52	12.14	12.46	11.51	10.27	8.03	7.11	5.01	5.71	5.96	6.35	8.60	7.97	8.59	8.70
14	6.09	5.36	5.11	6.72	12.13	20.71	30.41	30.62	23.59	24.97	21.90	16.69	12.30	12.69	11.76	10.51	8.17	7.29	5.14	5.91	6.13	6.56	8.86	8.15	8.80	8.92
15	6.25	5.57	5.36	7.00	12.55	21.18	30.69	30.72	23.78	25.14	22.00	16.82	12.44	12.88	11.97	10.70	8.28	7.44	5.23	6.07	6.27	6.74	9.07	8.30	8.96	9.09
16	6.40	5.72	5.58	7.22	12.87	21.50	30.85	30.80	23.90	25.26	22.08	16.92	12.56	13.04	12.14	10.86	8.36	7.56	5.31	6.20	6.38	6.88	9.24	8.42	9.09	9.23
17	6.50	5.86	5.73	7.41	13.12	21.70	30.99	30.93	23.99	25.36	22.15	17.00	12.65	13.17	12.27	10.97	8.41	7.64	5.36	6.29	6.46	6.99	9.37	8.51	9.19	9.34
18	6.60	5.98	5.83	7.54	13.28	21.85	31.14	31.01	24.06	25.44	22.20	17.07	12.72	13.27	12.36	11.05	8.46	7.71	5.40	6.37	6.53	7.07	9.48	8.58	9.27	9.42
19	6.69	6.05	5.91	7.63	13.40	21.94	31.27	31.07	24.12	25.51	22.24	17.12	12.78	13.35	12.43	11.12	8.49	7.76	5.44	6.44	6.58	7.14	9.56	8.64	9.33	9.48
20	6.77	6.11	5.99	7.71	13.48	22.02	31.37	31.12	24.17	25.57	22.28	17.16	12.83	13.41	12.49	11.17	8.52	7.80	5.46	6.49	6.63	7.20	9.63	8.68	9.38	9.54
21	6.83	6.15	6.04	7.76	13.55	22.08	31.45	31.16	24.21	25.62	22.31	17.19	12.86	13.46	12.53	11.21	8.54	7.84	5.49	6.53	6.66	7.25	9.68	8.72	9.42	9.58
22	6.85	6.17	6.09	7.81	13.61	22.14	31.52	31.19	24.25	25.66	22.34	17.22	12.89	13.50	12.57	11.24	8.55	7.87	5.50	6.57	6.70	7.29	9.73	8.75	9.45	9.61
23	6.87	6.21	6.12	7.85	13.66	22.19	31.59	31.22	24.29	25.71	22.37	17.24	12.92	13.54	12.60	11.27	8.57	7.90	5.52	6.60	6.72	7.32	9.77	8.77	9.48	9.64
24	6.90	6.24	6.16	7.89	13.70	22.23	31.65	31.25	24.32	25.74	22.39	17.26	12.94	13.56	12.63	11.29	8.58	7.92	5.53	6.63	6.75	7.35	9.80	8.79	9.50	9.67
25	6.93	6.26	6.19	7.92	13.74	22.27	31.70	31.27	24.34	25.78	22.42	17.27	12.95	13.59	12.65	11.31	8.59	7.94	5.54	6.65	6.77	7.38	9.83	8.81	9.52	9.69
26	6.96	6.29	6.21	7.95	13.78	22.30	31.75	31.28	24.37	25.81	22.44	17.29	12.97	13.61	12.67	11.33	8.60	7.96	5.56	6.67	6.78	7.40	9.86	8.83	9.54	9.70
27	6.98	6.31	6.24	7.98	13.81	22.34	31.79	31.30	24.39	25.84	22.46	17.30	12.98	13.63	12.69	11.34	8.61	7.97	5.56	6.69	6.80	7.42	9.88	8.84	9.55	9.72
28	7.00	6.33	6.26	8.00	13.84	22.36	31.83	31.31	24.41	25.86	22.47	17.31	12.99	13.65	12.70	11.35	8.62	7.99	5.57	6.71	6.81	7.43	9.90	8.85	9.56	9.73
29	7.02	6.35	6.28	8.02	13.86	22.39	31.87	31.32	24.43	25.89	22.49	17.32	13.00	13.66	12.72	11.37	8.62	8.00	5.58	6.72	6.83	7.45	9.91	8.86	9.57	9.74
30	7.03	6.37	6.30	8.04	13.88	22.41	31.90	31.33	24.45	25.91	22.51	17.33	13.01	13.67	12.73	11.38	8.63	8.01	5.59	6.74	6.84	7.46	9.93	8.87	9.58	9.75

= Actual Experience

Summary of Cumulative Claim Rates
30-Year Fixed Rate Mortgages
Investors LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.01	0.00	0.01	0.01	0.00	0.01	0.03	0.13	0.01	0.02	0.04	0.01	0.01	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.05	0.04
2	0.25	0.40	0.30	0.25	0.25	0.51	1.88	2.99	0.67	1.22	1.51	0.74	0.40	0.47	0.31	0.24	0.23	0.21	0.07	0.15	0.23	0.10	0.24	0.25	0.26	0.25
3	1.10	1.25	0.78	0.67	0.93	1.60	6.23	7.41	2.56	4.52	5.79	3.27	1.66	1.76	1.39	1.06	1.24	0.88	0.62	0.71	0.81	0.75	1.03	1.00	1.07	1.08
4	1.92	2.01	1.21	1.23	1.56	3.08	9.90	11.39	5.00	8.44	10.95	5.90	3.04	3.41	2.81	2.30	2.69	2.08	1.40	1.68	1.58	1.58	2.13	2.16	2.34	2.39
5	2.57	2.54	1.50	1.63	2.27	4.46	13.03	14.68	7.67	12.03	14.47	7.85	4.41	5.01	4.20	3.56	4.24	3.24	2.42	2.39	2.24	2.36	3.21	3.33	3.60	3.68
6	3.04	2.87	1.81	2.07	2.91	5.88	15.60	16.98	10.24	15.43	16.59	9.46	5.60	6.36	5.51	4.61	5.50	4.51	2.97	2.96	2.82	3.07	4.20	4.37	4.71	4.78
7	3.37	3.17	2.00	2.39	3.62	7.04	17.72	18.36	13.00	16.96	18.13	10.80	6.59	7.46	6.55	5.37	6.89	5.01	3.40	3.44	3.31	3.69	5.05	5.24	5.61	5.64
8	3.57	3.43	2.25	2.75	4.16	8.10	19.19	19.30	14.23	17.87	19.25	11.80	7.40	8.32	7.28	6.14	7.36	5.48	3.89	3.96	3.84	4.36	5.95	6.18	6.56	6.56
9	3.89	3.62	2.45	3.03	4.70	9.25	20.05	19.79	15.06	18.58	20.06	12.59	8.01	8.99	7.92	6.56	7.72	5.87	4.31	4.44	4.32	4.95	6.69	6.92	7.30	7.28
10	4.06	3.76	2.60	3.32	5.50	10.20	20.69	20.12	15.78	19.07	20.69	13.19	8.52	9.50	8.33	6.89	8.01	6.21	4.68	4.86	4.74	5.44	7.30	7.50	7.88	7.87
11	4.26	3.93	2.80	3.68	6.11	10.86	21.15	20.36	16.29	19.48	21.07	13.61	9.00	9.89	8.67	7.18	8.28	6.53	5.03	5.29	5.13	5.90	7.85	8.02	8.41	8.40
12	4.40	4.11	2.99	3.97	6.61	11.32	21.46	20.54	16.65	19.73	21.34	13.95	9.26	10.17	8.93	7.40	8.48	6.77	5.26	5.59	5.40	6.21	8.21	8.35	8.76	8.75
13	4.51	4.28	3.14	4.19	6.95	11.73	21.73	20.69	16.93	19.91	21.59	14.13	9.44	10.37	9.11	7.55	8.62	6.94	5.44	5.81	5.60	6.43	8.48	8.58	9.00	9.01
14	4.65	4.37	3.25	4.49	7.27	12.03	21.97	20.80	17.07	20.15	21.75	14.31	9.61	10.57	9.30	7.72	8.77	7.11	5.61	6.03	5.79	6.65	8.73	8.81	9.24	9.25
15	4.83	4.49	3.36	4.65	7.54	12.30	22.15	20.87	17.20	20.34	21.87	14.44	9.76	10.75	9.45	7.84	8.89	7.25	5.74	6.21	5.95	6.82	8.94	8.99	9.44	9.45
16	4.95	4.57	3.46	4.79	7.78	12.52	22.30	20.97	17.32	20.49	21.97	14.55	9.88	10.89	9.57	7.94	8.99	7.36	5.85	6.36	6.08	6.96	9.10	9.13	9.59	9.61
17	5.07	4.69	3.56	4.91	7.99	12.62	22.38	21.12	17.41	20.61	22.05	14.63	9.97	11.00	9.67	8.02	9.06	7.45	5.94	6.48	6.18	7.07	9.23	9.24	9.71	9.73
18	5.16	4.74	3.68	4.96	8.17	12.72	22.47	21.22	17.48	20.70	22.11	14.69	10.05	11.09	9.74	8.07	9.11	7.52	6.01	6.57	6.26	7.16	9.33	9.33	9.80	9.83
19	5.24	4.86	3.72	5.02	8.28	12.77	22.54	21.30	17.54	20.79	22.16	14.75	10.10	11.16	9.80	8.12	9.15	7.58	6.07	6.65	6.34	7.24	9.42	9.40	9.88	9.91
20	5.30	4.94	3.79	5.12	8.35	12.80	22.59	21.36	17.59	20.86	22.21	14.79	10.15	11.22	9.84	8.15	9.18	7.63	6.12	6.73	6.40	7.30	9.48	9.46	9.95	9.98
21	5.35	4.99	3.81	5.18	8.40	12.83	22.64	21.41	17.63	20.92	22.25	14.82	10.18	11.26	9.88	8.18	9.21	7.67	6.16	6.79	6.45	7.35	9.54	9.51	10.00	10.04
22	5.38	5.05	3.88	5.24	8.45	12.86	22.69	21.45	17.67	20.98	22.28	14.84	10.21	11.30	9.91	8.21	9.23	7.70	6.19	6.84	6.50	7.40	9.59	9.55	10.05	10.08
23	5.38	5.10	3.94	5.28	8.49	12.89	22.73	21.48	17.71	21.03	22.31	14.86	10.23	11.33	9.94	8.23	9.25	7.72	6.21	6.89	6.54	7.44	9.64	9.58	10.08	10.12
24	5.43	5.15	4.00	5.33	8.53	12.91	22.76	21.51	17.73	21.07	22.34	14.88	10.25	11.36	9.97	8.25	9.27	7.75	6.22	6.94	6.57	7.48	9.68	9.61	10.11	10.16
25	5.48	5.20	4.05	5.37	8.57	12.93	22.79	21.53	17.76	21.12	22.36	14.90	10.27	11.39	9.99	8.27	9.28	7.76	6.24	6.99	6.60	7.51	9.72	9.63	10.14	10.18
26	5.52	5.24	4.10	5.41	8.60	12.95	22.82	21.55	17.78	21.15	22.38	14.91	10.28	11.41	10.02	8.29	9.29	7.78	6.26	7.03	6.62	7.54	9.75	9.65	10.16	10.20
