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July 2002

MORTGAGE FINANCING

Changes in the Performance of FHA-Insured Loans

G A O

Accountability ⋆ Integrity ⋆ Reliability

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Abbreviations

ARM	Adjustable rate mortgage
Fannie Mae	Federal National Mortgage Association
FHA	Federal Housing Administration
Freddie Mac	Federal Home Loan Mortgage Corporation
HUD	Department of Housing and Urban Development
LTV	Loan-to-value

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United States General Accounting Office
Washington, D.C. 20548

July 10, 2002

The Honorable Marge Roukema
Chairwoman, Subcommittee on Housing
and Community Opportunity
Committee on Financial Services
House of Representatives

Dear Madam Chairwoman:

The Department of Housing and Urban Development (HUD), through its Federal Housing Administration (FHA), provides insurance for private lenders against losses on home mortgages. The insurance program is supported by the Mutual Mortgage Insurance Fund (Fund). To help place the Fund on a financially sound basis, the Congress enacted legislation in November 1990 that required the Secretary of HUD to, among other things, take steps to ensure that the Fund achieve and maintain an economic value of at least 2 percent of the Fund's insurance-in-force.[1] In February 2001 we reported that a 2 percent capital ratio appeared sufficient to withstand moderately severe economic downturns that could lead to worse-than-expected loan performance.[2] However, we cautioned against concluding that the Fund could withstand the specified economic scenarios regardless of the future activities of FHA or the market. Specifically, we noted that our estimates and those of others are valid only under a certain set of conditions, including that recently insured FHA loans respond to economic conditions similarly to the response of those insured in the more distant past. At the end of fiscal year 2001, loans originated in the most recent 4 fiscal years accounted for about 70 percent of FHA's portfolio.

Concerned about reported increases in FHA's default and foreclosure rates, you asked that we assess the performance of loans made in recent years and the implications for the Fund of any worsening loan performance. To address your concerns, we (1) describe how the early performance of FHA loans originated in recent years differs from the performance of loans

[1]The economic value of the Fund is the sum of existing capital resources plus the net present value of future cash flows.

[2]These included scenarios that are based on recent regional experiences and on the 1981 through1982 national recession. See U.S. General Accounting Office, *Mortgage Financing: FHA's Fund Has Grown, but Options for Drawing on the Fund Have Uncertain Outcomes*, GAO-01-460 (Washington, D.C.: Feb. 28, 2001).

originated earlier; (2) describe changes in FHA's program or the conventional mortgage market that could explain recent loan performance; and (3) assess whether the overall riskiness of FHA's portfolio is greater than we previously estimated and assess the impact that any increased riskiness might have on the ability of the Fund to withstand worse-than-expected loan performance.

To meet these objectives, we used data provided by FHA to compare foreclosure rates for FHA-insured loans over time by the type of loan, the location of the property, and the amount of the loan as a percentage of the property's value (loan-to-value ratio). We reviewed FHA guidance, trade literature, and publicly available information to identify changes in the FHA and conventional mortgage market that could explain any differences in loan performance for recently originated loans. Finally, using the model that we developed for our prior report and basing it on the experience of FHA loans insured from fiscal years 1975 through 1995, we also compared the estimated and actual foreclosure rates through 2001 of loans insured from fiscal years 1996 through 2001. Appendix I provides a more detailed description of our scope and methodology. Appendix II provides a technical description of the model we used to assess estimated and actual loan performance.

We conducted our work from July 2001 through June 2002, in accordance with generally accepted government auditing standards.

Results in Brief

Although FHA loans made in recent years have experienced somewhat higher foreclosure rates than loans made in the years immediately preceding them, recent loans are performing much better than loans made in the 1980s. Specifically, FHA loans made during the 1990s had lower cumulative foreclosures by the fourth year after origination than similarly aged loans made during the 1980s. However, foreclosure rates were somewhat higher for loans originated during the latter 1990s than they were earlier in the decade. Specifically, through their fourth year, loans insured during fiscal years 1990 through 1994 had an average cumulative foreclosure rate of 2.23 percent, while loans originated later in the decade had an average foreclosure rate of 2.93 percent. Foreclosure rates were even higher for adjustable rate mortgages and mortgages on properties located in California. Specifically, between 1990 and 1994 the 4-year cumulative foreclosure rate for adjustable rate mortgages, which nearly doubled in volume during the 1990s, averaged 2.53 percent, as compared with a 3.90 percent average 4-year cumulative foreclosure rate for

adjustable rate mortgages originated between 1995 and 1998. California, which accounted for 15 percent of the dollar value of all single-family loans FHA insured during the 1990s, had an average foreclosure rate of 6.41 percent for both fixed rate and adjustable rate mortgages. In comparison, the 4-year cumulative foreclosure rate for FHA loans insured during the 1990s outside of California averaged 1.97 percent. Part of the increase in the overall foreclosure rate during the 1990s is attributable to the increasing number of loans with higher loan-to-value ratios. However, regardless of the loan-to-value ratio of a loan, foreclosure rates generally were higher for loans made later in the decade.

Although economic factors such as house price appreciation are key determinants of mortgage foreclosure, changes in underwriting requirements as well as changes in the conventional mortgage market may partly explain the higher foreclosure rates experienced later in the 1990s. Since 1995 there have been numerous changes to FHA's underwriting procedures, designed mainly to increase homeownership opportunities. Generally, these changes have allowed more borrowers who may not have met previous underwriting standards to qualify for loans, or have increased the loan amounts for which these borrowers qualify. In addition, since 1995 private mortgage insurers have been more likely to insure loans with low down payments for borrowers whom the private insurers identified as being relatively low risk. As a result of both types of changes, the risk associated with FHA's loan portfolio may have increased since 1995. FHA also took steps to tighten underwriting and to mitigate losses from foreclosures. Because of data limitations, we were unable to directly estimate the effect of changes in FHA underwriting and the conventional mortgage market on loan performance. Specifically, the data that FHA collects at the individual loan level on items such as credit scores and debt-to-income ratios, which would allow such an analysis, have not been collected for a sufficient number of years or are not sufficiently detailed to permit their inclusion in a model that estimates the impact of economic variables on loan performance.

Although more years of loan performance are necessary to make a definitive judgment, our analysis suggests that factors not fully captured in the model we used for our February 2001 report may be affecting the performance of recent FHA loans and causing the overall riskiness of FHA's portfolio to be somewhat greater than we previously estimated. These factors could include the changes in underwriting and in the conventional mortgage market described above. In particular, we found that foreclosure rates through the end of fiscal year 2001, for books of business insured after fiscal year 1995, are greater than what would be anticipated from a model based on the performance of loans insured from 1975 through 1995.[3] Thus the Fund may be somewhat less able to withstand worse-than-expected loan performance resulting from adverse economic conditions. We continue to urge caution in concluding that the Fund can withstand specified economic scenarios regardless of how recently insured loans respond to economic conditions.

We presented a draft of this report to officials from HUD for their review and comment. They provided written comments that are reprinted in appendix IV. Generally, HUD officials agreed with the findings of the report and commented that the underwriting changes made in 1995 allowed FHA to be successful in its mission of increasing homeownership opportunities for underserved groups.

Background

FHA was established in 1934 under the National Housing Act (P.L. 73-479) to broaden homeownership, shore up and protect lending institutions, and stimulate employment in the building industry. FHA insures private lenders against losses on mortgages that finance purchases of properties with one to four housing units. Many FHA-insured loans are made to low-income, minority, and first-time homebuyers.

[3]A book of business represents all loans insured during a given year.

Generally, lenders require borrowers to purchase mortgage insurance when the value of the mortgage is large relative to the price of the house. FHA provides most of its single-family insurance through a program supported by the Mutual Mortgage Insurance Fund. The economic value of the Fund, which consists of the sum of existing capital resources plus the net present value of future cash flows, depends on the relative size of cash outflows and inflows over time. Cash flows out of the Fund from payments associated with claims on foreclosed properties, refunds of up-front premiums on mortgages that are prepaid, and administrative expenses for management of the program. To cover these outflows, FHA deposits cash inflows—up-front and annual insurance premiums from participating homebuyers and the net proceeds from the sale of foreclosed properties—into the Fund. If the Fund were to be exhausted, the U.S. Treasury would have to cover lenders' claims and administrative costs directly. The Fund remained relatively healthy from its inception until the 1980s, when losses were substantial, primarily because of high foreclosure rates in regions experiencing economic stress, particularly the oil-producing states in the West South Central section of the United States.[4] These losses prompted the reforms that were first enacted in November 1990 as part of the Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508). The reforms, designed to place the Fund on an actuarially sound basis, required the Secretary of HUD to, among other things, take steps to ensure that the Fund attained a capital ratio of 2 percent of the insurance-in-force by November 2000 and to maintain or exceed that ratio at all times thereafter.[5] As a result of the 1990 housing reforms, the Fund must meet not only the minimum capital ratio requirement but also operational goals before the Secretary of HUD can take certain actions that might reduce the value of the Fund. These operational goals include meeting the mortgage credit needs of certain homebuyers while maintaining an adequate capital ratio, minimizing risk, and avoiding adverse selection. However, the legislation does not define what constitutes adequate capital or specify the economic conditions that the Fund should withstand.

[4]The West South Central region comprises Arkansas, Louisiana, Oklahoma, and Texas.

[5]The Act defined the capital ratio as the ratio of the Fund's capital, or economic net worth, to its unamortized insurance-in-force. However, the Act defined unamortized insurance-in-force as the remaining obligations on outstanding mortgages—a definition generally understood to apply to amortized insurance-in-force. FHA has calculated the 2 percent capital ratio using unamortized insurance-in-force as it is generally understood—which is the initial amount of mortgages.

The 1990 reforms also required that an independent contractor conduct an annual actuarial review of the Fund. These reviews have shown that during the 1990s the estimated value of the Fund grew substantially. At the end of fiscal year 1995, the Fund attained an estimated economic value that slightly exceeded the amount required for a 2 percent capital ratio. Since that time, the estimated economic value of the Fund continued to grow and always exceeded the amount required for a 2 percent capital ratio. In the most recent actuarial review, Deloitte & Touche estimated the Fund's economic value at about $18.5 billion at the end of fiscal year 2001. This represents about 3.75 percent of the Fund's insurance-in-force.

In February 2001 we reported that the Fund had an economic value of $15.8 billion at the end of fiscal year 1999. This estimate implied a capital ratio of 3.20 percent of the unamortized insurance-in-force. The relatively large economic value and high capital ratio reported for the Fund reflected the strong economic conditions that prevailed during most of the 1990s, the good economic performance that was expected for the future, and the increased insurance premiums put in place in 1990.

In our February 2001 report we also reported that, given the economic value of the Fund and the state of the economy at the end of fiscal year 1999, a 2 percent capital ratio appeared sufficient to withstand moderately severe economic scenarios that could lead to worse-than-expected loan performance. These scenarios were based upon recent regional experiences and the national recession that occurred in 1981 and 1982. Specifically, we found that such conditions would not cause the economic value of the Fund at the end of fiscal year 1999 to decline by more than 2 percent of the Fund's insurance-in-force. Although a 2 percent capital ratio also appeared sufficient to allow the Fund to withstand some more severe scenarios, we found that three of the most severe scenarios we tested would cause the economic value of the Fund to decline by more than 2 percent of the Fund's insurance-in-force.[6] These results suggest that the existing capital ratio was more than sufficient to protect the Fund from many worse-than-expected loan performance scenarios. However, we cautioned that factors not fully captured in our economic models could

[6]These scenarios included (1) a scenario in which the entire nation experiences a downturn similar to the one New England experienced during the late 1980s and early 1990s, (2) a scenario in which FHA experiences foreclosure rates similar to those it experienced in the late 1980s, and (3) a scenario in which 35.6 percent or more of FHA loans experience foreclosure rates similar to those experienced by FHA in the West South Central portion of the United States in the late 1980s.

affect the Fund's ability to withstand worse-than-expected experiences over time. These factors include recent changes in FHA's insurance program and the conventional mortgage market that could affect the likelihood of poor loan performance and the ability of the Fund to withstand that performance.

In deciding whether to approve a loan, lenders rely upon underwriting standards set by FHA or the private sector. FHA's underwriting guidelines require lenders to establish that prospective borrowers have the ability and willingness to repay a mortgage. In order to establish a borrower's willingness and ability to pay, these guidelines require lenders to evaluate four major elements: qualifying ratios and compensating factors; stability and adequacy of income; credit history; and funds to close.

In recent years, private mortgage insurers and conventional lenders have begun to offer alternatives to borrowers who want to make small or no down payments.[7] Private lenders have also begun to use automated underwriting as a means to better target low-risk borrowers for conventional mortgages. Automated underwriting relies on the statistical analysis of hundreds of thousands of mortgage loans that have been originated over the past decade to determine the key attributes of the borrower's credit history, the property characteristics, and the terms of the mortgage note that affect loan performance. The results of this analysis are arrayed numerically in what is known as a "mortgage score." A mortgage score is used as an indicator of the foreclosure or loss risk to the lender.