27	5.56	5.28	4.15	5.45	8.64	12.97	22.84	21.57	17.80	21.18	22.40	14.92	10.29	11.43	10.04	8.30	9.29	7.79	6.27	7.07	6.64	7.57	9.77	9.66	10.18	10.22
28	5.60	5.32	4.19	5.49	8.67	12.98	22.86	21.59	17.82	21.20	22.42	14.93	10.30	11.45	10.06	8.32	9.30	7.81	6.28	7.10	6.65	7.60	9.80	9.67	10.19	10.23
29	5.63	5.35	4.23	5.52	8.70	13.00	22.88	21.60	17.84	21.23	22.44	14.94	10.31	11.46	10.08	8.33	9.31	7.82	6.28	7.13	6.67	7.62	9.82	9.68	10.20	10.25
30	5.66	5.38	4.26	5.56	8.72	13.01	22.90	21.61	17.86	21.24	22.45	14.95	10.32	11.48	10.09	8.34	9.32	7.83	6.29	7.16	6.68	7.64	9.84	9.69	10.21	10.26

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
Unknown LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.15	0.45	0.32	0.24	0.45	0.26	0.22	0.37	0.22	0.34	1.11	5.71	9.09	5.20	6.82	4.57	1.69	1.12	13.72	14.51	24.66	1.80	0.00	0.45	0.44	0.46
2	1.89	4.26	2.96	2.11	1.39	0.80	0.57	17.20	0.95	2.17	22.73	29.21	13.21	21.62	23.99	23.55	16.56	12.70	36.82	22.35	43.15	13.69	3.44	4.75	5.28	5.21
3	7.74	11.95	7.81	3.70	2.09	1.04	5.20	24.57	2.65	24.74	48.92	33.18	16.00	26.40	36.71	49.00	40.46	31.20	41.88	26.47	50.55	20.40	11.20	16.29	16.87	16.02
4	15.81	19.12	10.65	4.71	2.44	2.72	8.57	32.90	17.78	42.86	52.95	36.56	17.06	29.94	52.98	68.76	58.50	36.13	46.57	30.04	56.90	28.82	21.94	29.81	29.45	28.19
5	22.09	22.63	12.07	5.29	3.92	4.62	12.87	47.60	38.41	47.16	55.43	38.21	19.29	40.12	66.24	79.21	61.60	43.30	48.84	36.81	62.58	37.77	32.04	41.06	40.23	39.10
6	25.06	24.49	12.79	7.02	5.54	7.26	27.37	56.49	44.29	49.81	57.24	41.73	23.75	51.77	74.47	81.24	66.00	47.60	55.22	42.48	67.54	45.29	39.66	49.20	48.32	47.41
7	26.64	25.30	14.98	8.79	7.40	16.95	40.14	59.21	48.27	52.47	59.24	46.15	34.23	63.20	76.49	83.55	68.44	53.94	60.26	47.56	71.20	50.72	45.17	55.05	54.24	53.43
8	27.44	27.44	17.22	10.73	11.76	29.73	44.59	60.83	52.39	54.80	62.16	53.31	46.82	66.53	78.44	84.86	71.70	58.63	64.50	51.78	73.94	54.99	49.49	59.49	58.66	57.89
9	29.68	29.63	19.41	15.12	18.22	34.95	47.28	61.98	56.80	57.39	64.84	63.50	49.67	69.85	80.06	85.87	74.27	62.82	68.12	55.35	76.18	58.67	53.13	63.07	62.22	61.49
10	31.82	31.85	23.39	21.42	22.54	38.68	49.89	62.86	62.80	59.91	67.62	65.40	53.68	70.44	80.85	86.68	76.54	66.21	70.94	58.38	78.01	61.83	56.11	65.87	65.00	64.31
11	33.97	35.26	28.39	25.53	26.34	42.47	52.24	63.96	67.44	62.36	68.65	67.61	55.86	72.07	81.44	87.34	78.25	68.70	73.12	60.83	79.45	64.36	58.39	67.98	67.11	66.46
12	37.47	39.55	32.16	29.12	29.98	46.26	55.56	65.13	71.01	63.15	69.49	69.24	57.91	73.41	81.97	87.90	79.59	70.63	74.81	62.91	80.61	66.42	60.21	69.60	68.72	68.09
13	41.56	42.46	35.20	32.60	33.26	52.63	59.12	66.11	72.13	64.04	69.86	70.17	59.53	74.55	82.40	88.32	80.62	72.19	76.22	64.65	81.53	68.12	61.66	70.87	70.00	69.38
14	44.29	44.97	38.19	35.81	38.11	58.81	62.13	66.61	73.24	64.56	70.47	70.96	61.10	75.55	82.75	88.68	81.54	73.61	77.50	66.27	82.36	69.68	62.95	72.00	71.12	70.54
15	46.78	47.35	40.83	39.86	45.06	63.78	63.35	67.08	74.05	65.42	70.97	71.73	62.55	76.41	83.07	89.00	82.39	74.91	78.68	67.79	83.11	71.13	64.12	73.01	72.15	71.59
16	49.08	49.50	44.03	45.45	51.56	65.51	64.64	67.53	74.88	66.14	71.43	72.41	63.85	77.19	83.36	89.30	83.16	76.11	79.76	69.22	83.79	72.49	65.19	73.94	73.09	72.56
17	51.32	52.37	48.16	51.20	54.54	67.60	65.76	68.69	75.57	66.79	71.81	73.00	65.01	77.87	83.62	89.55	83.83	77.13	80.73	70.52	84.40	73.70	66.17	74.76	73.93	73.42
18	54.19	55.99	52.57	54.23	57.85	69.23	66.56	69.56	76.19	67.33	72.13	73.52	66.07	78.49	83.85	89.78	84.43	78.04	81.60	71.72	84.94	74.83	67.08	75.51	74.68	74.19
19	57.67	59.61	55.35	57.85	60.45	70.10	67.23	70.30	76.73	67.79	72.41	73.98	67.06	79.05	84.06	89.99	84.96	78.85	82.40	72.84	85.44	75.88	67.91	76.19	75.37	74.90
20	61.30	61.90	58.57	60.78	62.08	70.88	67.83	70.88	77.18	68.18	72.64	74.40	67.96	79.56	84.25	90.18	85.43	79.59	83.12	73.89	85.89	76.85	68.68	76.81	76.00	75.55
21	63.96	64.79	61.67	62.72	63.54	71.61	68.35	71.35	77.57	68.52	72.85	74.78	68.79	80.01	84.42	90.35	85.84	80.26	83.79	74.87	86.31	77.75	69.40	77.38	76.58	76.15
22	66.39	66.89	63.89	64.48	64.96	72.28	68.81	71.74	77.93	68.82	73.04	75.12	69.56	80.43	84.57	90.51	86.22	80.88	84.40	75.79	86.69	78.59	70.07	77.90	77.11	76.70
23	68.55	68.59	65.89	66.18	66.25	72.87	69.20	72.07	78.24	69.09	73.21	75.43	70.27	80.82	84.72	90.66	86.56	81.43	84.96	76.65	87.04	79.37	70.69	78.38	77.60	77.21
24	70.10	70.13	67.82	67.73	67.42	73.42	69.56	72.34	78.52	69.33	73.35	75.72	70.92	81.17	84.85	90.80	86.88	81.94	85.48	77.45	87.37	80.10	71.27	78.83	78.06	77.69
25	71.51	71.59	69.56	69.16	68.51	73.93	69.88	72.58	78.77	69.54	73.48	75.98	71.54	81.50	84.97	90.92	87.18	82.41	85.96	78.20	87.67	80.78	71.82	79.24	78.48	78.13
26	72.86	72.92	71.15	70.48	69.52	74.40	70.16	72.79	79.00	69.74	73.61	76.22	72.11	81.80	85.08	91.03	87.44	82.85	86.39	78.91	87.95	81.41	72.33	79.63	78.88	78.54
27	74.09	74.14	72.61	71.72	70.48	74.84	70.43	72.97	79.21	69.92	73.72	76.44	72.65	82.09	85.19	91.14	87.69	83.25	86.79	79.57	88.20	82.01	72.82	79.98	79.24	78.93
28	75.22	75.26	73.97	72.88	71.37	75.25	70.68	73.14	79.41	70.09	73.82	76.65	73.15	82.35	85.29	91.23	87.92	83.63	87.16	80.19	88.44	82.57	73.27	80.32	79.59	79.28
29	76.27	76.31	75.23	73.95	72.20	75.64	70.91	73.29	79.60	70.24	73.92	76.85	73.63	82.61	85.38	91.33	88.14	83.96	87.50	80.77	88.67	83.09	73.70	80.62	79.90	79.61
30	77.25	77.27	76.39	74.96	72.98	76.01	71.12	73.43	79.77	70.39	74.01	77.03	74.08	82.84	85.47	91.41	88.34	84.27	87.82	81.31	88.87	83.58	74.10	80.91	80.20	79.92

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
0 - 65 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	1.16	1.71	1.69	1.36	0.95	0.67	0.75	1.08	0.95	0.74	1.01	1.13	0.69	1.32	0.86	1.17	1.10	0.95	1.62	1.09	2.47	1.31	1.61	1.16	1.15	1.17
2	6.78	9.52	8.03	7.06	3.35	2.42	2.27	30.00	3.77	4.67	20.46	7.94	3.37	5.24	5.25	5.19	13.43	10.97	8.96	4.49	10.91	5.89	5.90	6.09	6.60	6.56
3	16.93	19.24	15.50	10.46	5.32	3.58	17.60	41.11	8.90	31.46	46.61	12.43	6.91	10.27	11.81	17.14	33.57	28.11	14.38	11.37	17.06	11.02	11.91	13.62	14.54	13.48
4	26.10	25.27	18.91	12.33	5.87	7.91	25.45	52.24	33.15	53.62	53.70	16.78	11.02	16.49	26.36	38.40	51.11	33.68	21.86	17.40	22.15	16.07	18.22	21.14	21.37	19.78
5	32.11	28.00	20.92	13.04	8.96	11.67	32.84	69.08	56.23	59.80	57.94	21.73	15.47	30.93	44.27	55.32	54.79	41.11	26.93	21.37	26.93	21.38	24.45	27.67	27.52	25.76
6	35.85	29.78	22.00	15.96	11.61	15.68	50.25	77.74	61.97	63.55	62.34	27.42	25.39	49.22	58.48	59.06	59.42	46.68	33.34	26.09	33.13	27.88	31.10	35.21	34.87	33.21
7	37.60	31.11	24.25	18.40	14.81	26.00	63.51	80.55	65.55	66.80	67.39	41.11	42.65	61.98	62.31	63.50	62.62	54.37	43.35	33.74	41.91	36.43	39.89	45.18	44.78	43.17
8	38.76	33.71	27.10	20.98	20.49	38.63	67.62	82.24	68.96	70.09	74.94	59.15	56.68	65.18	66.87	66.87	69.30	62.44	55.31	42.59	50.74	45.71	49.36	55.98	55.34	53.82
9	41.15	36.32	29.91	26.15	28.19	43.85	70.16	83.22	72.80	75.14	80.05	70.42	60.11	68.80	69.86	70.85	73.31	67.86	62.74	48.38	56.24	51.68	55.45	62.41	61.52	60.20
10	43.67	39.56	33.96	32.02	32.80	47.52	72.64	84.27	78.79	78.97	83.59	72.90	64.44	71.33	72.66	73.55	76.03	71.18	66.55	52.01	59.64	55.30	59.07	65.75	64.82	63.59
11	45.61	43.24	39.34	35.79	36.82	51.34	75.30	85.64	82.73	82.29	84.55	75.83	67.33	73.34	74.74	75.73	78.14	73.70	69.51	54.98	62.33	58.20	61.88	68.29	67.35	66.17
12	48.32	48.13	43.40	39.22	40.86	55.31	78.03	86.78	85.29	83.33	85.58	77.91	69.61	75.06	76.67	77.73	80.02	76.30	72.85	58.16	65.12	61.19	64.72	71.06	70.09	69.02
13	52.58	51.17	46.69	42.51	44.62	62.51	80.19	87.67	86.16	84.26	86.28	79.81	71.63	76.65	78.36	79.40	81.60	78.49	75.58	61.00	67.56	63.81	67.24	73.39	72.38	71.42
14	55.17	54.29	49.70	46.01	50.24	68.74	82.33	88.15	87.01	85.02	87.14	81.48	73.61	78.14	79.79	80.87	82.96	80.38	77.99	63.61	69.72	66.22	69.51	75.45	74.43	73.60
15	57.69	57.02	52.71	50.39	57.48	72.98	83.19	88.37	87.63	85.72	87.85	83.02	75.46	79.41	81.04	82.14	84.13	82.03	80.03	65.91	71.60	68.40	71.52	77.24	76.26	75.54
16	60.14	59.37	56.68	55.38	63.20	74.80	84.07	88.77	88.32	86.31	88.49	84.39	77.09	80.54	82.14	83.22	85.14	83.44	81.80	67.99	73.29	70.37	73.32	78.83	77.85	77.27
17	62.60	62.86	61.74	61.90	66.44	76.83	84.49	89.66	88.94	86.88	89.09	85.60	78.62	81.59	83.16	84.22	86.06	84.71	83.43	70.00	74.91	72.28	75.07	80.30	79.35	78.84
18	66.67	67.11	66.64	64.45	69.24	77.94	85.16	90.34	89.52	87.39	89.59	86.67	80.01	82.54	84.08	85.12	86.88	85.85	84.84	71.85	76.42	74.04	76.70	81.64	80.73	80.28
19	69.90	71.17	68.89	67.71	71.51	78.96	85.74	90.91	90.04	87.82	90.03	87.62	81.30	83.39	84.90	85.92	87.61	86.87	86.09	73.55	77.84	75.65	78.14	82.86	81.99	81.60
20	73.51	72.89	71.46	70.28	73.36	79.88	86.26	91.38	90.48	88.20	90.41	88.45	82.46	84.16	85.63	86.65	88.27	87.79	87.20	75.15	79.17	77.15	79.46	83.97	83.14	82.80
21	76.94	76.44	74.83	72.52	75.03	80.74	86.73	91.76	90.87	88.54	90.74	89.19	83.52	84.84	86.30	87.31	88.86	88.62	88.19	76.66	80.40	78.55	80.70	84.99	84.19	83.91
22	78.75	78.40	77.25	74.57	76.56	81.55	87.14	92.07	91.22	88.85	91.04	89.84	84.49	85.46	86.90	87.91	89.36	89.34	89.09	78.06	81.54	79.85	81.84	85.91	85.16	84.91
23	79.92	80.26	79.40	76.52	77.98	82.29	87.50	92.32	91.53	89.12	91.31	90.42	85.38	86.03	87.44	88.45	89.82	89.99	89.89	79.33	82.59	81.06	82.89	86.75	86.04	85.83
24	81.65	81.93	81.38	78.29	79.27	82.95	87.80	92.54	91.81	89.36	91.54	90.95	86.19	86.56	87.91	88.96	90.25	90.57	90.60	80.52	83.57	82.18	83.87	87.52	86.85	86.67
25	83.22	83.49	83.02	79.88	80.44	83.56	88.07	92.73	92.06	89.58	91.76	91.41	86.93	87.04	88.36	89.42	90.63	91.10	91.24	81.63	84.48	83.23	84.77	88.22	87.59	87.44
26	84.69	84.92	84.48	81.33	81.51	84.12	88.31	92.88	92.28	89.78	91.95	91.83	87.62	87.50	88.77	89.83	90.98	91.59	91.81	82.66	85.32	84.19	85.61	88.86	88.26	88.13
27	86.04	86.20	85.79	82.66	82.51	84.65	88.53	93.02	92.49	89.97	92.13	92.22	88.26	87.92	89.15	90.21	91.31	92.02	92.32	83.62	86.10	85.09	86.38	89.42	88.85	88.74
28	87.26	87.36	86.97	83.87	83.42	85.13	88.74	93.15	92.67	90.14	92.29	92.56	88.85	88.32	89.51	90.55	91.61	92.42	92.77	84.51	86.83	85.93	87.09	89.92	89.38	89.29
29	88.37	88.40	88.03	84.91	84.25	85.58	88.93	93.26	92.85	90.30	92.44	92.88	89.40	88.70	89.85	90.88	91.88	92.78	93.17	85.33	87.50	86.70	87.75	90.38	89.87	89.78
30	89.38	89.34	88.97	85.87	85.03	86.01	89.11	93.37	93.01	90.46	92.58	93.18	89.91	89.05	90.16	91.19	92.13	93.11	93.53	86.10	88.09	87.41	88.33	90.80	90.31	90.24

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
65 - 80 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.69	0.86	1.09	1.50	0.72	0.66	0.31	0.51	0.53	0.38	0.74	0.93	0.58	0.77	0.72	0.79	0.69	0.82	1.56	1.20	2.47	1.22	1.40	1.00	0.97	0.99
2	4.68	6.62	6.42	6.67	2.38	2.28	1.32	27.04	2.16	2.96	18.93	6.87	2.48	3.45	3.51	3.77	7.91	9.82	7.90	4.55	11.43	5.43	4.54	4.65	5.07	4.96
3	12.50	14.94	13.43	9.65	3.48	2.82	14.53	37.39	5.62	29.75	44.65	10.45	5.07	7.20	8.25	14.95	30.68	25.39	12.33	11.03	17.58	9.45	9.24	10.83	11.59	10.48
4	21.20	21.88	16.67	11.21	3.91	5.47	21.69	47.49	29.13	53.26	51.40	13.97	8.33	11.94	23.15	37.72	49.58	30.46	19.22	16.94	21.85	13.76	14.73	17.65	17.74	16.01
5	27.68	25.77	18.33	12.03	6.02	8.33	29.04	65.09	53.53	58.92	55.70	18.01	11.93	25.82	44.19	54.62	53.52	37.67	24.58	20.18	25.96	18.47	20.25	23.66	23.38	21.40
6	30.85	27.34	19.18	14.64	8.01	11.72	46.41	73.95	59.27	62.45	59.99	22.85	20.46	45.11	59.04	58.31	58.61	42.71	29.81	23.78	31.11	23.84	25.76	30.08	29.66	27.69
7	32.35	28.10	21.83	16.77	10.43	22.17	59.92	76.32	62.86	65.87	64.83	35.94	38.22	59.11	62.49	62.93	62.10	49.38	38.32	29.99	38.82	31.27	33.43	39.10	38.71	36.65
8	33.05	29.74	23.99	19.41	16.16	35.92	63.94	77.71	66.32	69.16	72.24	54.78	52.14	62.10	66.72	66.02	67.66	55.92	47.80	36.66	46.22	38.80	41.22	48.24	47.71	45.56
9	35.16	31.99	26.74	24.53	24.23	40.99	66.42	78.69	70.30	73.59	78.11	66.49	55.38	65.98	69.59	69.25	71.14	60.74	54.17	41.27	51.16	44.01	46.58	54.13	53.44	51.32
10	37.33	34.36	31.60	30.80	28.88	44.77	68.45	79.58	75.75	77.33	81.59	68.89	59.76	68.83	71.87	71.49	73.76	64.17	58.25	44.57	54.59	47.70	50.30	57.94	57.17	55.11
11	39.81	38.25	37.06	35.02	33.16	48.49	70.43	80.68	79.72	80.31	82.57	71.97	62.93	70.53	73.69	73.50	75.96	66.92	61.65	47.47	57.52	50.84	53.39	61.04	60.25	58.24
12	43.60	42.75	41.05	38.73	37.20	52.74	73.17	81.48	82.62	81.14	83.66	74.19	64.94	71.95	75.35	75.29	77.86	69.62	65.36	50.46	60.43	53.99	56.45	64.22	63.39	61.50
13	48.45	46.41	44.18	42.35	40.87	59.88	75.33	82.14	83.45	82.00	84.43	75.93	66.73	73.31	76.84	76.78	79.46	71.99	68.62	53.20	62.97	56.81	59.17	66.96	66.10	64.37
14	51.36	49.64	47.71	45.58	47.35	66.36	77.47	82.41	84.29	82.70	85.17	77.48	68.58	74.62	78.15	78.13	80.92	74.21	71.58	55.83	65.33	59.50	61.72	69.44	68.59	67.04