[7]Conventional mortgage lenders, by offering second mortgages of up to 23 percent of the value of the house, sometimes allow borrowers to borrow more than the value of the house without obtaining mortgage insurance.

Early Performance of FHA Loans Originated during the Late 1990s Has Declined Slightly

During their early years, FHA loans insured from fiscal year 1995 through fiscal year 1998 have shown somewhat higher cumulative foreclosure rates than FHA loans insured from fiscal year 1990 through fiscal year 1994, but these rates are well below comparable rates for FHA loans insured in the 1980s. To better understand how foreclosure rates might vary, we compared the rates for different types of loans—fixed-rate and adjustable rate mortgages (ARMs)—locations of properties, and loan-to-value (LTV) ratios. For loans made in recent years, FHA has been experiencing particularly high foreclosure rates for ARMs and mortgages on properties located in California. One measure of the initial risk of a loan, its LTV, can partly explain the difference over time in foreclosure rates. That is, FHA insured relatively more loans with high LTVs later in the decade than it insured earlier in the decade. However, the same pattern of higher foreclosure rates in the later 1990s exists even after differences in LTV are taken into account.[8]

Foreclosure Rates Are Somewhat Higher for FHA Loans Made Later in the 1990s, but Do Not Approach the Levels for Loans Made in the Previous Decade

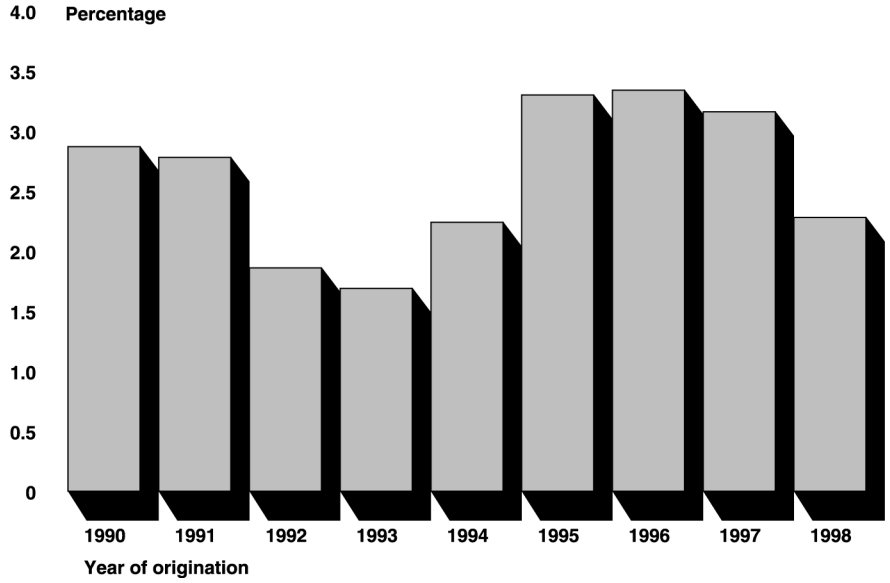
We compared the four-year cumulative foreclosure rates across books of business to measure the performance of FHA's insured loans.[9] As shown in figure 1, the 4-year cumulative foreclosure rate for FHA-insured loans was generally higher for loans originated later in the 1990s than for loans originated earlier in that decade.[10] Through their fourth year, loans originated during fiscal years 1990 through 1994 had an average cumulative foreclosure rate of 2.23 percent, while loans originated during fiscal years 1995 through 1998 had an average cumulative foreclosure rate of 2.93 percent.

[8]Later in this report we discuss in some detail the potential impact that both changes in FHA's program and competition from conventional lenders may have on foreclosure rates for FHA-insured loans, and on the riskiness of FHA's portfolio.

[9]We selected a 4-year cumulative foreclosure rate because it best balanced the competing goals of having the greatest number of recent observations and the greatest number of years of experience. We also examined a 3-year cumulative foreclosure rate across books of business originated between 1990 and 1999 and found a similar pattern in foreclosure rates. Therefore, we concluded that a 4-year cumulative claim rate was a reasonable indicator of loan performance.

[10]These figures represent the original loan amount of the foreclosed loans for which FHA paid a claim during the first 4 years of the life of these mortgages as a percentage of the total value of mortgages originated in that year.

Figure 1: National 4-Year Cumulative Foreclosure Rates for All FHA Loans Originated during Fiscal Years 1990–1998

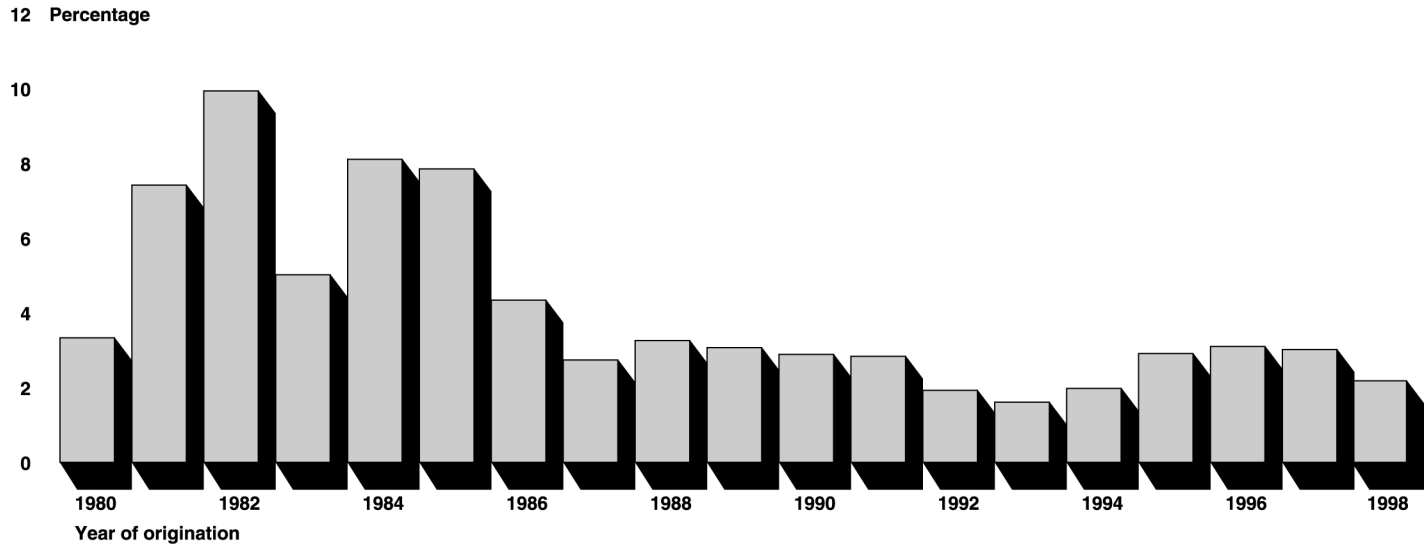


Note: Data for all figures are in appendix III.

Source: GAO analysis of FHA data.

Although the 4-year cumulative foreclosure rates for loans that FHA insured in the later part of the 1990s were higher than that for loans that FHA insured earlier in that decade, those rates were still well below the high levels experienced for loans that FHA insured in the early- to mid-1980s, as shown in figure 2. The 4-year cumulative foreclosure rates for FHA loans originated between 1981 and 1985, a period of high interest and unemployment rates and low house price appreciation rates, ranged between 5 and 10 percent, while the rates for loans originated during the 1990s, when economic conditions were better, have consistently been below 3.5 percent.

Figure 2: National 4-Year Cumulative Foreclosure Rates for All FHA Loans Originated during Fiscal Years 1980–1998

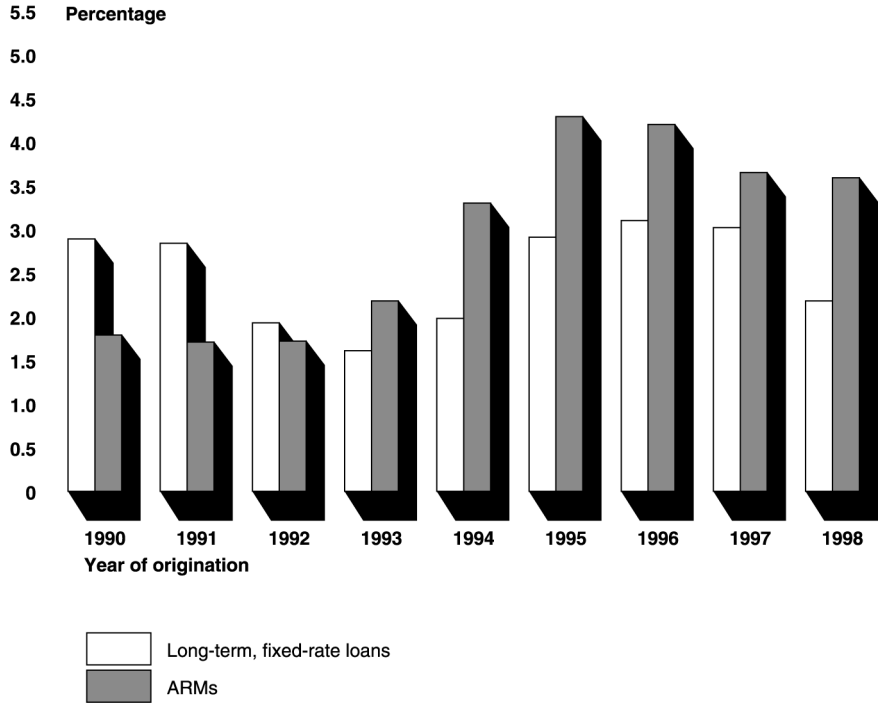


Source: GAO analysis of FHA data.

FHA Foreclosure Rates Have Been Particularly High for Adjustable Rate Mortgages

Since fiscal year 1993, FHA has experienced higher 4-year cumulative foreclosure rates for ARMs than it has for long-term (generally 30-year) fixed-rate mortgages, as shown in figure 3. In addition, between 1990 and 1994 the 4-year cumulative foreclosure rate for ARMs averaged 2.53 percent, as compared with a 3.90 percent average 4-year cumulative foreclosure rate for ARMs originated between 1995 and 1998. These higher foreclosures have occurred even though mortgage interest rates have been generally stable or declining during this period.

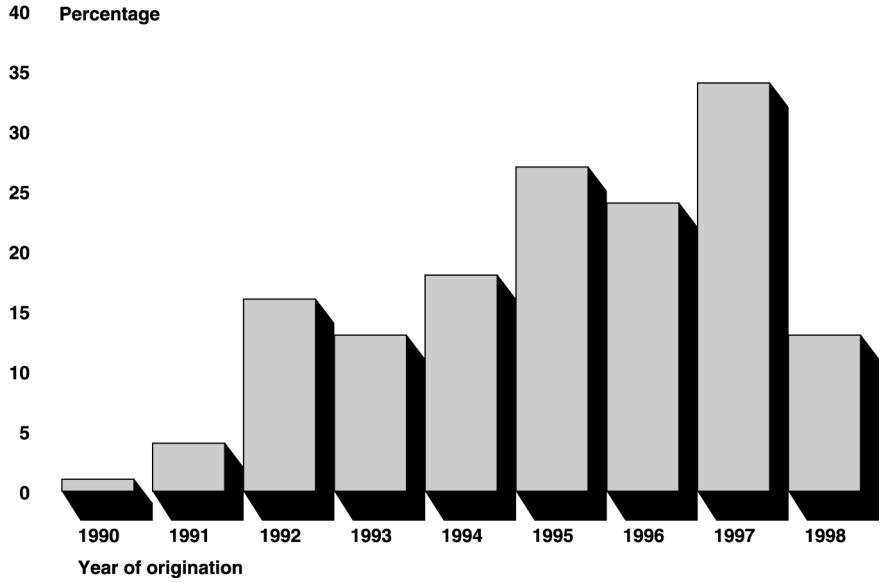
Figure 3: National 4-Year Cumulative Foreclosure Rates for All FHA Loans Originated during Fiscal Years 1990–1998, by Loan Type



Source: GAO analysis of FHA data.

In the early 1990s, when ARMs were performing better than fixed-rate mortgages, the performance of ARMs had relatively little impact on the overall performance of loans FHA insured because FHA insured relatively few ARMs. However, as shown in figure 4, later in the decade ARMs represented a greater share of the loans that FHA insured, so their performance became a more important factor affecting the overall performance of FHA loans. FHA is studying its ARM program and has contracted with a private consulting firm to examine the program's design and performance.

Figure 4: Adjustable Rate Mortgages as Share of All FHA Loans Originated during Fiscal Years 1990–1998



Source: GAO analysis of FHA data.