15	53.80	53.15	50.54	50.65	56.11	71.34	78.22	82.69	84.96	83.28	85.77	78.95	70.32	75.74	79.29	79.33	82.20	76.16	74.18	58.26	67.44	61.94	64.01	71.62	70.82	69.44
16	56.75	55.80	54.79	56.49	63.59	73.17	79.01	82.84	85.57	83.75	86.30	80.27	71.86	76.74	80.28	80.39	83.31	77.87	76.46	60.51	69.34	64.17	66.09	73.58	72.81	71.58
17	59.27	59.67	59.91	62.63	66.16	74.99	79.74	83.88	86.08	84.19	86.76	81.38	73.25	77.64	81.19	81.35	84.29	79.39	78.48	62.62	71.07	66.24	68.02	75.35	74.61	73.50
18	62.67	63.89	64.54	65.47	69.28	76.32	80.27	84.63	86.55	84.56	87.14	82.35	74.53	78.46	81.98	82.19	85.14	80.74	80.27	64.59	72.65	68.16	69.80	76.94	76.21	75.23
19	67.43	68.22	68.89	68.70	71.74	77.12	80.71	85.23	86.96	84.87	87.44	83.21	75.70	79.20	82.68	82.94	85.90	81.95	81.85	66.43	74.09	69.95	71.44	78.35	77.65	76.79
20	71.32	70.85	69.96	71.48	73.29	77.84	81.10	85.70	87.31	85.14	87.70	83.96	76.76	79.86	83.31	83.61	86.56	83.03	83.23	68.16	75.42	71.61	72.94	79.59	78.94	78.20
21	74.13	74.00	73.03	73.48	74.68	78.51	81.43	86.05	87.60	85.37	87.93	84.63	77.73	80.46	83.87	84.21	87.15	84.00	84.46	69.79	76.65	73.14	74.32	80.72	80.09	79.48
22	76.36	76.59	75.57	75.29	76.01	79.13	81.72	86.34	87.86	85.56	88.13	85.23	78.62	81.00	84.38	84.76	87.68	84.88	85.56	71.31	77.78	74.55	75.60	81.73	81.13	80.63
23	78.46	78.53	77.78	77.02	77.24	79.68	81.97	86.57	88.09	85.73	88.31	85.76	79.44	81.51	84.84	85.26	88.16	85.68	86.52	72.74	78.83	75.87	76.78	82.62	82.07	81.66
24	80.11	80.26	79.85	78.60	78.34	80.18	82.19	86.76	88.30	85.88	88.47	86.24	80.20	81.97	85.26	85.73	88.60	86.39	87.37	74.07	79.80	77.08	77.85	83.42	82.90	82.59
25	81.59	81.87	81.71	80.04	79.35	80.64	82.38	86.91	88.48	86.01	88.61	86.67	80.90	82.39	85.65	86.16	88.99	87.04	88.11	75.32	80.68	78.21	78.84	84.15	83.66	83.45
26	82.99	83.33	83.27	81.33	80.28	81.06	82.56	87.04	88.65	86.13	88.73	87.06	81.55	82.79	86.01	86.56	89.34	87.63	88.77	76.48	81.47	79.25	79.76	84.82	84.35	84.21
27	84.27	84.63	84.67	82.52	81.14	81.45	82.71	87.16	88.80	86.24	88.85	87.43	82.17	83.17	86.35	86.93	89.66	88.16	89.37	77.58	82.21	80.21	80.61	85.43	84.98	84.89
28	85.41	85.80	85.93	83.61	81.93	81.82	82.85	87.26	88.94	86.34	88.96	87.76	82.75	83.53	86.66	87.27	89.95	88.64	89.91	78.60	82.90	81.10	81.40	86.00	85.56	85.50
29	86.46	86.87	87.07	84.59	82.67	82.16	82.97	87.35	89.08	86.43	89.06	88.08	83.29	83.86	86.95	87.59	90.22	89.06	90.40	79.54	83.55	81.93	82.12	86.52	86.10	86.06
30	87.42	87.78	88.09	85.48	83.35	82.49	83.09	87.43	89.20	86.52	89.16	88.37	83.81	84.18	87.22	87.89	90.48	89.46	90.84	80.42	84.17	82.69	82.79	87.00	86.59	86.57

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
80 - 90 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.31	0.49	0.54	0.67	0.25	0.33	0.14	0.20	0.27	0.20	0.33	0.61	0.30	0.48	0.44	0.37	0.49	0.50	0.95	0.53	2.00	0.64	0.62	0.61	0.59	0.61
2	3.09	4.77	4.26	3.99	1.18	0.93	0.61	21.23	1.25	1.82	15.01	4.84	1.55	2.13	2.47	2.43	7.24	9.16	6.23	3.03	10.89	3.22	3.26	3.88	4.28	4.23
3	10.55	12.82	10.13	6.24	1.85	1.25	10.88	29.60	3.79	24.80	38.08	7.66	3.50	5.34	6.96	13.89	33.22	25.09	10.32	8.94	16.83	7.39	8.10	10.77	11.64	10.42
4	19.60	19.65	13.17	7.38	2.22	3.19	15.90	40.00	24.80	46.36	44.65	10.70	6.37	9.95	23.19	41.46	53.01	29.70	16.57	13.80	21.49	12.05	14.01	18.61	18.65	16.69
5	26.24	22.68	14.51	8.01	3.94	5.44	22.54	60.16	47.91	52.09	49.29	14.71	9.64	24.26	46.27	58.96	56.59	36.83	21.75	17.21	25.81	16.99	19.80	25.11	24.73	22.47
6	29.10	24.20	14.99	10.07	5.72	8.25	39.85	70.15	53.79	55.81	54.02	19.28	17.41	45.29	60.98	62.05	61.71	41.58	26.49	20.49	30.55	21.88	24.77	30.84	30.34	28.01
7	30.43	24.75	17.34	12.07	7.91	18.13	53.06	72.80	57.69	59.46	59.25	31.44	33.82	59.23	63.85	66.32	65.01	47.09	33.57	25.70	37.13	28.09	31.09	38.22	37.75	35.24
8	30.93	26.99	19.59	14.59	13.10	30.92	57.05	74.33	61.38	62.94	67.27	49.93	47.58	62.08	67.75	69.21	69.36	52.71	41.82	31.49	43.65	34.59	37.74	45.98	45.38	42.66
9	32.92	29.09	22.19	20.16	20.63	36.12	59.77	75.45	65.44	67.42	73.09	61.92	50.76	66.00	70.27	71.86	72.25	57.22	47.88	35.77	48.28	39.41	42.66	51.38	50.61	47.83
10	35.37	31.51	26.82	26.85	25.48	39.91	61.72	76.33	71.08	71.10	76.87	64.38	55.18	68.65	72.41	73.85	74.75	61.14	52.94	39.48	52.17	43.54	46.78	55.76	54.88	52.15
11	37.63	35.80	33.22	31.30	29.60	43.68	63.81	77.48	75.02	74.24	77.90	67.71	58.49	70.31	74.13	75.68	76.90	64.35	57.24	42.81	55.55	47.14	50.29	59.38	58.46	55.78
12	41.23	41.19	37.36	35.05	33.46	47.79	66.74	78.27	78.20	75.17	78.96	70.01	60.49	71.65	75.67	77.24	78.58	67.05	61.01	45.81	58.47	50.28	53.29	62.46	61.50	58.91
13	46.08	44.62	41.07	38.47	37.05	54.88	69.68	79.03	79.12	76.12	79.67	71.88	62.31	72.96	77.07	78.57	80.01	69.49	64.43	48.64	61.07	53.17	56.05	65.19	64.19	61.73
14	49.36	47.45	44.17	41.64	43.46	61.47	71.86	79.25	80.08	76.94	80.44	73.53	64.20	74.22	78.28	79.75	81.30	71.77	67.57	51.36	63.48	55.93	58.62	67.66	66.66	64.39
15	51.93	50.48	47.36	46.46	52.37	67.01	72.70	79.55	80.76	77.53	81.04	75.09	65.99	75.28	79.31	80.79	82.43	73.78	70.35	53.89	65.64	58.46	60.95	69.85	68.91	66.79
16	54.32	53.25	51.48	52.58	59.66	68.88	73.67	79.80	81.41	78.00	81.57	76.48	67.56	76.22	80.22	81.71	83.40	75.54	72.81	56.25	67.58	60.78	63.08	71.84	70.93	68.96
17	56.87	56.95	56.56	58.86	62.35	70.97	74.50	81.02	81.95	78.42	82.02	77.66	68.99	77.06	81.03	82.53	84.25	77.12	75.02	58.48	69.36	62.95	65.08	73.65	72.77	70.93
18	60.24	61.80	61.42	61.54	65.62	72.57	75.20	81.85	82.43	78.78	82.38	78.67	70.30	77.82	81.73	83.25	84.99	78.53	77.00	60.56	70.98	64.98	66.93	75.28	74.41	72.71
19	64.63	66.19	64.08	64.76	67.95	73.45	75.77	82.48	82.85	79.06	82.68	79.56	71.51	78.50	82.35	83.88	85.65	79.79	78.76	62.52	72.48	66.87	68.65	76.74	75.89	74.33
20	68.60	68.69	67.16	67.95	69.56	74.22	76.24	82.95	83.19	79.29	82.92	80.35	72.61	79.10	82.90	84.44	86.22	80.92	80.34	64.37	73.87	68.64	70.23	78.06	77.24	75.81
21	71.16	71.49	70.29	69.98	71.01	74.94	76.62	83.28	83.48	79.49	83.12	81.04	73.60	79.64	83.39	84.95	86.74	81.94	81.77	66.12	75.15	70.27	71.70	79.25	78.47	77.15
22	73.43	73.65	72.84	71.84	72.40	75.60	76.94	83.55	83.73	79.66	83.29	81.65	74.52	80.13	83.83	85.41	87.20	82.87	83.05	67.77	76.33	71.80	73.06	80.34	79.58	78.38
23	75.27	75.74	75.11	73.64	73.69	76.18	77.21	83.75	83.95	79.81	83.44	82.20	75.37	80.58	84.23	85.83	87.62	83.72	84.21	69.32	77.42	73.22	74.32	81.33	80.60	79.50
24	77.06	77.61	77.25	75.30	74.84	76.70	77.44	83.91	84.14	79.94	83.57	82.69	76.15	80.99	84.59	86.21	88.00	84.50	85.25	70.77	78.43	74.54	75.49	82.23	81.54	80.53
25	78.68	79.37	79.20	76.81	75.89	77.17	77.63	84.04	84.31	80.04	83.68	83.13	76.87	81.37	84.92	86.57	88.35	85.21	86.17	72.14	79.37	75.77	76.58	83.06	82.39	81.47
26	80.22	80.97	80.93	78.20	76.87	77.61	77.81	84.14	84.47	80.14	83.78	83.53	77.54	81.72	85.23	86.90	88.67	85.85	87.01	73.42	80.24	76.92	77.60	83.81	83.18	82.33
27	81.64	82.41	82.50	79.48	77.77	78.01	77.96	84.23	84.61	80.23	83.87	83.90	78.18	82.05	85.52	87.20	88.97	86.45	87.76	74.63	81.05	78.00	78.54	84.51	83.90	83.12
28	82.92	83.71	83.92	80.67	78.61	78.38	78.11	84.31	84.73	80.31	83.96	84.24	78.78	82.36	85.79	87.49	89.24	86.99	88.43	75.77	81.81	79.00	79.42	85.14	84.56	83.84
29	84.08	84.88	85.19	81.76	79.38	78.73	78.23	84.37	84.85	80.38	84.04	84.56	79.35	82.66	86.04	87.75	89.50	87.49	89.04	76.84	82.52	79.94	80.24	85.72	85.16	84.50
30	85.15	85.95	86.34	82.76	80.11	79.06	78.35	84.44	84.96	80.45	84.11	84.86	79.88	82.94	86.28	88.01	89.74	87.96	89.58	77.84	83.19	80.81	81.01	86.25	85.71	85.10

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
90 - 93 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.23	0.29	0.37	0.44	0.26	0.15	0.07	0.10	0.14	0.16	0.21	0.39	0.16	0.27	0.30	0.23	0.24	0.35	0.65	0.21	1.78	0.33	0.37	0.40	0.38	0.39
2	2.36	3.98	3.60	3.31	0.95	0.76	0.27	16.48	0.81	1.60	12.37	3.56	0.99	1.45	1.98	1.82	5.72	7.70	4.82	2.13	10.12	2.18	2.57	3.15	3.44	3.43
3	8.96	11.48	9.37	5.46	1.49	1.05	8.22	23.45	2.72	23.45	34.74	5.90	2.57	4.27	6.12	12.62	32.60	23.45	8.50	7.64	15.46	6.26	7.26	9.83	10.62	9.45
4	18.07	19.11	12.22	6.50	1.91	2.74	12.78	32.87	21.42	45.03	41.75	8.81	5.28	8.79	22.07	41.00	53.88	28.05	15.08	12.54	20.65	11.41	13.67	18.65	18.47	16.47
5	25.06	22.45	13.45	7.11	3.20	4.63	17.96	53.67	42.63	51.09	46.25	12.63	8.40	23.11	46.38	59.07	57.36	35.62	20.22	16.31	25.46	16.81	19.95	25.92	25.25	22.92
6	28.25	23.94	14.04	8.98	4.68	7.27	33.58	64.02	48.62	55.00	51.37	17.10	16.10	44.64	61.18	62.26	62.53	40.71	25.85	19.96	30.76	22.15	25.36	32.27	31.46	29.07
7	29.59	24.56	16.24	10.79	6.53	15.89	45.92	66.75	52.37	58.75	56.43	28.46	32.60	58.59	64.02	66.42	65.75	46.02	32.90	24.83	37.12	27.97	31.25	39.24	38.45	35.91
8	30.14	26.84	18.57	12.72	11.28	28.45	49.95	68.43	56.28	62.11	64.38	45.88	46.31	61.55	67.89	69.22	69.63	51.18	40.39	29.96	43.05	33.73	37.12	46.07	45.18	42.42
9	32.10	29.03	21.11	17.73	18.37	33.34	52.44	69.56	60.63	66.66	70.19	57.58	49.44	65.57	70.48	71.79	72.48	55.77	46.50	34.16	47.69	38.45	41.94	51.37	50.28	47.45
10	34.08	31.51	26.11	24.77	22.85	36.81	54.74	70.33	68.54	70.43	74.36	59.95	53.90	68.16	72.56	73.73	75.01	60.04	52.09	38.01	51.80	42.73	46.23	55.98	54.77	52.00
11	36.47	36.27	32.78	29.48	26.68	40.45	57.09	71.31	70.87	73.62	75.40	63.38	57.00	69.77	74.26	75.54	77.22	63.56	56.90	41.53	55.46	46.56	49.95	59.86	58.58	55.88
12	40.48	41.71	36.80	33.26	30.76	44.30	60.43	72.34	74.28	74.48	76.54	65.66	58.96	71.07	75.78	77.08	78.88	66.34	60.70	44.54	58.43	49.70	52.96	62.88	61.56	58.94
13	45.25	45.45	40.38	37.06	34.47	50.85	63.69	73.21	75.23	75.33	77.43	67.71	60.80	72.38	77.19	78.40	80.31	68.90	64.23	47.44	61.14	52.67	55.77	65.62	64.26	61.78
14	48.68	48.47	43.95	40.52	40.45	57.59	66.55	73.60	76.19	76.02	78.34	69.56	62.74	73.65	78.41	79.59	81.61	71.34	67.55	50.31	63.70	55.56	58.46	68.14	66.78	64.50
15	51.31	51.16	48.94	45.20	49.06	62.93	67.40	74.10	76.88	76.71	79.03	71.28	64.59	74.72	79.45	80.63	82.75	73.49	70.48	52.98	65.99	58.22	60.89	70.38	69.07	66.96
16	54.02	53.92	51.18	51.49	56.92	64.95	68.47	74.52	77.61	77.23	79.61	72.81	66.21	75.65	80.34	81.54	83.72	75.37	73.08	55.48	68.04	60.67	63.11	72.40	71.14	69.18
17	56.50	57.38	56.29	57.71	59.92	67.10	69.40	76.10	78.20	77.69	80.10	74.08	67.67	76.48	81.14	82.34	84.55	77.03	75.38	57.82	69.89	62.92	65.18	74.22	72.99	71.18
18	59.89	62.13	61.37	60.54	63.23	68.82	70.19	77.11	78.72	78.07	80.47	75.16	68.99	77.22	81.82	83.03	85.27	78.50	77.43	60.00	71.57	65.03	67.09	75.85	74.65	72.98
19	63.78	66.71	64.25	63.88	65.78	69.74	70.81	77.84	79.16	78.36	80.76	76.10	70.21	77.87	82.42	83.64	85.90	79.80	79.24	62.05	73.12	66.99	68.85	77.31	76.13	74.62
20	67.86	69.18	67.10	66.46	67.45	70.54	71.34	78.37	79.52	78.59	81.01	76.91	71.31	78.45	82.94	84.18	86.45	80.96	80.86	63.98	74.54	68.81	70.47	78.62	77.48	76.10
21	70.62	72.19	69.85	68.60	68.94	71.28	71.78	78.73	79.81	78.79	81.21	77.63	72.31	78.96	83.39	84.66	86.93	82.01	82.31	65.80	75.85	70.50	71.97	79.80	78.70	77.45
22	73.14	74.46	72.50	70.55	70.37	71.96	72.14	79.01	80.07	78.96	81.38	78.26	73.23	79.43	83.81	85.09	87.36	82.95	83.61	67.51	77.04	72.06	73.35	80.87	79.80	78.67
23	75.27	76.50	74.87	72.43	71.68	72.55	72.44	79.21	80.29	79.10	81.53	78.81	74.07	79.86	84.17	85.48	87.76	83.82	84.77	69.11	78.14	73.51	74.63	81.84	80.81	79.79
24	77.04	78.31	77.08	74.16	72.85	73.07	72.69	79.37	80.48	79.22	81.65	79.30	74.85	80.24	84.51	85.83	88.11	84.60	85.80	70.62	79.16	74.86	75.82	82.72	81.73	80.81
25	78.63	80.01	79.09	75.73	73.92	73.54	72.90	79.49	80.64	79.33	81.76	79.75	75.56	80.59	84.81	86.16	88.43	85.30	86.72	72.03	80.10	76.11	76.91	83.52	82.58	81.74
26	80.14	81.56	80.87	77.16	74.89	73.97	73.09	79.59	80.79	79.42	81.86	80.15	76.23	80.92	85.10	86.46	88.73	85.95	87.54	73.35	80.97	77.27	77.93	84.25	83.35	82.59
27	81.52	82.93	82.47	78.49	75.80	74.37	73.25	79.68	80.92	79.50	81.94	80.51	76.86	81.23	85.36	86.74	89.00	86.54	88.28	74.59	81.77	78.36	78.88	84.92	84.05	83.36
28	82.76	84.17	83.91	79.71	76.63	74.73	73.40	79.75	81.05	79.57	82.02	80.85	77.45	81.52	85.60	87.00	89.24	87.07	88.93	75.76	82.53	79.37	79.76	85.53	84.69	84.07
29	83.89	85.29	85.21	80.82	77.40	75.07	73.53	79.81	81.15	79.64	82.09	81.17	78.01	81.80	85.83	87.25	89.48	87.57	89.52	76.85	83.23	80.32	80.58	86.09	85.27	84.71
30	84.93	86.31	86.37	81.85	78.12	75.39	73.66	79.86	81.25	79.71	82.16	81.46	78.54	82.06	86.05	87.48	89.69	88.02	90.04	77.88	83.89	81.19	81.34	86.59	85.81	85.29

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
93 - 95 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.15	0.17	0.31	0.38	0.14	0.17	0.06	0.04	0.13	0.13	0.11	0.35	0.09	0.20	0.24	0.18	0.25	0.28	0.56	0.23	1.83	0.30	0.37	0.33	0.32	0.32
2	1.98	3.72	3.50	2.79	0.72	0.47	0.35	13.32	0.74	1.29	10.56	3.33	0.70	1.28	1.67	1.55	4.91	7.37	4.65	2.10	10.47	2.06	2.38	2.90	3.16	3.13