FHA Foreclosure Rates Have Been Particularly High in California

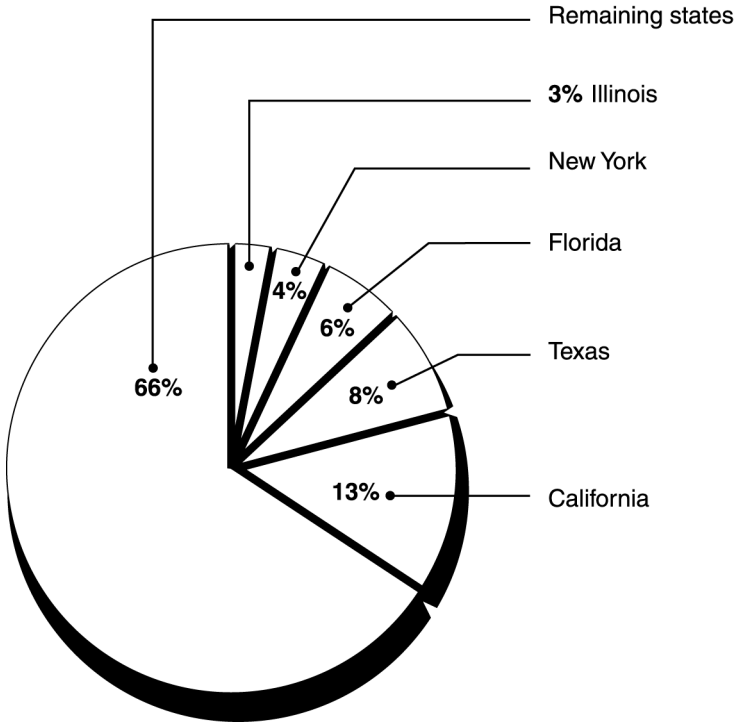
FHA insured a greater dollar value of loans in the 1990s in California than in any other state. Among the states in which FHA does the largest share of its business, 4-year cumulative foreclosure rates for both long-term, fixed-rate mortgages and ARMs were typically highest in California. California, which accounted for 15 percent of the dollar value of all single-family loans that FHA insured during the 1990s, had an average foreclosure rate of 6.41 percent for both fixed rate and ARMs. In comparison, the 4-year cumulative foreclosure rate for FHA loans insured during the 1990s outside of California averaged 1.97 percent. According to FHA, the poor performance of FHA loans originated in California was attributable to poor economic conditions that existed during the early- to mid-1990s, coupled

with the practice of combining FHA's interest-rate buy-down program with an ARM to qualify borrowers in California's high-priced housing market.[11]

The five states with the greatest dollar value of long-term fixed-rate mortgages insured by FHA during the 1990s were California, Texas, Florida, New York, and Illinois. Loans insured in these states made up about one-third of FHA's business for this loan type from fiscal year 1990 through fiscal year 1998, with California alone accounting for about 13 percent, as shown in figure 5. As a result, the performance of loans insured in California can significantly affect the overall performance of FHA's portfolio of loans of this type.

[11]Buy downs allow sellers to pay a nominal amount to lower (or buy down) the homebuyer's interest rate for the first year. With lower first-year payments, buyers can more easily qualify for a mortgage for which they otherwise would have been ineligible. According to FHA, some homebuyers, when faced with a large increase in mortgage payments after the buy down period, had a greater likelihood of defaulting on their mortgages.

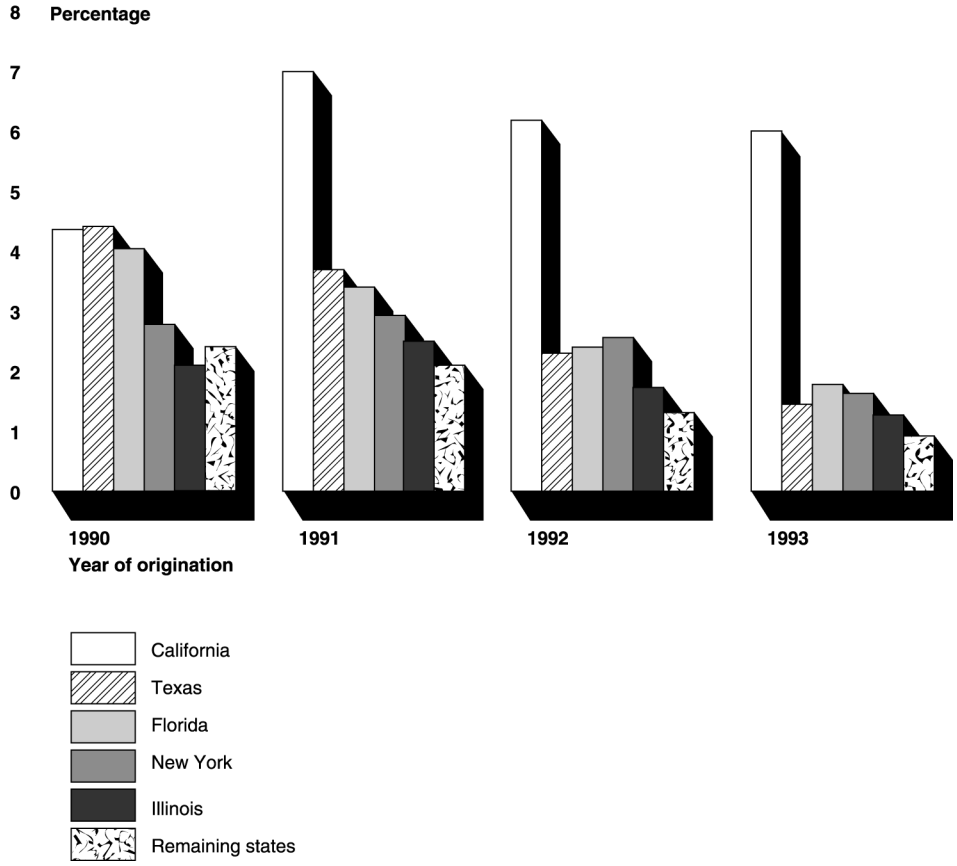
Figure 5: Share in Selected States of FHA Long-Term, Fixed-Rate Loans Originated during Fiscal Years 1990–1998

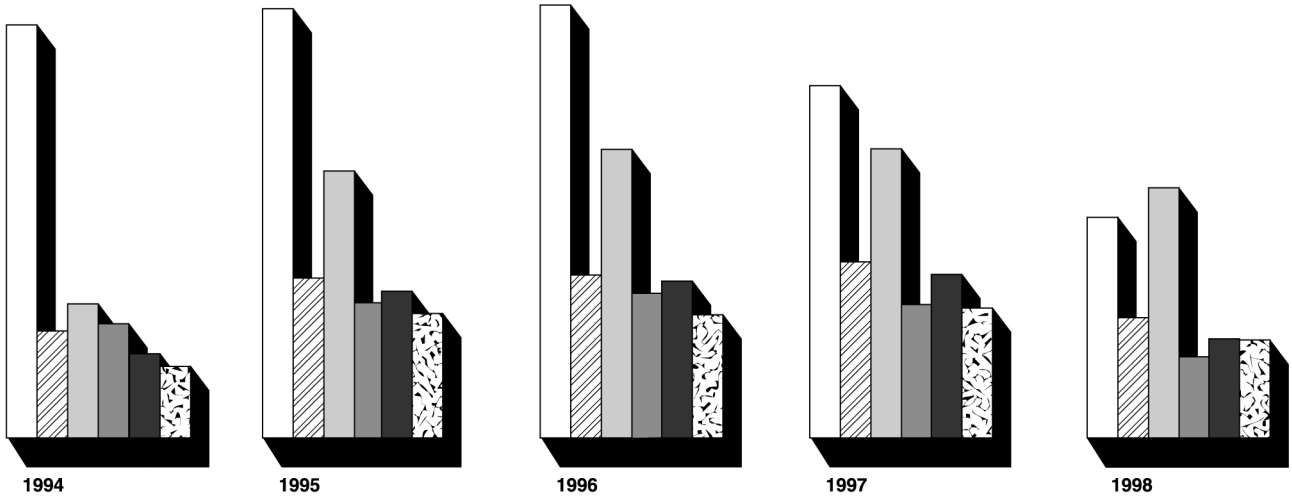


Source: GAO analysis of FHA data.

For long-term fixed-rate mortgages that FHA insured in California from fiscal year 1990 through fiscal year 1998, the 4-year cumulative foreclosure rates averaged about 5.6 percent. As shown in figure 6, Florida, Texas, and New York also had relatively high 4-year foreclosure rates during the early 1990s. And Florida experienced relatively high 4-year cumulative foreclosure rates again from 1995 through 1998. For states that were not among the five states with the greatest share of fixed-rate mortgages, the 4-year cumulative foreclosure rates for the same type of loan over the same period averaged less than 2 percent.

Figure 6: National 4-Year Cumulative Foreclosure Rates in Selected States for FHA Long-Term, Fixed-Rate Loans Originated during Fiscal Years 1990–1998

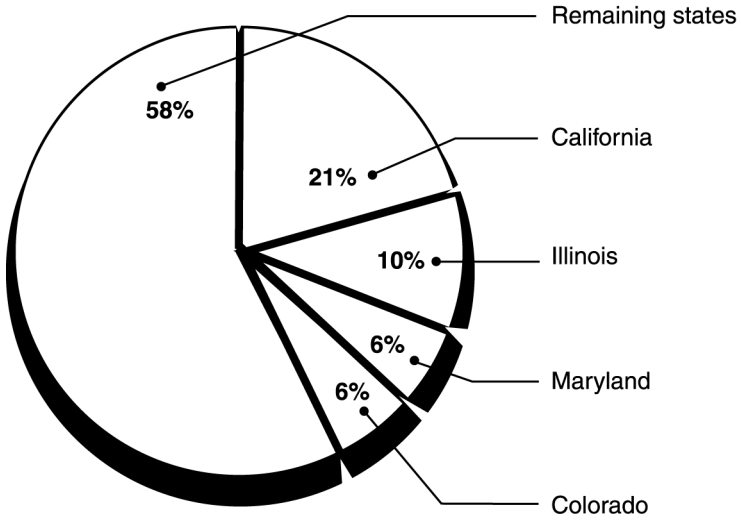




Source: GAO analysis of FHA data.

The four states with the highest dollar value of ARMs insured by FHA during the 1990s were California, Illinois, Maryland, and Colorado. Loans insured in these states made up about 42 percent of FHA's business for this loan type, with California alone accounting for about 21 percent, as shown in figure 7. As a result, the performance of ARMs insured in California can significantly affect the overall performance of FHA's portfolio of loans of this type.

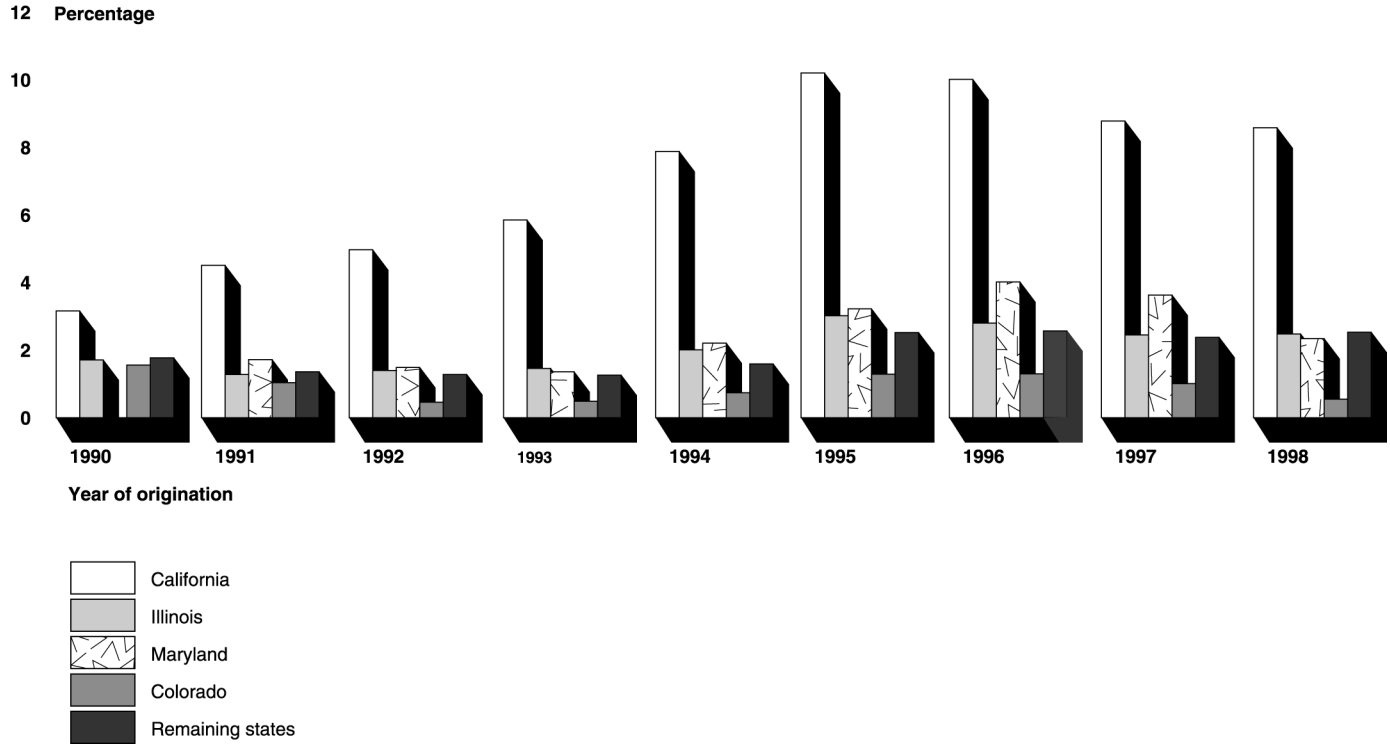
Figure 7: Share of FHA Adjustable Rate Mortgages, in Selected States, Originated during Fiscal Years 1990–1998



Source: GAO analysis of FHA data.