3	9.02	11.55	9.45	4.68	1.28	0.73	7.47	19.67	2.44	20.71	31.61	5.56	2.12	3.92	5.17	10.62	31.05	23.46	8.46	7.99	15.77	6.04	6.90	9.49	10.13	8.95
4	17.89	19.46	12.41	5.90	1.60	2.28	11.38	28.23	19.15	41.21	38.65	8.26	4.68	8.03	19.59	38.73	52.47	28.23	15.12	12.78	20.67	10.94	12.97	17.82	17.47	15.47
5	25.14	23.07	13.74	6.54	2.67	3.97	16.10	49.23	39.12	47.50	43.26	11.99	7.55	20.89	43.35	56.92	55.95	35.84	20.67	16.36	25.24	16.13	18.90	24.72	23.84	21.52
6	28.31	24.62	14.29	8.25	4.23	6.21	31.72	60.12	44.70	51.41	48.08	16.18	14.89	42.08	58.60	60.25	61.13	41.16	25.79	19.68	30.11	21.00	23.79	30.42	29.39	27.00
7	29.69	25.12	16.52	10.05	6.07	14.28	44.84	63.09	48.55	55.50	53.40	26.67	30.56	56.37	61.48	64.67	64.46	45.80	31.98	23.98	35.72	26.13	28.94	36.51	35.50	32.97
8	30.23	27.50	18.83	12.04	10.84	25.56	48.64	64.59	52.59	59.15	61.02	43.48	43.79	59.22	65.38	67.53	67.91	50.25	38.57	28.42	40.90	31.15	34.04	42.52	41.41	38.67
9	32.47	30.03	21.23	17.03	18.19	30.50	51.15	65.82	56.65	64.00	67.11	54.89	46.87	63.11	68.02	69.87	70.54	54.41	44.12	32.16	45.11	35.42	38.42	47.40	46.11	43.28
10	34.48	32.63	26.20	23.82	22.78	34.10	53.15	66.88	62.41	68.14	71.43	57.40	51.27	65.76	70.03	71.71	73.02	58.47	49.48	35.75	49.04	39.52	42.55	51.93	50.49	47.70
11	36.95	37.26	32.13	28.36	26.66	37.70	55.08	68.06	67.05	71.40	72.64	60.87	54.41	67.29	71.65	73.44	75.16	61.78	54.05	39.02	52.52	43.15	46.10	55.72	54.20	51.45
12	40.91	43.11	36.43	32.09	30.47	41.46	58.10	69.23	70.64	72.43	73.88	63.39	56.31	68.59	73.18	74.99	76.85	64.53	57.88	41.96	55.51	46.32	49.15	58.86	57.27	54.58
13	45.73	46.80	39.86	35.86	33.95	48.07	61.47	70.24	71.66	73.52	74.70	65.33	57.99	69.83	74.53	76.24	78.24	66.96	61.29	44.68	58.13	49.18	51.87	61.56	59.93	57.35
14	49.06	49.85	43.24	39.31	39.80	54.37	63.89	70.72	72.90	74.29	75.59	67.09	59.81	71.05	75.72	77.40	79.54	69.33	64.57	47.41	60.63	52.01	54.52	64.12	62.46	60.06
15	51.81	52.72	46.30	43.71	47.68	59.90	65.03	71.19	73.88	74.93	76.27	68.77	61.54	72.08	76.74	78.41	80.68	71.46	67.53	50.00	62.92	54.66	56.95	66.42	64.80	62.56
16	54.50	55.37	50.51	49.64	54.80	62.01	65.97	71.76	74.61	75.40	76.86	70.27	63.07	72.99	77.63	79.32	81.68	73.35	70.20	52.46	65.00	57.13	59.21	68.54	66.95	64.85
17	56.92	58.84	55.68	55.97	57.90	64.48	66.76	73.20	75.20	75.82	77.34	71.51	64.44	73.79	78.42	80.13	82.54	75.03	72.58	54.74	66.86	59.39	61.30	70.44	68.88	66.92
18	60.25	63.05	60.94	59.00	61.21	66.12	67.51	74.11	75.73	76.17	77.71	72.57	65.70	74.52	79.11	80.83	83.29	76.52	74.70	56.88	68.56	61.51	63.24	72.17	70.62	68.81
19	64.49	67.54	63.88	62.56	63.95	67.03	68.10	74.77	76.17	76.44	78.00	73.49	66.86	75.17	79.72	81.45	83.95	77.86	76.61	58.90	70.13	63.50	65.04	73.72	72.19	70.54
20	68.30	69.78	66.78	65.38	65.49	67.81	68.60	75.24	76.52	76.66	78.23	74.31	67.92	75.74	80.25	82.01	84.53	79.06	78.32	60.81	71.59	65.35	66.71	75.13	73.64	72.12
21	70.91	72.48	69.54	67.37	66.86	68.54	69.01	75.57	76.81	76.84	78.43	75.02	68.89	76.25	80.72	82.50	85.05	80.15	79.87	62.63	72.93	67.08	68.26	76.41	74.96	73.57
22	72.99	74.59	71.95	69.18	68.19	69.20	69.35	75.81	77.07	77.00	78.61	75.65	69.78	76.72	81.15	82.95	85.51	81.14	81.27	64.34	74.17	68.69	69.71	77.58	76.17	74.90
23	74.87	76.47	74.11	70.93	69.40	69.78	69.63	75.99	77.29	77.13	78.75	76.22	70.60	77.14	81.53	83.36	85.94	82.05	82.54	65.95	75.31	70.19	71.06	78.65	77.28	76.13
24	76.48	78.15	76.14	72.55	70.49	70.29	69.86	76.13	77.48	77.24	78.88	76.72	71.36	77.53	81.88	83.73	86.32	82.89	83.68	67.47	76.37	71.60	72.31	79.64	78.31	77.27
25	77.94	79.74	77.99	74.03	71.48	70.75	70.06	76.24	77.64	77.34	78.99	77.17	72.06	77.88	82.20	84.08	86.68	83.65	84.71	68.91	77.37	72.92	73.49	80.54	79.26	78.32
26	79.33	81.17	79.64	75.39	72.39	71.17	70.23	76.32	77.79	77.42	79.08	77.58	72.72	78.21	82.50	84.40	87.00	84.35	85.64	70.27	78.29	74.15	74.58	81.38	80.14	79.29
27	80.61	82.46	81.14	76.65	73.25	71.56	70.39	76.40	77.93	77.50	79.17	77.96	73.35	78.53	82.78	84.70	87.30	84.99	86.48	71.55	79.15	75.31	75.61	82.15	80.96	80.18
28	81.76	83.63	82.50	77.82	74.03	71.92	70.52	76.46	78.06	77.57	79.25	78.32	73.94	78.82	83.04	84.98	87.58	85.59	87.24	72.76	79.97	76.40	76.58	82.86	81.71	81.01
29	82.82	84.69	83.75	78.90	74.77	72.26	70.64	76.51	78.17	77.63	79.32	78.65	74.50	79.11	83.28	85.24	87.84	86.14	87.92	73.91	80.73	77.42	77.48	83.51	82.40	81.77
30	83.80	85.67	84.87	79.90	75.46	72.58	70.76	76.56	78.27	77.69	79.39	78.96	75.04	79.37	83.52	85.49	88.08	86.65	88.54	74.99	81.45	78.38	78.33	84.12	83.03	82.46

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
95 - 97 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.18	0.13	0.31	0.34	0.17	0.10	0.11	0.15	0.13	0.09	0.13	0.27	0.13	0.20	0.26	0.19	0.22	0.29	0.61	0.21	1.75	0.28	0.33	0.32	0.30	0.31
2	1.88	3.39	3.63	2.74	0.71	0.44	0.36	11.88	0.60	0.86	9.03	2.92	0.72	1.29	1.83	1.69	4.84	8.04	4.69	2.02	10.53	1.88	2.32	2.89	3.17	3.15
3	8.99	11.94	9.74	4.59	1.17	0.69	5.81	17.28	1.95	17.23	27.70	4.93	2.03	3.81	5.46	10.42	30.45	24.89	8.38	8.11	15.82	5.75	6.71	9.49	10.14	9.03
4	18.99	20.48	12.92	5.69	1.45	2.02	9.34	24.67	15.83	36.21	34.34	7.45	4.40	7.78	18.85	36.75	51.88	29.73	15.15	13.08	20.51	10.49	12.62	17.75	17.40	15.54
5	26.84	24.09	14.39	6.29	2.54	3.50	13.69	44.27	33.83	41.96	38.95	11.06	7.31	20.08	41.21	54.82	55.57	37.42	20.65	16.51	24.88	15.53	18.38	24.48	23.63	21.48
6	29.99	25.80	14.95	8.04	3.87	5.45	27.53	54.75	39.11	45.80	43.95	15.22	14.26	40.08	56.30	58.18	61.06	42.60	26.00	19.83	29.78	20.47	23.35	30.38	29.36	27.19
7	31.51	26.41	17.17	9.95	5.52	12.73	39.17	57.77	42.76	49.41	48.95	25.15	29.11	53.82	59.32	62.81	64.31	47.32	32.75	24.33	35.67	25.89	28.80	36.93	35.92	33.63
8	32.28	28.81	19.39	12.05	9.81	22.72	42.89	59.62	46.54	52.90	56.25	40.73	41.83	56.80	63.39	65.71	67.75	51.78	39.82	28.92	41.03	31.15	34.14	43.27	42.14	39.67
9	34.34	31.11	21.95	16.57	15.92	27.05	45.32	60.77	50.23	57.81	62.48	52.07	44.99	60.95	66.16	68.02	70.30	55.83	45.53	32.67	45.26	35.48	38.57	48.23	46.90	44.38
10	36.53	33.63	26.66	22.98	20.00	30.25	47.58	61.80	55.78	62.09	67.02	54.50	49.59	63.75	68.21	69.92	72.77	59.75	50.85	36.27	49.21	39.61	42.71	52.71	51.24	48.77
11	38.75	37.92	32.39	27.14	23.54	33.71	49.67	62.84	60.45	65.62	68.26	57.93	52.91	65.28	69.85	71.69	74.88	62.92	55.32	39.50	52.66	43.24	46.25	56.41	54.87	52.46
12	42.19	43.05	38.25	30.77	27.30	37.35	52.74	64.02	64.60	66.73	69.54	60.37	54.73	66.55	71.37	73.23	76.49	65.45	58.85	42.28	55.50	46.25	49.13	59.31	57.71	55.36
13	46.62	46.32	39.61	34.32	30.76	43.57	55.81	65.12	65.86	67.93	70.52	62.36	56.40	67.81	72.76	74.54	77.89	67.76	62.11	44.95	58.07	49.08	51.81	61.91	60.27	58.04
14	49.69	49.23	42.91	37.48	36.15	49.82	58.72	65.52	67.15	68.69	71.45	64.17	58.21	69.06	74.00	75.74	79.19	70.02	65.25	47.63	60.55	51.89	54.43	64.39	62.72	60.66
15	52.07	52.11	45.85	41.73	43.89	55.43	59.94	66.05	68.12	69.39	72.16	65.90	59.94	70.11	75.05	76.80	80.33	72.05	68.08	50.16	62.81	54.51	56.83	66.60	64.99	63.08
16	54.65	54.67	49.70	47.13	51.34	57.67	61.08	66.42	68.86	69.94	72.78	67.44	61.46	71.03	75.97	77.75	81.33	73.85	70.63	52.56	64.85	56.94	59.06	68.64	67.06	65.30
17	57.04	57.93	54.48	53.19	54.38	59.99	61.96	67.84	69.45	70.43	73.30	68.72	62.84	71.86	76.79	78.59	82.19	75.45	72.90	54.80	66.70	59.19	61.12	70.49	68.93	67.31
18	60.16	62.24	59.19	56.10	57.72	62.16	62.79	68.75	69.98	70.83	73.71	69.82	64.10	72.61	77.50	79.32	82.94	76.88	74.95	56.91	68.38	61.29	63.04	72.16	70.62	69.14
19	63.91	66.15	61.91	59.66	60.51	63.08	63.43	69.41	70.42	71.14	74.04	70.77	65.26	73.27	78.12	79.96	83.60	78.16	76.79	58.89	69.94	63.26	64.83	73.68	72.16	70.82
20	67.64	68.42	65.13	62.66	62.12	63.88	63.98	69.87	70.78	71.39	74.30	71.61	66.32	73.85	78.67	80.53	84.18	79.31	78.44	60.77	71.39	65.10	66.48	75.05	73.56	72.36
21	70.45	71.26	68.30	64.67	63.56	64.63	64.42	70.19	71.08	71.60	74.52	72.35	67.29	74.37	79.16	81.04	84.70	80.35	79.94	62.56	72.73	66.82	68.02	76.30	74.86	73.78
22	72.66	73.40	70.60	66.51	64.96	65.30	64.79	70.44	71.34	71.78	74.72	73.01	68.18	74.85	79.59	81.51	85.16	81.31	81.30	64.24	73.96	68.42	69.45	77.44	76.04	75.07
23	74.79	75.22	72.66	68.30	66.23	65.89	65.08	70.62	71.56	71.92	74.88	73.58	69.00	75.28	79.99	81.93	85.59	82.19	82.53	65.83	75.10	69.91	70.79	78.49	77.13	76.27
24	76.30	76.85	74.62	69.95	67.38	66.41	65.33	70.76	71.76	72.05	75.01	74.10	69.76	75.68	80.35	82.31	85.97	82.99	83.64	67.33	76.16	71.31	72.03	79.46	78.14	77.38
25	77.66	78.40	76.41	71.46	68.42	66.89	65.54	70.86	71.92	72.15	75.13	74.57	70.47	76.04	80.67	82.67	86.33	83.72	84.64	68.74	77.15	72.62	73.19	80.35	79.07	78.41
26	78.97	79.81	78.02	72.85	69.39	67.32	65.72	70.95	72.07	72.24	75.24	75.00	71.13	76.38	80.98	83.00	86.65	84.39	85.54	70.08	78.07	73.84	74.27	81.17	79.94	79.35
27	80.17	81.07	79.49	74.15	70.29	67.71	65.88	71.02	72.21	72.33	75.33	75.39	71.75	76.70	81.26	83.31	86.95	85.01	86.36	71.34	78.93	74.99	75.29	81.93	80.73	80.22
28	81.26	82.22	80.84	75.35	71.12	68.08	66.02	71.08	72.34	72.41	75.42	75.75	72.34	77.01	81.53	83.60	87.23	85.59	87.10	72.53	79.74	76.07	76.24	82.63	81.47	81.02
29	82.27	83.28	82.07	76.46	71.89	68.42	66.15	71.14	72.45	72.48	75.50	76.09	72.91	77.29	81.78	83.87	87.49	86.12	87.77	73.66	80.50	77.08	77.13	83.27	82.15	81.76
30	83.20	84.25	83.18	77.50	72.62	68.75	66.27	71.18	72.56	72.54	75.58	76.41	73.44	77.56	82.02	84.13	87.73	86.61	88.38	74.73	81.21	78.03	77.96	83.87	82.78	82.44

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
97 - 100 LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.13	0.17	0.28	0.21	0.18	0.17	0.10	0.12	0.13	0.11	0.14	0.24	0.13	0.28	0.40	0.31	0.28	0.23	0.40	0.23	1.42	0.35	0.31	0.31	0.30	0.31
2	1.66	3.02	3.42	2.45	0.85	0.66	0.36	10.94	0.52	0.85	8.07	2.71	0.82	1.56	2.30	2.05	4.63	4.54	3.43	2.18	8.76	1.87	2.30	2.76	2.95	2.95
3	8.22	11.32	9.70	4.49	1.47	0.93	5.65	16.13	1.84	14.71	25.39	4.78	2.21	4.52	6.12	10.37	27.59	15.18	7.11	7.95	13.73	6.02	6.88	9.30	9.89	8.92
4	17.56	19.59	13.19	5.85	1.79	2.22	8.63	22.63	14.30	31.97	32.34	7.44	4.87	8.77	18.78	34.80	47.85	20.24	13.53	12.91	19.72	11.85	13.79	19.15	18.69	16.96
5	25.39	23.71	14.98	6.61	2.94	3.66	12.29	36.29	30.69	38.04	37.26	11.33	7.97	20.36	39.90	52.09	51.63	27.61	19.20	17.40	25.35	17.92	20.56	27.30	26.30	24.27
6	29.00	25.65	15.69	8.38	4.28	5.49	23.74	47.08	36.11	42.32	42.41	15.75	15.13	39.28	54.45	55.56	57.12	33.11	26.03	21.60	31.24	23.63	26.25	34.10	32.92	30.88
7	30.83	26.40	17.92	10.16	5.90	11.51	34.09	50.46	39.79	46.09	47.49	25.35	29.46	52.80	57.56	60.28	60.69	38.68	33.18	26.35	37.41	29.11	31.73	40.63	39.46	37.33
8	31.69	28.80	20.02	12.14	9.60	20.05	37.83	52.32	43.55	49.39	54.55	40.34	41.61	55.77	61.61	63.27	64.54	43.93	40.56	31.17	42.99	34.38	37.02	46.92	45.64	43.35
9	33.94	31.05	22.44	16.29	15.28	24.04	40.35	53.73	47.41	53.59	60.33	51.18	44.67	59.81	64.38	65.85	67.57	48.88	46.84	35.32	47.59	38.94	41.65	52.09	50.60	48.25
10	36.01	33.33	26.44	21.85	19.12	27.14	42.46	54.79	52.66	57.59	64.72	53.69	49.20	62.64	66.65	67.93	70.35	53.44	52.30	39.09	51.65	43.08	45.78	56.49	54.85	52.53
11	38.06	36.87	31.28	25.72	22.53	30.41	44.37	55.82	57.12	61.10	66.01	57.15	52.46	64.36	68.46	69.83	72.72	57.13	56.87	42.47	55.20	46.72	49.30	60.10	58.38	56.11
12	41.29	41.12	34.64	29.12	26.09	33.54	46.93	56.84	60.92	62.28	67.36	59.61	54.42	65.79	70.10	71.47	74.50	59.97	60.27	45.29	58.01	49.64	52.09	62.80	61.02	58.79
13	45.19	44.12	37.59	32.51	29.20	38.88	49.67	57.97	62.23	63.49	68.39	61.68	56.19	67.16	71.56	72.81	76.00	62.51	63.36	47.92	60.50	52.33	54.61	65.17	63.34	61.19
14	47.86	46.66	40.56	35.67	34.02	44.74	52.30	58.53	63.55	64.42	69.53	63.67	58.20	68.58	72.91	74.12	77.47	65.12	66.51	50.72	63.03	55.13	57.20	67.53	65.68	63.67
15	50.21	49.13	43.30	39.67	40.92	50.21	53.45	59.02	64.61	65.33	70.39	65.53	60.10	69.77	74.06	75.26	78.76	67.47	69.34	53.35	65.32	57.74	59.57	69.65	67.82	65.94
16	52.48	51.46	46.54	45.03	47.82	52.32	54.56	59.43	65.55	66.03	71.12	67.17	61.77	70.80	75.05	76.26	79.88	69.55	71.89	55.84	67.38	60.16	61.76	71.58	69.78	68.02
17	54.70	54.40	50.69	50.75	50.76	54.76	55.53	61.17	66.30	66.63	71.71	68.52	63.26	71.71	75.91	77.14	80.84	71.40	74.14	58.14	69.23	62.37	63.77	73.31	71.52	69.88
18	57.43	58.13	55.23	53.89	54.22	56.83	56.48	62.27	66.94	67.12	72.17	69.65	64.61	72.51	76.67	77.91	81.67	73.05	76.16	60.29	70.90	64.43	65.63	74.86	73.09	71.57
19	60.75	61.81	58.05	57.39	57.10	57.88	57.21	63.06	67.48	67.50	72.52	70.63	65.85	73.23	77.32	78.58	82.40	74.52	77.97	62.30	72.44	66.35	67.35	76.26	74.51	73.12
20	64.13	64.21	61.21	60.45	58.84	58.79	57.80	63.61	67.92	67.80	72.81	71.49	66.97	73.86	77.88	79.17	83.03	75.85	79.58	64.19	73.86	68.13	68.93	77.51	75.80	74.53
21	66.83	67.17	64.41	62.54	60.40	59.62	58.28	64.00	68.27	68.05	73.06	72.23	67.99	74.41	78.38	79.69	83.59	77.04	81.04	65.97	75.16	69.78	70.40	78.65	76.98	75.81