As shown in figure 8, the 4-year cumulative foreclosure rates for ARMs that FHA insured in California were consistently higher than the rates for any of the other three states with the largest dollar volume of ARMs insured by FHA, as well as the average rate for the remaining 46 states and the District of Columbia combined. In fact, for ARMs that FHA insured in California in fiscal years 1995 and 1996, the 4-year cumulative foreclosure rate was about 10 percent, more than twice as high as the rate for any of the other three states with the highest dollar volume of loans or for the remaining 46 states and the District of Columbia combined.

Figure 8: National 4-Year Cumulative Foreclosure Rates in Selected States for FHA Adjustable Rate Mortgages Originated during Fiscal Years 1990–1998



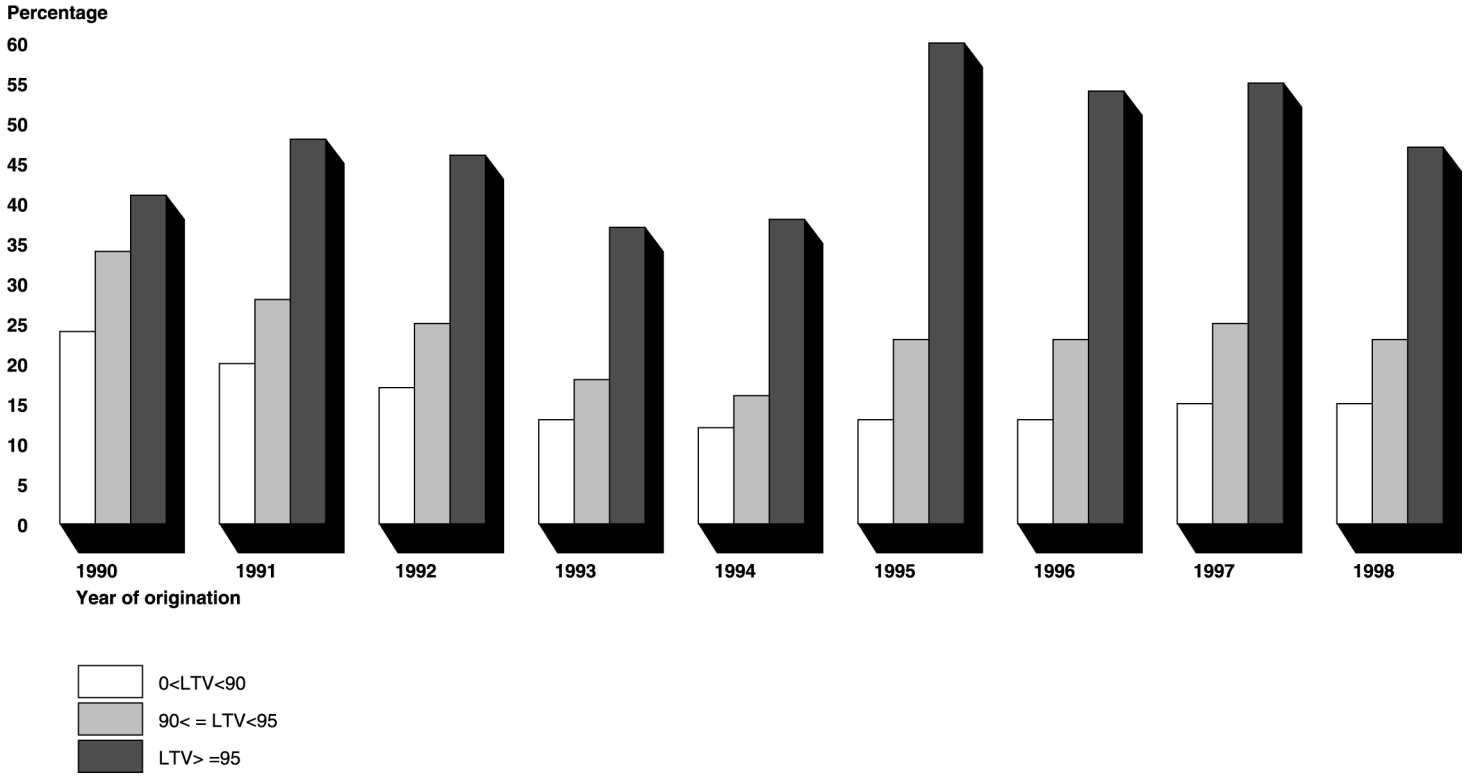
Source: GAO analysis of FHA data.

Difference in LTV Ratios Can Explain Part but Not All of the Difference in Foreclosure Rates

Although differences in the share of FHA-insured loans with high LTVs (above 95 percent) may be a factor accounting for part of the difference in cumulative foreclosure rates between more recent loans and loans insured earlier in the 1990s, the same pattern exists even when differences in LTV are taken into account. As shown in figure 9, the share of FHA-insured loans with LTVs of 95 percent or more was higher later in the 1990s.[12]

[12]For this analysis and the one that follows, we do not include loans for which the recorded LTV is zero.

Figure 9: Share of FHA Loans within Various LTV Categories for Loans Originated during Fiscal Years 1990–1998



Note: Excludes loans whose LTV equals zero.

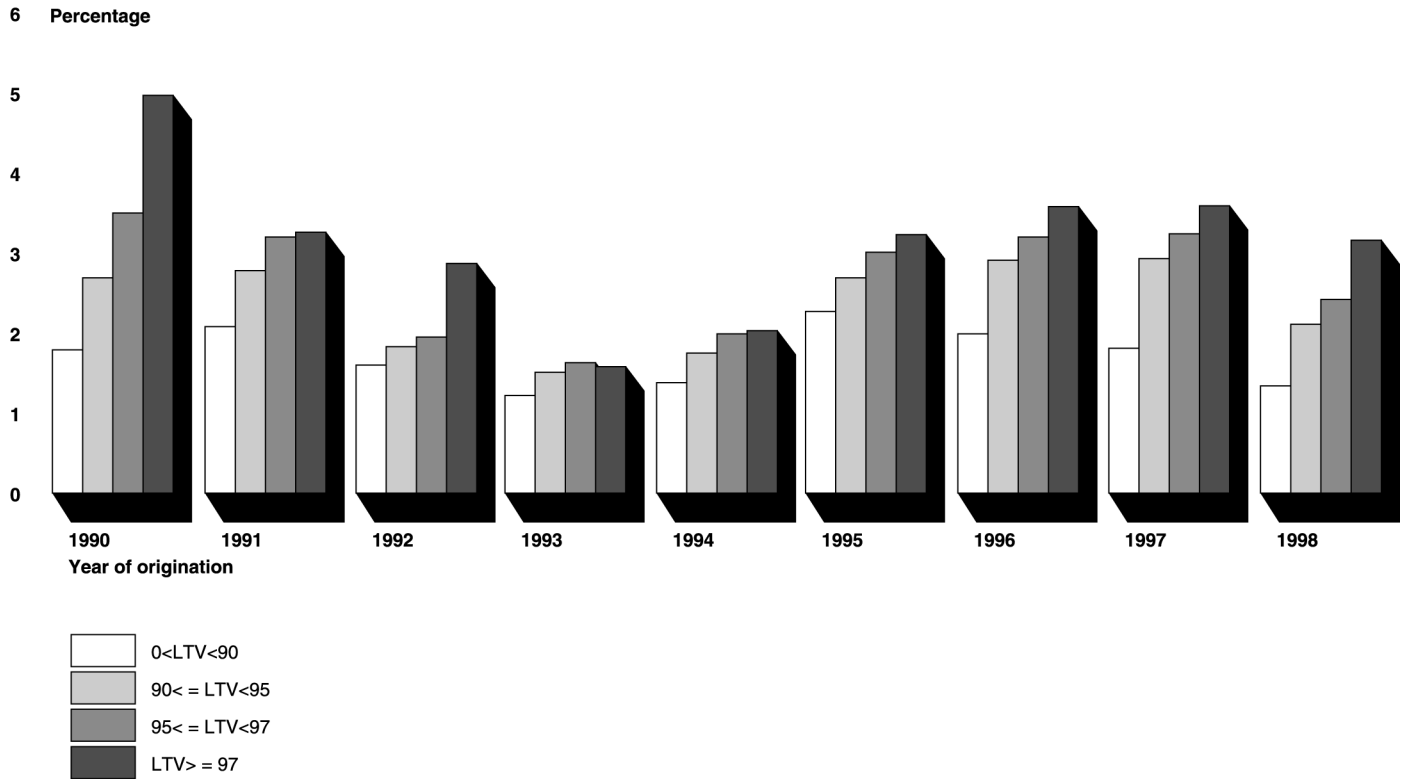
Source: GAO analysis of FHA data.

Generally, as shown in figure 10, higher LTV ratios, which measure borrowers' initial equity in their homes, are associated with higher foreclosure rates.[13] However, figure 10 also shows that the same general pattern over time for the 4-year cumulative foreclosure rates that was shown in figure 1 continues to exist even when the loans are divided into

[13]In previous modeling work we also found that even when the effects of other factors are taken into account, higher LTVs are associated with a greater likelihood of foreclosure.

categories by LTV.[14] Thus, differences in LTV alone cannot account for the observed differences in foreclosure rates.

Figure 10: National 4-Year Cumulative Foreclosure Rates for Selected LTV Classes of Long-Term, Fixed-Rate FHA Mortgages Originated during Fiscal Years 1990–1998



Note: Excludes loans whose LTV equals zero. These loans showed a similar pattern of foreclosure rates.

Source: GAO analysis of FHA data.

Finally, we also considered whether the differences in foreclosures rates could be explained by differences in prepayment rates. Higher prepayment rates might be associated with lower foreclosure rates: if a higher

[14]For the purpose of this analysis, we grouped FHA loans into four categories by LTV: LTV greater than or equal to 97 percent; LTV at least 95 percent but less than 97 percent; LTV at least 90 percent but less than 95 percent; and LTV greater than zero but less than 90 percent.

percentage of loans in a book of business are prepaid, then only a smaller share of the original book of business might be subject to foreclosure. However, we found that during the 1990s, prepayment rates showed the same pattern across the years as foreclosure rates and, if anything, were generally higher when foreclosure rates were higher, suggesting that less frequent prepayment was not a factor explaining higher foreclosure rates in the late 1990s.

Program- and Market-Related Changes that Could Explain Higher Foreclosure Rates

Although economic factors such as house-price-appreciation rates are key determinants of mortgage foreclosure, a number of program- and market-related changes occurring since 1995 could also affect the performance of recently insured FHA loans. Specifically, in 1995 FHA made a number of changes in its single-family insurance program that allow borrowers who otherwise might not have qualified for home loans to obtain FHA-insured loans. These changes also allow qualified borrowers to increase the amount of loan for which they can qualify. According to HUD, these underwriting changes were designed to expand homeownership opportunities by eliminating unnecessary barriers to potential homebuyers. The proportion of FHA purchase-mortgages made to first-time homebuyers increased from 65 percent in 1994 to 78 percent at the end of March 2002 and the proportion of FHA purchase-mortgages made to minority homebuyers increased from 25 percent to 42 percent. At the same time, there has been increased competition from private mortgage insurers offering mortgages with low down payments to borrowers identified as relatively low risk. The combination of changes in FHA's program and the increased competition in the marketplace may partly explain the higher foreclosure rates of FHA loans originated since fiscal year 1995. FHA has since made changes that may reduce the likelihood of mortgage default, including requiring that, when qualifying an FHA borrower for an ARM, the lender use the ARM's second year mortgage rate rather than the first-year rate. In addition, FHA has implemented a new loss-mitigation program.[15] Because certain data that FHA collects on individual loans have not been collected for a sufficient number of years or in sufficient detail, we were

[15]Loss mitigation refers to steps taken by the mortgage lender to avoid foreclosure. In November 1996 FHA implemented a new loss mitigation program that included a range of options that helped homeowners to either retain their homes or dispose of them in ways that reduced the costs of foreclosure for both the homeowners and FHA.

unable to estimate the effect of changes in FHA's program and competition from conventional lenders on FHA loan performance.