22	69.00	69.28	66.81	64.45	61.88	60.37	58.68	64.28	68.58	68.27	73.26	72.89	68.92	74.92	78.83	80.16	84.10	78.14	82.36	67.64	76.35	71.31	71.75	79.69	78.06	76.99
23	70.96	71.18	68.98	66.28	63.24	61.02	59.01	64.50	68.84	68.45	73.44	73.46	69.78	75.37	79.22	80.59	84.55	79.15	83.54	69.21	77.44	72.73	73.01	80.63	79.04	78.07
24	72.52	72.89	71.02	67.98	64.45	61.60	59.29	64.66	69.06	68.60	73.58	73.98	70.57	75.79	79.58	80.98	84.96	80.06	84.60	70.68	78.46	74.06	74.18	81.50	79.95	79.06
25	73.94	74.51	72.90	69.53	65.56	62.12	59.52	64.79	69.26	68.73	73.71	74.44	71.29	76.16	79.91	81.33	85.34	80.90	85.56	72.06	79.39	75.29	75.26	82.29	80.78	79.98
26	75.29	75.99	74.59	70.95	66.57	62.59	59.72	64.89	69.43	68.85	73.83	74.85	71.97	76.51	80.22	81.66	85.68	81.67	86.42	73.36	80.26	76.44	76.27	83.01	81.55	80.82
27	76.53	77.32	76.13	72.26	67.51	63.02	59.89	64.98	69.59	68.95	73.93	75.23	72.61	76.84	80.50	81.97	86.00	82.38	87.20	74.57	81.07	77.52	77.21	83.68	82.26	81.59
28	77.67	78.54	77.54	73.48	68.38	63.42	60.05	65.05	69.73	69.05	74.02	75.58	73.21	77.15	80.76	82.25	86.29	83.03	87.90	75.71	81.83	78.52	78.09	84.29	82.90	82.29
29	78.72	79.66	78.83	74.61	69.19	63.80	60.20	65.12	69.86	69.14	74.11	75.91	73.77	77.44	81.01	82.52	86.56	83.63	88.52	76.79	82.54	79.46	78.91	84.85	83.50	82.94
30	79.69	80.69	80.01	75.66	69.95	64.15	60.33	65.17	69.99	69.22	74.19	76.22	74.31	77.72	81.24	82.77	86.82	84.19	89.09	77.79	83.20	80.33	79.67	85.36	84.04	83.53

= Actual Experience

Summary of Cumulative Prepayment Rates
30-Year Fixed Rate Mortgages
Investors LTV

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	0.39	0.30	0.41	0.54	0.43	1.48	0.15	0.74	0.41	0.30	0.35	0.70	0.32	0.85	1.03	0.51	0.35	0.39	0.54	0.18	1.98	0.33	0.72	0.53	0.52	0.53
2	2.28	3.19	3.25	3.13	1.51	5.44	0.66	20.00	1.66	2.18	10.35	5.04	1.63	3.40	3.82	2.97	5.50	6.59	4.20	1.53	12.20	2.85	3.15	3.28	3.57	3.55
3	7.13	9.16	7.96	5.20	2.38	5.92	8.66	28.80	4.10	18.26	30.29	7.82	3.47	7.04	8.32	13.10	27.23	21.06	6.68	6.97	18.02	6.31	7.09	8.34	9.02	8.29
4	13.58	14.67	10.24	6.63	2.82	7.71	14.01	38.73	17.02	38.10	37.02	10.61	6.05	11.44	22.10	37.96	46.49	24.84	12.01	11.07	21.94	10.37	12.08	14.70	14.89	13.68
5	19.00	17.43	11.89	7.55	4.53	10.00	19.24	46.85	36.25	44.35	41.20	14.19	8.89	23.92	43.30	55.64	49.81	32.01	16.58	14.74	26.21	15.32	17.82	21.27	21.16	19.70
6	21.55	18.99	12.81	9.35	6.55	12.60	31.29	57.60	42.22	48.47	45.45	18.17	15.48	43.15	57.81	58.96	55.29	36.79	22.20	18.60	31.25	20.68	23.36	27.88	27.63	26.10
7	23.14	19.93	14.87	11.50	9.16	19.97	43.59	60.90	45.95	52.04	49.59	27.91	30.28	56.35	61.00	63.47	59.07	42.95	30.28	24.51	38.26	27.60	30.48	36.31	35.99	34.26
8	24.13	22.13	17.50	14.03	13.30	30.50	48.32	62.77	49.84	55.19	55.70	43.48	43.64	59.27	65.04	66.34	64.09	49.50	40.04	31.36	45.59	35.19	38.23	45.46	44.85	42.91
9	26.28	24.92	20.29	17.96	19.51	35.77	51.18	64.06	53.49	59.50	61.06	54.83	46.64	63.12	67.76	69.17	67.38	54.55	47.00	36.35	50.72	40.66	43.74	51.51	50.65	48.68
10	28.59	27.44	24.45	23.90	23.93	39.26	53.55	65.14	59.07	62.97	65.26	57.32	51.18	65.77	70.00	71.31	70.14	58.77	52.43	40.50	54.82	45.10	48.10	56.04	55.05	53.15
11	30.99	31.60	30.01	28.19	27.91	42.80	55.65	66.16	63.75	66.06	66.38	60.75	54.58	67.55	71.84	73.29	72.57	62.33	57.15	44.29	58.44	49.02	51.85	59.84	58.78	56.95
12	34.28	36.49	33.81	31.71	31.53	46.12	58.02	67.09	67.60	67.20	67.60	63.25	56.85	69.00	73.47	75.01	74.56	65.50	61.57	47.84	61.68	52.57	55.20	63.24	62.13	60.42
13	38.62	40.35	37.05	35.22	34.67	52.02	60.22	67.95	68.86	68.37	68.56	65.24	58.90	70.39	74.96	76.48	76.27	68.33	65.49	51.12	64.53	55.81	58.24	66.21	65.05	63.50
14	41.81	43.57	40.51	38.27	39.16	57.99	62.42	68.44	70.27	69.23	69.41	67.05	61.06	71.76	76.29	77.83	77.84	70.98	69.07	54.30	67.20	58.92	61.10	68.92	67.75	66.40
15	44.99	46.63	43.26	41.88	45.75	62.78	63.34	68.90	71.27	69.90	70.09	68.71	63.05	72.91	77.41	78.99	79.16	73.24	72.10	57.16	69.54	61.70	63.63	71.24	70.12	68.93
16	47.68	49.13	46.78	47.14	52.06	64.59	64.30	69.25	71.99	70.43	70.67	70.17	64.80	73.91	78.37	79.99	80.27	75.16	74.69	59.76	71.58	64.19	65.87	73.27	72.18	71.13
17	50.27	52.63	51.19	52.57	54.90	66.63	65.16	70.42	72.63	70.94	71.20	71.48	66.44	74.83	79.24	80.89	81.24	76.90	77.04	62.25	73.48	66.55	68.00	75.14	74.07	73.15
18	53.29	56.79	55.89	55.58	58.17	68.48	65.86	71.26	73.21	71.38	71.64	72.61	67.94	75.65	80.00	81.68	82.08	78.45	79.11	64.57	75.19	68.73	69.96	76.79	75.74	74.94
19	57.27	60.88	58.71	58.88	61.09	69.38	66.43	71.92	73.72	71.74	72.00	73.61	69.31	76.38	80.67	82.37	82.80	79.81	80.91	66.72	76.77	70.76	71.75	78.25	77.22	76.54
20	61.47	63.62	62.04	62.06	62.99	70.17	66.95	72.44	74.16	72.05	72.31	74.49	70.55	77.03	81.25	82.99	83.43	81.01	82.47	68.74	78.21	72.61	73.38	79.55	78.55	77.97
21	65.71	67.57	66.35	64.46	64.72	70.93	67.39	72.83	74.53	72.31	72.58	75.26	71.68	77.61	81.77	83.54	83.99	82.07	83.86	70.63	79.51	74.32	74.86	80.69	79.72	79.24
22	68.09	70.17	69.25	66.66	66.39	71.63	67.77	73.14	74.86	72.54	72.81	75.95	72.71	78.14	82.23	84.04	84.50	83.01	85.04	72.37	80.69	75.88	76.22	81.69	80.75	80.36
23	70.34	72.43	71.86	68.78	67.94	72.26	68.10	73.39	75.15	72.75	73.01	76.56	73.66	78.62	82.65	84.49	84.95	83.86	86.07	73.99	81.75	77.31	77.46	82.59	81.68	81.36
24	72.37	74.48	74.30	70.76	69.34	72.83	68.38	73.59	75.41	72.92	73.19	77.10	74.53	79.06	83.04	84.91	85.36	84.62	86.98	75.49	82.71	78.62	78.58	83.38	82.50	82.25
25	74.22	76.40	76.52	72.56	70.63	73.36	68.62	73.75	75.63	73.08	73.34	77.60	75.34	79.46	83.39	85.29	85.72	85.29	87.78	76.87	83.57	79.82	79.61	84.09	83.24	83.03
26	75.97	78.15	78.50	74.22	71.83	73.84	68.84	73.89	75.84	73.22	73.48	78.04	76.08	79.83	83.71	85.64	86.05	85.90	88.49	78.15	84.36	80.91	80.55	84.72	83.89	83.72
27	77.58	79.72	80.28	75.75	72.94	74.29	69.04	74.01	76.03	73.34	73.61	78.45	76.79	80.18	84.01	85.96	86.35	86.46	89.11	79.33	85.08	81.92	81.39	85.27	84.46	84.33
28	79.02	81.14	81.87	77.16	73.96	74.71	69.22	74.11	76.20	73.46	73.73	78.83	77.44	80.51	84.29	86.26	86.63	86.96	89.64	80.41	85.74	82.83	82.15	85.77	84.98	84.87
29	80.35	82.39	83.27	78.45	74.91	75.10	69.38	74.20	76.36	73.56	73.84	79.17	78.06	80.82	84.54	86.54	86.89	87.41	90.10	81.40	86.34	83.66	82.85	86.22	85.44	85.36
30	81.56	83.53	84.54	79.64	75.80	75.47	69.54	74.29	76.51	73.66	73.95	79.50	78.64	81.11	84.79	86.80	87.13	87.82	90.50	82.31	86.89	84.40	83.48	86.62	85.87	85.80

= Actual Experience