Changes in FHA's Underwriting Guidelines Could Have Resulted in Higher Foreclosure Rates

FHA issued revised underwriting guidelines in fiscal year 1995 that, according to HUD, represented significant underwriting changes that would enhance the homebuying opportunities for a substantial number of American families.[16] These underwriting changes made it easier for borrowers to qualify for loans and allowed borrowers to qualify for higher loan amounts. However, the changes may also have increased the likelihood of foreclosure. The loans approved with more liberal underwriting standards might, over time, perform worse relative to existing economic conditions than those approved with the previous standards. The revised standards decreased what is included as borrowers' debts and expanded the definition of what can be included as borrowers' effective income when lenders calculate qualifying ratios.[17] In addition, the new underwriting standards expanded the list of compensating factors that could be considered in qualifying a borrower, and they relaxed the standards for evaluating a borrower's credit history.

FHA Has Changed How It Defines Long-Term Debt

The underwriting changes that FHA implemented in 1995 can decrease the amount of debt that lenders consider in calculating one of the qualifying ratios, the debt-to-income ratio, which is a measure of the borrower's ability to pay debt obligations. This change results in some borrowers having a lower debt-to-income ratio than they would otherwise have, and it increases the mortgage amount for which these borrowers can qualify. For example, childcare expenses were considered a recurring monthly debt in

[16]In 1994, FHA established an Underwriting Working Group to review FHA's underwriting guidelines and recommend changes and modifications that would eliminate unnecessary barriers to homeownership; provide the flexibility to underwrite creditworthy nontraditional and underserved borrowers; and, clarify certain underwriting requirements so that they are not applied in a discriminatory manner. The group's recommendations formed the basis for underwriting changes made in fiscal year 1995.

[17]FHA uses two qualifying ratios to determine whether a borrower will be able to meet the expenses involved in homeownership. The payment-to-income ratio (not to exceed 29 percent) examines a borrower's expected monthly housing expenses as a percentage of monthly income; the debt-to-income ratio (not to exceed 41 percent) looks at a borrower's expected monthly housing expenses plus long-term debt as a percentage of monthly income. Both ratios can be exceeded if significant compensating factors exist. Compensating factors are conditions related to the borrower that may be used in justifying approval of a mortgage with qualifying ratios exceeding FHA benchmark guidelines.

the debt-to-income ratio prior to 1995, but FHA no longer requires that these expenses be considered when calculating the debt-to-income ratio.

Another change affecting the debt-to-income ratio is that only debts extending 10 months or more are now included in the ratio; previously, FHA required all debts extending 6 months or more to be included. As a result of this change, borrowers can have short-term debts that might affect their ability to meet their mortgage payments, but these debts would not be included in the debt-to-income ratio. However, FHA does encourage lenders to consider all of a borrower's obligations and the borrower's ability to make mortgage payments immediately following closing.

FHA Has Changed How It Defines Effective Income

The 1995 changes not only decreased the amount of debt considered in the debt-to-income ratio; they also increased the amount of income considered—increasing the number of borrowers considered able to meet a particular level of mortgage payments. When calculating a borrower's effective income, lenders consider the anticipated amount of income and the likelihood of its continuance. Certain types of income that were previously considered too unstable to be counted toward effective income are now acceptable in qualifying a borrower. For example, FHA previously required income to be expected to continue for 5 years in order for it to be considered as effective income. Now income expected to continue for 3 years can be used in qualifying a borrower. Similarly, FHA now counts income from overtime and bonuses toward effective income, as long as this income is expected to continue. Before 1995, FHA required that such income be earned for 2 years before counting it toward effective income.

FHA Uses Additional Compensating Factors to Qualify Borrowers

If borrowers do not meet the qualifying ratio guidelines for a loan of a given size, lenders may still approve them for an FHA-insured mortgage of that size. FHA's 1995 revised handbook on underwriting standards adds several possible compensating factors or circumstances that lenders may consider when determining whether a borrower is capable of handling the mortgage debt. For example, lenders may consider food stamps or other public benefits that a borrower receives as a compensating factor increasing the borrower's ability to pay the mortgage. These types of benefits are not included as effective income, but FHA believes that receiving food stamps or other public benefits positively affects the borrower's ability to pay the mortgage. Lenders may also consider as a compensating factor a borrower's demonstrated history of being able to pay housing expenses equal to or greater than the proposed housing expense. In FHA's revised handbook, the section on compensating factors now states, "If the borrower over the past 12 to 24 months has met his or her housing

obligation as well as other debts, there should be little reason to doubt the borrower's ability to continue to do so despite having ratios in excess of those prescribed."

FHA Has Changed How It Evaluates Borrowers' Past Credit History

In addition to changes affecting borrowers' qualifying ratios, the 1995 underwriting changes affected how FHA lenders are supposed to evaluate credit history to determine a borrower's willingness and ability to handle a mortgage. As with qualifying ratios and compensating factors, FHA relies on the lender's judgment and interpretation to determine prospective borrowers' creditworthiness. The 1995 underwriting changes affected FHA guidelines regarding unpaid federal liens as well as credit and credit reports. Specifically, before 1995, borrowers were ineligible for an FHA-insured mortgage if they were delinquent on any federal debt or had any federal liens, including taxes, placed on their property. Following the 1995 changes, borrowers may qualify for a loan even if federal tax liens remain unpaid. FHA guidelines stipulate that a borrower may be eligible as long as the lien holder subordinates the tax lien to the FHA-insured mortgage. If the borrower is in a payment plan to repay liens, lenders may also approve the mortgage if the borrower meets the qualifying ratios calculated with these payments. Finally, FHA expanded the options available to lenders to evaluate a borrower's credit history. The previous guidance on developing credit histories mentions only rent and utilities as nontraditional sources of credit history. Lenders can now elect to use a nontraditional mortgage credit report developed by a credit reporting agency if no other credit history exists.[18] Lenders may also develop a credit history by considering a borrower's payment history for rental housing and utilities, insurance, childcare, school tuition, payments on credit accounts with local stores, or uninsured medical bills.[19] In general, FHA advises lenders that an individual with no late housing or installment debt payments should be considered as having an acceptable credit history.

[18]A nontraditional credit report is designed to assess the credit history for borrowers without the credit references normally appearing on a traditional credit report. In developing a nontraditional credit report, credit agencies are to consider only the type of credit that requires periodic payments, such as payments for rental housing, utilities, telephone and cable service, insurance payments, school tuition, and medical bills.

[19]Since 1992, a borrower's lack of credit history cannot be used as a basis for rejecting a loan application. At that time, FHA began requiring lenders to use an alternate method of verifying credit (or establishing an alternative credit history) for borrowers with no credit history by documenting rent and utility payments.

Increased Competition and Changes in the Conventional Mortgage Market Could Have Resulted in Higher FHA Foreclosure Rates

Increased competition and recent changes in the conventional mortgage market could also have resulted in FHA's insuring relatively more loans that carry greater risk. Homebuyers' demand for FHA-insured loans depends, in part, on the alternatives available to them. In recent years, FHA's competitors in the mortgage insurance market—private mortgage insurers and conventional mortgage lenders—have increasingly offered products that compete with FHA's for those homebuyers who are borrowing more than 95 percent of the value of their home. In addition, automated underwriting systems and credit-scoring analytic software such as those introduced by the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) in 1996 are believed to be able to more effectively distinguish low-risk loans for expedited processing. The improvement of conventional lenders' ability to identify low-risk borrowers might increase the risk profile of FHA's portfolio as lower-risk borrowers choose conventional financing with private mortgage insurance, which is often less expensive. In addition, by lowering the required down payment, conventional mortgage lenders and private mortgage insurers may have attracted some borrowers who might otherwise have insured their mortgages with FHA. If, by selectively offering these low down payment loans to better risk borrowers, conventional mortgage lenders and private mortgage insurers were able to attract FHA's lower-risk borrowers, recent FHA loans with down payments of less than 5 percent may be more risky on average than they have been historically. FHA is taking some action to more effectively compete with the conventional market. For example, FHA is attempting to implement an automated underwriting system that could enhance the ability of lenders underwriting FHA-insured mortgages to distinguish better credit risks from poorer ones. Although this effort is likely to increase the speed with which lenders process FHA-insured loans, it may not improve the risk profile of FHA borrowers unless lenders can lower the price of insurance for better credit risks.

FHA Has Taken Steps to Improve the Quality of Its Underwriting

Since 1996, FHA has revised and tightened some guidelines, specifically in underwriting ARMs, identifying sources of cash reserves and requiring more documentation from lenders. These steps should reduce the riskiness of loans that FHA insures. In a 1997 letter to lenders, FHA expressed concern about the quality of the underwriting of ARMs, particularly when a buy down is used, and reminded lenders that the first-year mortgage-interest rate must be used when qualifying the borrower (rather than the lower rate after the buy down). FHA also stipulated that lenders should

consider a borrower's ability to absorb increased payments after buy down periods. FHA also emphasized that lenders should rarely exceed FHA's qualifying ratio guidelines in the case of ARMs. In 1998, seeing that borrowers were still experiencing trouble handling increased payments after the buy down period, FHA required borrowers to be qualified at the anticipated second-year interest rate, or the interest rate they would experience after the buy down expired, and it prohibited any form of temporary interest-rate buy down on ARMs. These changes will likely reduce the riskiness of ARMs in future books of business.

FHA has also required stricter documentation from lenders on the use of compensating factors and gift letters in mortgage approvals. In a June 10, 1997, letter to lenders, FHA expressed concern about an increased number of loans with qualifying ratios above FHA's guidelines for which the lender gave no indication of the compensating factors used to justify approval of the loans. FHA emphasized in this letter that lenders are required to clearly indicate which compensating factor justified the approval of a mortgage and to provide their rationale for approving mortgages above the qualifying ratios. Similarly, in an effort to ensure that any gift funds a borrower has come from a legitimate source, FHA has advised lenders of the specific information that gift letters should contain and the precise process for verifying the donor or source of the gift funds.

In 2000, FHA also tightened its guidelines on what types of assets can be considered as cash reserves. Although cash reserves are not required, lenders use cash reserves to assess the riskiness of loans. FHA noticed that in some cases lenders considered questionable assets as cash reserves. For example, lenders were overvaluing assets or including assets such as 401(k)s or IRAs that were not easily converted into cash. As a result, FHA strengthened its policy and required lenders to judge the liquidity of a borrower's assets when considering a borrower's cash reserves. The new policy requires lenders, when considering an asset's value, to account for any applicable taxes or withdrawal penalties that borrowers may incur in converting the asset to cash.

FHA Has Implemented a New Loss Mitigation Program that Could Reduce Foreclosures and Foreclosure Losses

In 1996 Congress passed legislation directing FHA to terminate its Single-Family Mortgage Assignment Program.[20] FHA ceased accepting assignment applications for this program on April 26, 1996. The same legislation authorized FHA to implement a new program that included a range of loss mitigation tools designed to help borrowers either retain their home's or to dispose of their property in ways that lessen the cost of foreclosure for both the borrowers and FHA. Specifically, the loss mitigation program provides a number of options for reducing losses, including special forbearance, loan modification, partial claim, pre-foreclosure sale, and deed-in-lieu-of-foreclosure (see table 1 for an explanation of these options). To encourage lenders to engage in loss mitigation, FHA offers incentive payments to lenders for completing each loss mitigation workout. In addition, lenders face a variety of financial penalties for failing to engage in loss mitigation. FHA's loss mitigation program went into effect on November 12, 1996; however, use was initially fairly low, with only 6,764 loss mitigation cases realized in fiscal year 1997, as lenders began to implement the new approach. HUD experienced substantial growth in loss mitigation claims over the next 4 fiscal years, with total claims reaching 25,027 in fiscal year 1999 and 53,389 in fiscal year 2001. The three loss mitigation tools designed to allow borrowers to remain in their homes—special forbearance, loan modification, and partial claim—realized the largest increase in use. In contrast, the use of deed-in-lieu-of-foreclosure and pre-foreclosure sale, options resulting in insurance claims against the Fund, declined.[21]

[20]Until April 26, 1996, lenders servicing FHA loans were required to either recommend that HUD accept assignment of FHA-insured mortgage notes that had become 90 days delinquent or initiate foreclosure proceedings. If loans were accepted for assignment, HUD paid an insurance claim to the servicer and became the holder and servicer of the loan.

[21]Incentive claims for taking loss mitigation actions are paid to the mortgage lender or servicer for the three home retention tools—special forbearance, loan modification, and partial claim. However, for deed-in-lieu and pre-foreclosure sales, the loan is terminated and an insurance claim, similar to that paid when an FHA loan is foreclosed, is paid to the mortgage lender or servicer.

Table 1: Description of FHA's Loss Mitigation Tools Available to Lenders

Loss mitigation tool	Type of action taken by lender
Special forbearance	The use of a long-term repayment plan that may provide for reduced or suspended payments when there is a reasonable likelihood that the borrower can resume normal payments.
Loan modification	A permanent change in the term, interest rate, or loan type of a mortgage to accommodate inclusion of the accumulated delinquency. The new monthly payment may be higher or lower than the existing payment.
Partial claim	Provides for funds to be advanced from the Fund to repay past amounts due on the mortgage for a borrower. To be eligible for this option, a borrower must have long-term financial stability to support the mortgage debt but lack the resources to cure the delinquency.
Pre-foreclosure sale	When the borrower is unable or unwilling to maintain ownership and the market value of the property is less than the level of debt, this option allows the borrower to sell the property and apply the proceeds to retire the debt.
Deed-in-lieu-of- foreclosure	If a pre-foreclosure sale is not feasible, the borrower may deed the property to HUD to avoid foreclosure.

Source: *An Assessment of FHA's Single-Family Mortgage Insurance Loss Mitigation Program: Final Report*, Abt Associates Inc., November 30, 2000.

Existing Data Preclude a Full Assessment of the Impact of FHA Program and Conventional Mortgage Market Changes on Mortgage Default Rates

Existing FHA data are not adequate to assess the impact of both FHA program changes and the changes in the conventional mortgage market on FHA default rates. Adequately assessing the impact of those changes would require detailed data on information used during loan underwriting to qualify individual borrowers. Such data on qualifying ratios, use of compensating factors, credit scores, and sources and amount of income would allow FHA to assess how factors key to determining the quality of its underwriting have changed over time. In addition, these data could be used in a more comprehensive analysis of the relationship among FHA foreclosures and FHA program design, the housing market, and economic conditions. Some of the data required for that type of assessment and analysis are not collected by FHA, while other data elements have not been collected for a sufficient number of years to permit modeling the impact of underwriting changes on loan performance.

Since 1993, FHA has collected data on items such as payment-to-income and debt-to-income ratios, monthly effective income, and total monthly debt payments. However, FHA has not collected more detailed information on individual components of income and debt, such as overtime, bonus income, alimony and childcare payments, or length of terms for installment debt. Nor does FHA collect information on the use by lenders of compensating factors in qualifying borrowers for FHA insurance. These

data would be required, for example, to analyze the impact on loan performance of underwriting changes that FHA implemented in 1995.

One of the most important measures of a borrower's credit risk is the borrower's credit score. Lenders began using credit scores to assess a borrower's likelihood of default in the mid-1990s. In March 1998, FHA approved Freddie Mac's automated underwriting system for use by lenders in making FHA-insured loans and began collecting data on borrower credit scores for those loans underwritten using the system. Similarly, in August 1999 FHA approved the use of Fannie Mae's and PMI Mortgage Servicers' automated underwriting systems, and it currently collects credit scores on loans underwritten using these systems. According to HUD officials, FHA plans to begin collecting credit score data on all FHA-insured loans underwritten through either automated underwriting systems or conventional methods.

Finally, because of the newness of FHA's loss mitigation program and the several years required for a loan delinquency to be completely resolved, it is difficult to measure the impact that loss mitigation activities will ultimately have on the performance of FHA loans. As recently as 2000, substantial revisions to the program were made that could improve the program's effectiveness according to Abt Associates Inc.[22] A recent audit of the program by HUD's Office of Inspector General noted the large increase in usage of loss mitigation strategies and concluded that the program is reducing foreclosures and keeping families in their homes.

Performance of Recent Loans Suggests that FHA's Portfolio May Be Riskier than Previously Estimated

The overall riskiness of FHA loans made in recent years appears to be greater than we had estimated in our February 2001 report on the Mutual Mortgage Insurance Fund, reducing to some extent the ability of the Fund to withstand worse-than-expected loan performance.[23] Although more years of loan performance are necessary to make a definitive judgment, factors not accounted for in the models that we used for that report appear to be affecting the performance of loans insured after 1995 and causing the

[22]See *An Assessment of FHA's Single-Family Mortgage Insurance Loss Mitigation Program: Final Report*, Abt Associates Inc., November 30, 2000.

[23]See U.S. General Accounting Office, *Mortgage Financing: FHA's Fund Has Grown, but Options for Drawing on the Fund Have Uncertain Outcomes*, GAO-01-460 (Washington, D.C.: Feb. 28, 2001).

overall riskiness of FHA's portfolio to be greater than we previously estimated. In that report we based our estimate of the economic value of the Fund (as of the end of fiscal year 1999), in part, on econometric models that we developed and used to forecast future foreclosures and prepayments for FHA-insured loans based on the historical experience of loans dating back to 1975. However, a large share of the loans in FHA's portfolio at that time were originated in fiscal years 1998 and 1999, and therefore there was little direct evidence of how those loans would perform. As a result, at the time that we released that estimate we cautioned that recent changes in FHA's insurance program and the conventional mortgage market, such as those discussed in the previous section, could be causing recent loans to perform differently, even under the same economic conditions, from earlier loans.

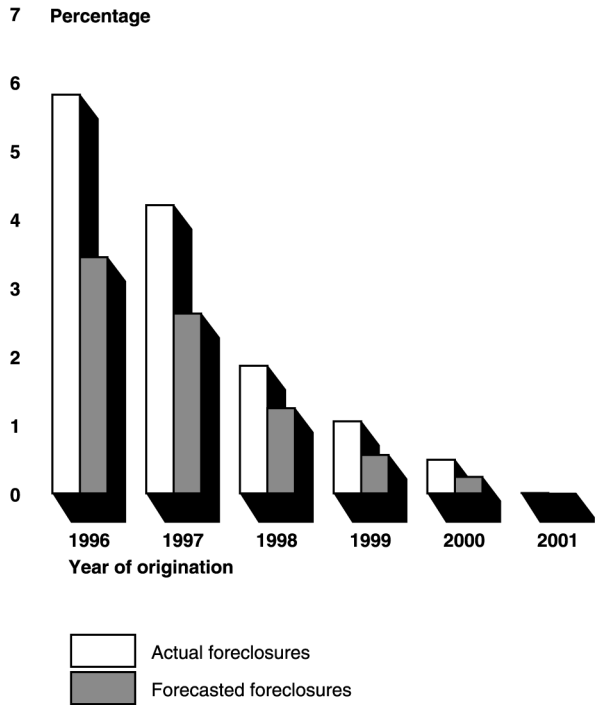
To estimate the potential impact of these changes, we first used our previous model to develop estimates of the relationship between, on the one hand, the probability of foreclosure and prepayment and, on the other hand, key explanatory factors such as borrower equity and unemployment for loans insured between fiscal years 1975 and 1995.[24] On the basis of these estimates and of the actual values beyond 1995 for key economic variables, such as interest and unemployment rates and the rate of house price appreciation, we forecasted the performance (both foreclosures and prepayments) of loans that FHA insured from fiscal year 1996 through fiscal year 2001. We then compared those forecasts with the actual experience of those loans. (See app. II for a full discussion of our methodology.) As is shown in figure 11, for each year's book of business, we found that cumulative foreclosure rates through the end of fiscal year 2001 exceeded our forecasted levels.[25] For example, for the book of business with the longest experience, loans insured in 1996, we forecasted that the cumulative foreclosure rate through the end of fiscal year 2001 would be 3.44 percent, but the actual foreclosure rate was 5.81 percent. These results suggest that some factors other than those accounted for in

[24]For our previous work, we used data on loans insured through fiscal year 1999.

[25]These figures represent the total value of unpaid balances on loans for which FHA paid claims as a percentage of the total value of mortgages originated.

the model may be causing loans insured after 1995 to perform worse thanwould be expected based on the historical experience of older loans.[26]

Figure 11: Actual and Forecasted Cumulative Foreclosure Rates for FHA Loans Insured during Fiscal Years 1996–2001, as of September 30, 2001



Note: The number of years of data varies by book of business. For example, there are up to 6 years of data on the performance of loans originated in 1996, while there is only 1 year of data for loans originated in 2001. Thus, the foreclosure rates for loans originated in 1996 represent 6-year cumulative foreclosure rates, while the foreclosure rates for loans originated in 2001 represent 1-year cumulative foreclosure rates.

Source: GAO analysis of FHA data.

The fact that cumulative foreclosures for recent FHA-insured loans have been greater than what would be anticipated from a model based on the performance of loans insured from fiscal year 1975 through fiscal year 1995

[26]We view this evidence as merely suggestive because we have only a few years of experience with these loans, particularly those insured after 1997. After more years have passed, the evidence on the performance of loans insured after 1995 will be more conclusive.

suggests that the caution we expressed in our 2001 report about the effect of recent changes in FHA's insurance program and the conventional mortgage market on the ability of the Fund to withstand future economic downturns is still warranted. In particular, the performance of loans insured in fiscal years 1998 and 1999, which represented about one-third of FHA's loan portfolio at the end of 1999, could be worse than what we previously forecasted. In turn, lower performance by these loans could affect the economic value of the Fund and its ability to withstand future economic downturns.

To assess the extent of this effect, we would need to know the extent to which the performance of loans insured in fiscal years 1998 and 1999 has been and will be worse than what we forecasted in developing our previous estimate of the economic value of the Fund. Because loans insured in fiscal years 1998 and 1999 have not completely passed through the peak years for foreclosures,[27] these loans' foreclosures to date provide only a limited indication of their long-term performance. We do, however, have a better indication of the long-term performance of loans insured in fiscal years 1996 and 1997 because they are older loans with more years of experience. The experience of these loans suggests that changes that are not accounted for in our models are causing these books of business to have higher foreclosure rates than would be anticipated from a model based on the performance of earlier loans. If loans insured in fiscal years 1998 and 1999 are affected by changes that are not accounted for in our models in the same way that loans insured in fiscal years 1996 and 1997 appear to be affected, then the 1998 and 1999 loans will continue to have higher cumulative foreclosure rates than we estimated. Higher foreclosure rates, in turn, imply a lower economic value of the Fund, which is generally estimated as a baseline value under an expected set of economic conditions. With a lower baseline economic value of the Fund under expected economic conditions, the Fund would be less able to withstand adverse economic conditions.

To better understand the reasons for the increased risk of recently originated FHA loans would require additional data on factors that might explain loan performance—including qualifying ratios and credit scores. Even if these historical data were available today, it is too soon to estimate with confidence the impact that recent changes will ultimately have on

[27]The peak foreclosure years for a book of business are generally the third through seventh years of the loans.

recently insured loans because many of these loans have not yet reached the peak years when foreclosures usually occur. Recently insured loans represent the majority of FHA's portfolio. The impact of underwriting changes and changes in the conventional mortgage market on the riskiness of the portfolio is not fully understood. Understanding this risk will give a better basis for determining whether the Fund has an adequate capital ratio, and also whether program changes are in order to adjust that level of risk.

Agency Comments and Our Evaluation

We obtained written comments on a draft of this report from HUD officials. The written comments are presented in appendix IV. Generally HUD agreed with the report's findings that the underwriting changes made in 1995 likely increased the riskiness of FHA loans insured after that year. HUD commented that fiscal year 1995 was the first year in which FHA exceeded the 2 percent capital ratio mandated by the National Affordable Housing Act of 1990. According to HUD, by making the 1995 underwriting changes FHA modestly increased the risk characteristics of FHA loans and, by doing so, allowed FHA to achieve its mission of increasing homeownership opportunities for underserved groups. HUD also provided information, which has been incorporated into the final report as appropriate, on the change in homeownership rates among underserved groups since 1994.

As agreed with your offices, unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days after its issuance date. At that time, we will send copies of this report to the Ranking Minority Member of the House Subcommittee on Housing and Community Opportunity and other interested members of Congress and congressional committees. We will also send copies to the HUD Secretary and make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

Please contact me or Mathew J. Scire at (202) 512-6794, or Jay Cherlow at (202) 512-4918, if you or your staff have any questions concerning this report. Key contributors to this report were Jill Johnson, DuEwa Kamara, Mitch Rachlis, Mark Stover, and Pat Valentine.

Sincerely yours,

Richard J. Hillman
Director, Financial Markets and
Community Investment

Scope and Methodology

We initiated this review to determine (1) how the early performance of FHA loans originated in recent years has differed from loans originated in earlier years; (2) how changes in FHA's program and the conventional mortgage market might explain recent loan performance; and (3) if there is evidence that factors affecting the performance of recent FHA loans may be causing the overall riskiness of FHA's portfolio to be greater than what we previously estimated, and if so what effect this might have on the ability of the Fund to withstand future economic downturns.

To address these objectives, we obtained and analyzed data on loans insured by FHA from 1990 through 1998 by year of origination; by loan type (fixed interest rates versus adjustable interest rates); by loan-to-value ratio; and by location of the property, for selected states that held the greatest share of FHA-insured loans. We compared the foreclosure rates for the first 4 years of these loans. We selected a 4-year cumulative foreclosure rate as a basis for comparing books of business because it best balanced the competing goals of having the greatest number of observations and the greatest number of years of foreclosure experience.[28] We also interviewed HUD officials and reviewed HUD mortgagee letters, trade literature, and publicly available information on the conventional mortgage market. Finally, using the model that we developed for our prior report and basing it on the experience of FHA loans insured from fiscal years 1975 through 1995, we also compared the estimated and actual foreclosure rates through 2001 of loans insured from fiscal years 1996 through 2001.

We worked closely with HUD officials and discussed the interpretation of HUD's data. Although we did not independently verify the accuracy of the data, we did perform internal checks to determine (1) the extent to which the data fields were coded; and (2) the reasonableness of the values contained in the data fields. We checked the mean, median, mode, skewness, and high and low values for each of the variables used.

We conducted our review in Washington, D.C., between July 2001 and June 2002 in accordance with generally accepted government auditing standards.

[28]We also examined 3 years of foreclosure experience and found that the relative foreclosure rates for each book of business exhibited similar patterns.

Models Used to Forecast Defaults and Prepayments for FHA-Insured Mortgages

For an earlier report,[29] we built econometric and cash flow models to estimate the economic value of FHA's Mutual Mortgage Insurance Fund (Fund) as of the end of fiscal year 1999. In that report, we acknowledged that factors not fully captured in our models could affect the future performance of loans in FHA's portfolio and, therefore, the ability of the Fund to withstand worse-than-expected economic conditions. In particular, we suggested that these factors could include changes in FHA's insurance program and the conventional insurance market. For our current report we sought to assess whether there is evidence that factors not captured in our previous model may be causing the overall riskiness of FHA's portfolio to be greater than we previously estimated and, if so, would that have a substantial effect on the ability of the Fund to withstand future economic downturns. In this appendix, we describe how we conducted that assessment.

Our basic approach was to (1) reestimate the econometric models built for our previous report using the same specifications as before and data on loans insured by FHA in all 50 states and the District of Columbia, but excluding U.S. territories, from 1975 through 1995 (in the previous report, we used data on loans originated through 1999); (2) use the estimated coefficients and actual values of our explanatory variables during the forecasted period to forecast foreclosures and prepayments through fiscal year 2001 for loans insured from fiscal year 1996 through fiscal year 2001; and (3) compare the forecasted and actual foreclosures and prepayments for these loans during that time. A finding that our foreclosure model fit the data well for loans insured from 1975 through 1995, but consistently underestimated foreclosure rates for post-1995 loans, would suggest that there had been a structural change in the post-1995 period not captured in our models that might cause the future performance of FHA-insured loans to be worse than we estimated for our previous report.

Our econometric models used observations on loan years—that is, information on the characteristics and status of an insured loan during each year of its life—to estimate conditional foreclosure and prepayment probabilities.[30] These probabilities were estimated using observed patterns of prepayments and foreclosures in a large set of FHA-insured loans. More

[29]See U. S. General Accounting Office, *Mortgage Financing: FHA's Fund Has Grown, but Options for Drawing on the Fund Have Uncertain Outcomes*, GAO-01-460 (Feb. 2001).

[30]These probabilities are conditional, because they are subject to the condition that the loan has remained active until a given year.

specifically, our models used logistic equations to estimate the logarithm of the odds ratio,[31] from which the probability of a loan's payment (or a loan's prepayment) in a given year could be calculated. These equations were expressed as a function of interest and unemployment rates, the borrower's equity (computed using a house's price and current and contract interest rates as well as a loan's duration), the loan-to-value (LTV) ratio, the loan's size, the geographic location of the house, and the number of years that the loan had been active. The results of the logistic regressions were used to estimate the probabilities of a loan being foreclosed or prepaid in each year.

We prepared separate estimates for fixed-rate mortgages, adjustable rate mortgages (ARMs), and investor loans. The fixed-rate mortgages with terms of 25 years or more (long-term loans) were divided between those that were refinanced and those that were purchase money mortgages (mortgages associated with home purchase). Separate estimates were prepared for each group of long-term loans. Similarly, investor loans were divided between mortgages that were refinanced and the loans that were purchase money mortgages. We prepared separate estimates for each group of investor loans (refinanced and purchase money mortgages). A separate analysis was also prepared for loans with terms that were less than 25 years (short-term loans).

A complete description of our models, the data that we used, and the results that we obtained is presented in detail in the following sections. In particular, this appendix describes (1) the sample data that we used; (2) our model specification and the independent variables in the regression models; and (3) the model results.

Data and Sample Selection

For our analysis, we selected from FHA's computerized files a 10 percent sample of records of mortgages insured by FHA from fiscal years 1975 through 1995 (1,046,916 loans). From the FHA records, we obtained information on the initial characteristics of each loan, such as the year of

[31]If P is the probability that an event will occur, the "odds ratio" is defined as $P/(1-P)$. The logistic transformation is the natural logarithm of the odds ratio, or $\ln[P/(1-P)]$, of which the logistic regression provides an estimate. See G.S. Maddala, *Limited Dependent Variables and Qualitative Variables in Econometrics* (Cambridge: Cambridge University Press, 1983). Also see John H. Aldrich and Forrest D. Nelson, *Linear Probability, Logit, and Probit Models* (SAGE Publications: Beverly Hills, London, and New York, 1984), pp. 41–44.

the loan's origination and the state in which the loan originated; LTV ratio; loan amount; and contract interest rates.

To describe macroeconomic conditions at the national and state levels, we obtained data at the national level on quarterly interest rates for 30-year fixed-rate mortgages on existing housing, and at the state level on annual civilian unemployment rates from DRI-WEFA.[32] We also used state level data from DRI-WEFA on median house prices to compute house price appreciation rates by state. To adjust nominal loan amounts for inflation, we used data from the *2000 Economic Report of the President* on the implicit price deflator for personal consumption expenditures.

Specification of the Model

People buy houses for consumption and investment purposes. Normally, people do not plan to default on loans. However, conditions that lead to defaults do occur. Defaults may be triggered by a number of events, including unemployment, divorce, or death. These events are not likely to trigger defaults if the owner has positive equity in his or her home because the sale of the home with realization of a profit is preferable to the loss of the home through foreclosure. However, if the property is worth less than the mortgage, these events may trigger defaults.

Prepayments of home mortgages can also occur. These may be triggered by events such as declining interest rates, which prompt refinancing, and rising house prices, which prompt homeowners to take out accumulated equity or sell the residence. Because FHA mortgages are assumable, the sale of a residence does not automatically trigger prepayment. For example, if interest rates have risen substantially since the time that the mortgage was originated, a new purchaser may prefer to assume the seller's mortgage.

We hypothesized that foreclosure behavior is influenced by, among other things, the (1) level of unemployment, (2) size of the loan, (3) value of the home, (4) current interest rates, (5) contract interest rates, (6) home equity, and (7) region of the country within which the home is located. We hypothesized that prepayment behavior is influenced by, among other things, the (1) difference between the interest rate specified in the mortgage contract and the mortgage rates generally prevailing in each

[32]DRI-WEFA is a leading economic forecasting firm.

subsequent year, (2) amount of accumulated equity, (3) size of the loan, and (4) region of the country in which the home is located.

Our first regression model estimated conditional mortgage foreclosure probabilities as a function of a variety of explanatory variables. In this regression, the dependent variable is a 0/1 indicator of whether a given loan was foreclosed in a given year. The outstanding mortgage balance, expressed in inflation-adjusted dollars, weighted each loan-year observation.

Our foreclosure rates were conditional on whether the loan survives an additional year. We estimated conditional foreclosures in a logistic regression equation. Logistic regression is commonly used when the variable to be estimated is the probability that an event, such as a loan's foreclosure, will occur. We regressed the dependent variable (whose value is 1 if foreclosure occurs and 0 otherwise) on the explanatory variables previously listed.

Our second regression model estimated conditional prepayment probabilities. The independent variables included a measure that is based on the relationship between the current mortgage interest rate and the contract rate, the primary determinant of a mortgage's refinance activity. We further separated this variable between ratios above and below 1 to allow for the possibility of different marginal impacts in higher and lower ranges.

The variables that we used to predict foreclosures and prepayments fall into two general categories: descriptions of states of the economy and characteristics of the loan. In choosing explanatory variables, we relied on the results of our own and others' previous efforts to model foreclosure and prepayment probabilities, and on implications drawn from economic principles. We allowed for many of the same variables to affect both foreclosure and prepayment.

Equity

The single most important determinant of a loan's foreclosure is the borrower's equity in the property, which changes over time because (1) payments reduce the amount owed on the mortgage and (2) property values can increase or decrease. Equity is a measure of the current value of a property compared with the current value of the mortgage on that property. Previous research strongly indicates that borrowers with small

amounts of equity, or even negative equity, are more likely than other borrowers to default.[33]

We computed the percentage of equity as 1 minus the ratio of the present value of the loan balance evaluated at the current mortgage interest rate, to the current estimated house price. For example, if the current estimated house price is $100,000, and the value of the mortgage at the current interest rate is $80,000, then equity is .2 (20 percent), or 1-(80/100). To measure current equity, we calculated the value of the mortgage as the present value of the remaining mortgage, evaluated at the current year's fixed-rate mortgage interest rate. We calculated the current value of a property by multiplying the value of that property at the time of the loan's origination by the change in the state's median nominal house price, adjusted for quality changes, between the year of origination and the current year.[34] Because the effects on foreclosure of small changes in equity may differ depending on whether the level of equity is large or small, we used a pair of equity variables, LAGEQHIGH and LAGEQLOW,[35] in our foreclosure regression. The effect of equity is lagged 1 year, as we are predicting the time of foreclosure, which usually occurs many months after a loan first defaults.

We anticipated that higher levels of equity would be associated with an increased likelihood of prepayment. Borrowers with substantial equity in their homes may be more interested in prepaying their existing mortgages, and may take out larger ones to obtain cash for other purposes. Borrowers with little or no equity may be less likely to prepay because they may have to take money from other savings to pay off their loans and cover transaction costs.

For the prepayment regression, we used a variable that measures book equity—the estimated property value less the amortized balance of the loan—instead of market equity. It is book value, not market value, that the

[33]When we discuss the likely effects of one of our explanatory variables, we are describing the marginal effects of that variable, while holding the effects of other variables constant.

[34]We revised the estimated rate of appreciation in nominal median house prices downward by 2 percentage points per year to account for depreciation and the gradual improvement in the quality of the existing housing stock over time.

[35]Essentially, LAGEQHIGH takes the value of equity minus .2 if equity is greater than 20 percent, or 0 if equity is less than or equal to 20 percent. LAGEQLOW takes the value of equity if equity is 20 percent or less, and .2 if equity is greater than 20 percent.

borrower must pay to retire the debt.[36] Additionally, the important effect of interest rate changes on prepayment is captured by two other equity variables, RELEQHI and RELEQLO, which are sensitive to the difference between a loan's contract rate and the interest rate on 30-year mortgages available in the current year. These variables are described below.

Loan-to-Value (LTV) Ratio

We included an additional set of variables in our regressions related to equity: the initial LTV ratio. We entered LTV as a series of dummy variables, depending on its size. Loans fit into eight discrete LTV categories. In some years, FHA measured LTV as the loan amount less mortgage insurance premium financed in the numerator of the ratio, and appraised value plus closing costs in the denominator. To reflect true economic LTV, we adjusted FHA's measure by removing closing costs from the denominator and including financed premiums in the numerator.

A borrower's initial equity can be expressed as a function of LTV, so we anticipated that if LTV was an important predictor in an equation that also includes a variable measuring current equity, it would probably be positively related to the probability of foreclosure. One reason for including LTV is that it measures initial equity accurately. Our measures of current equity are less accurate because we do not have data on the actual rate of change in the mortgage loan balance or the actual rate of house price change for a specific house.

Loans with higher LTVs are more likely to foreclose. We used the lowest LTV category as the omitted category. We expected LTV to have a positive sign in the foreclosure equations at higher levels of LTV. LTV in our foreclosure equations may capture the effects of income constraints. We were unable to include borrowers' income or payment to income ratio directly because data on borrowers' income were not available.[37] However, it seems likely that borrowers with little or no down payment (high LTV) are more likely to be financially stretched in meeting their payments and,

[36]Similarly, for foreclosures within the ARM equations, we defined equity as book equity (the estimated property value less the amortized balance of the loan) and not market equity. The effects of interest rate changes in the ARM equations were estimated using a separate variable.

[37]We also did not know whether individual borrowers had subsequently acquired second mortgages or other obligations that would affect prepayment or foreclosure probabilities.

therefore, more likely to default. The anticipated relationship between LTV and the probability of prepayment is uncertain.

For two equations—long-term refinanced loans and investor-refinanced loans—we used down payment information directly, rather than the series of LTV variables. We defined down payment to ensure that closing costs were included in the loan amount and excluded from the house price.

Unemployment

We used the annual unemployment rates for each state for the period from fiscal years 1975 through 1995 to measure the relative condition of the economy in the state where a loan was made. We anticipated that foreclosures would be higher in years and states with higher unemployment rates, and that prepayments would be lower because property sales slow down during recessions. The actual variable we used in our regressions, LAGUNEMP, is defined as the logarithm of the preceding year's unemployment rate in that state.

Interest Rates

We included the logarithm of the interest rate on the mortgage as an explanatory variable in the foreclosure equation. We expected a higher interest rate to be associated with a higher probability of foreclosure because higher interest rates cause higher monthly payments. However, in explaining the likelihood of prepayment, our model uses information on the level of current mortgage rates relative to the contract rate on the borrower’s mortgage. A borrower’s incentive to prepay is high when the interest rate on a loan is greater than the rate at which money can currently be borrowed, and it diminishes as current interest rates increase. In our prepayment regression we defined two variables, RELEQHI and RELEQLO. RELEQHI is defined as the ratio of the market value of the mortgage to the book value of the mortgage, but is never smaller than 1. RELEQLO is also defined as the ratio of the market value of the mortgage to the book value, but is never larger than 1. When currently available mortgage rates are lower than the contract interest rate, market equity exceeds book equity because the present value of the remaining payments evaluated at the current rate exceeds the present value of the remaining payments evaluated at the contract rate. Thus, RELEQHI captures a borrower's incentive to refinance, and RELEQLO captures a new buyer's incentive to assume the seller's mortgage.

We created two 0/1 variables, REFIN and REFIN2, that take on a value of 1 if a borrower had not taken advantage of a refinancing opportunity in the

past, and 0 otherwise. We defined a refinancing opportunity as having occurred if the interest rate on fixed-rate mortgages in any previous year in which a loan was active was at least 200 basis points[38] below the rate on the mortgage in any year through 1994, or 150 basis points below the rate on the mortgage in any year after 1994.[39] REFIN takes a value of 1 if the borrower had passed up a refinancing opportunity at least once in the past. REFIN2 takes on a value of 1 if the borrower had passed up two or more refinancing opportunities in the past.

Several reasons might explain why borrowers passed up apparently profitable refinancing opportunities. For example, if they had been unemployed or their property had fallen in value, they might have had difficulty obtaining refinancing. This reasoning suggests that REFIN and REFIN2 would be positively related to the probability of foreclosure; that is, a borrower unable to obtain refinancing previously because of poor financial status might be more likely to default.

Similar reasoning suggests a negative relationship between REFIN and REFIN2 and the probability of prepayment; a borrower unable to obtain refinancing previously might also be unlikely to obtain refinancing currently. A negative relationship might also exist if a borrower's passing up one profitable refinancing opportunity reflected a lack of financial sophistication that, in turn, would be associated with passing up additional opportunities. However, a borrower who anticipated moving soon might pass up an apparently profitable refinancing opportunity to avoid the transaction costs associated with refinancing. In this case, there might be a positive relationship, with the probability of prepayment being higher if the borrower fulfilled his or her anticipation and moved, thereby prepaying the loan.

Another explanatory variable is the volatility of interest rates, INTVOL, which is defined as the standard deviation of the monthly average of the Federal Home Loan Mortgage Corporation's series of 30-year, fixed-rate mortgages' effective interest rates. We calculated the standard deviation over the previous 12 months. Financial theory predicts that borrowers are

[38]A basis point equals 1/100 of a percentage point.

[39]Transaction costs associated with refinancing have fallen in recent years, making it more profitable than before to refinance at a smaller decrease in interest rates.

likely to refinance more slowly at times of volatile rates because there is a larger incentive to wait for a still lower interest rate.

We also included the slope of the yield curve, YC, in our prepayment estimates, which we calculated as the difference between the 1- and 10-year Treasury rates of interest. We then subtracted 250 basis points from this difference and set differences that were less than 0 to 0. This variable measured the relative attractiveness of ARMs versus fixed-rate mortgages; the steeper the yield curve, the more attractive ARMs would be. When ARMs have low rates, borrowers with fixed-rate mortgages may be induced into refinancing into ARMs to lower their monthly payments.

For ARMs, we did not use relative equity variables as we did with fixed-rate mortgages. Instead, we defined four variables, CHANGEPOS, CHANGENEG, CAPPEDPOS, and CAPPEDNEG to capture the relationship between current interest rates and the interest rate paid on each mortgage. CHANGEPOS measures how far the interest rate on the mortgage has increased since origination, with a minimum of 0, while CHANGENEG measures how far the rate has decreased, with a maximum of 0. CAPPEDPOS measures how much further the interest rate on the mortgage would rise if prevailing interest rates in the market did not change, while CAPPEDNEG measures how much further the mortgage's rate would fall if prevailing interest rates did not change. For example, if an ARM was originated at 7 percent and interest rates increased by 250 basis points 1 year later, CHANGEPOS would equal 100 because FHA's ARMs can increase by no more than 100 basis points in a year. CAPPEDPOS would equal 150 basis points, since the mortgage rate would eventually increase by another 150 basis points if market interest rates did not change, and CHANGENEG and CAPPEDNEG would equal 0. Because interest rates have generally trended downward since FHA introduced ARMs, there is very little experience with ARMs in an increasing interest rate environment.

Geographic Regions

We created nine 0/1 variables to reflect the geographic distribution of FHA loans, and included them in both regressions. Location differences may capture the effects of differences in borrowers' incomes, underwriting standards by lenders, economic conditions not captured by the unemployment rate, or other factors that may affect foreclosure and prepayment rates. We assigned each loan to one of the nine Bureau of the Census (Census) divisions on the basis of the state in which the borrower resided. The Pacific division was the omitted category; that is, the

regression coefficients show how each of the regions was different from the Pacific division. We also created a variable, JUDICIAL, to indicate states that allowed judicial foreclosure procedures in place of nonjudicial foreclosures. We anticipated that the probability of foreclosure would be lower where judicial foreclosure procedures were allowed because of the greater time and expense required for the lender to foreclose on a loan.

Loan Size

To obtain an insight into the differential effect of relatively larger loans on mortgage foreclosures and prepayments, we assigned each loan to 1 of 10 loan-size categorical variables (LOAN1 to LOAN10). The omitted category in our regressions was that of loans between $80,000 and $90,000, and results on loan size are relative to those loans between $80,000 and $90,000. All dollar amounts are inflation adjusted and represent 1999 dollars.

Number of Units

The number of units covered by a single mortgage was a key determinant in deciding which loans were more likely to be investor loans. Loans were noted as investor loans if the LTV ratio was between specific values, depending on the year of the loan or whether there were two or more units covered by the loan. Once a loan was identified as an investor loan, we separated the refinanced loans from the purchase-money mortgages and performed foreclosure and payoff analyses on each. For each of the investor equations, we used two dummy variables defined according to the number of units in the dwelling. LIVUNT2 has the value of 1 when a property has two dwelling units and a value of 0 otherwise. LIVUNT3 has a value of 1 when a property has three or more dwelling units and a value of 0 otherwise. The missing category in our regressions was investors with one unit. Our database covers only loans with no more than four units.

Policy Year and Refinance Indicator

To capture the time pattern of foreclosures and prepayments (given the effects of equity and the other explanatory variables), we defined seven variables on the basis of the number of years that had passed since the year of the loan's origination. We refer to these variables as YEAR1 to YEAR7 and set them equal to 1 during the corresponding policy year and 0 otherwise. Finally, for those loan type categories for which we did not estimate separate models for refinancing loans and nonrefinancing loans, we created a variable called REFINANCE DUMMY to indicate whether a loan was a refinancing loan.

Table 2 summarizes the variables that we used to predict foreclosures and prepayments. Table 3 presents mean values for our predictor variables for each mortgage type for which we ran a separate regression.

Table 2: Variable Names and Descriptions

Variable name	Variable description
Loan size dummy variables	
LOAN1	1 if loan amount is less than $40,000, else 0
LOAN2	1 if loan amount is $40,000 or above but below $50,000, else 0
LOAN3	1 if loan amount is $50,000 or above but below $60,000, else 0
LOAN4	1 if loan amount is $60,000 or above but below $70,000, else 0
LOAN5	1 if loan amount is $70,000 or above but below $80,000, else 0
LOAN6	1 if loan amount is $80,000 or above but below $90,000, else 0
LOAN7	1 if loan amount is $90,000 or above but below $100,000, else 0
LOAN8	1 if loan amount is $100,000 or above but below $110,000, else 0
LOAN9	1 if loan amount is $110,000 or above but below $130,000, else 0
LOAN10	1 if loan amount is at least $130,000, else 0
Economic variables	
LOGINT	Log of the contract mortgage interest rate
REFINANCE DUMMY	1 if the loan is a refinancing loan, else 0
RELEQLO	The ratio of the market value of the mortgage to the book value if the market value is below the book value, else 1
RELEQHI	The ratio of the market value of the mortgage to the book value if the market value is above the book value, else 1
REFIN	1 if, in at least 1 previous year, the mortgage interest rate had been at least 200 basis points below the contract rate in any year prior to 1995 or 150 basis points below the contract rate after 1994 and the borrower had not refinanced, else 0
REFIN2	1 if, in at least 2 previous years the above situation prevailed, else 0
INTVOL	The volatility of mortgage rates, defined as the standard deviation of 30-year fixed-rate mortgage interest rates over the previous 12 months
YC	The slope of the yield curve, defined as the difference between 1- and 10-year U.S. Treasury interest rates minus 250 basis points, but not less than 0
LIVUNT2	1 if the property has two housing units, else 0
LIVUNT3	1 if the property has three or more housing units, else 0
LAGUNEM	The log of the previous year's unemployment rate in each state
JUDICIAL	1 if state allowed judicial foreclosure (list of states varies by year), else 0
Policy year dummy variables	
YEAR1	1 if in loan's first year, else 0

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Variable name	Variable description
YEAR2	1 if in loan's second year, else 0
YEAR3	1 if in loan's third year, else 0
YEAR4	1 if in loan's fourth year, else 0
YEAR5	1 if in loan's fifth year, else 0
YEAR6	1 if in loan's sixth year, else 0
YEAR7	1 if in loan's seventh year, else 0
Loan-to-value dummy variables	
LTV0	1 if LTV equals 0, assumed missing data, else 0
LTV1	1 if LTV is above 0 and less than 60, else 0
LTV2	1 if LTV is greater than or equal to 60, but less than 85, else 0
LTV3	1 if LTV is greater than or equal to 85, but less than 92, else 0
LTV4	1 if LTV is greater than or equal to 92, but less than 96, else 0
LTV5	1 if LTV is greater than or equal to 96, but less than 98, else 0
LTV6	1 if LTV is greater than or equal to 98, but less than 100, else 0
LTV7	1 if LTV is greater than or equal to 100, but less than 102, else 0
LTV8	1 if LTV is greater than or equal to 102, but less than 106, else 0
Equity variables	
LAGEQLOW	The lagged value of market equity (defined as 1 minus the ratio of the present value of the loan balance, evaluated at the current mortgage interest rate, to the current estimated house price) if equity is less than or equal to 20 percent, else .2
LAGEQHIGH	The lagged value of market equity (defined as 1 minus the ratio of the present value of the loan balance, evaluated at the current mortgage interest rate, to the current estimated house price minus .2) if equity is greater than 20 percent, else 0
BOOKNEG	The lagged value of book equity (defined as 1 minus the ratio of the amortized loan balance to the current estimated house price) if equity is less than or equal to 20 percent, else .2
BOOKPOS	The lagged value of book equity (defined as 1 minus the ratio of the amortized loan balance to the current estimated house price minus .2) if equity is greater than 20 percent, else 0
CHANGEPOS	The amount by which the interest rate of an ARM has increased since origination, with a minimum of 0
CHANGENEG	The amount by which the interest rate of an ARM has decreased since origination, with a maximum of 0
CAPPEDPOS	The amount by which the interest rate of an ARM could still rise, if prevailing interest rates in the market did not change, with a minimum of 0
CAPPEDNEG	The amount by which the interest rate of an ARM could still decline, if prevailing interest rates in the market did not change, with a maximum of 0
DOWNPAY	The down payment, expressed as a percentage of the purchase price of the house; closing costs were excluded from the house price and included in the loan amount
Census division dummy variables	
DV_A[a]	1 if the loan is in the Mid-Atlantic states (NY, PA, NJ), else 0
DV_E	1 if the loan is in the East South Central states (KY, TN, AL, MS), else 0
DV_G	1 if the loan is in the West North Central states (MN, MO, IA, NB, KS, SD, ND), else 0
DV_M	1 if the loan is in the Mountain states (CO, UT, AZ, NM, NV, ID, WY, MT), else 0

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Variable name	Variable description
DV_N	1 if the loan is in the New England states (MA, CT, RI, NH, ME, VT), else 0
DV_P	1 if the loan is in the Pacific states (CA, OR, WA), else 0
DV_R	1 if the loan is in the East North Central states (IL, MI, OH, IN, WI), else 0
DV_S	1 if the loan is in the South Atlantic states (FL, GA, NC, SC, VA, MD, DC, DE, WV), else 0
DV_W	1 if the loan is in the West South Central states (TX, OK, LA, AR), else 0

[a]DV = Division

Source: U.S. General Accounting Office.

Table 3: Means of Predictor Variables

	Loan type					
Predictor variable name	Long-term FRM	Long-term FRM refinance	Short-term FRM	ARM	Investor	Investor refinance
Loan size dummy variables						
LOAN1	0.0662	0.0171	0.1535	0.0044	0.0625	0.0292
LOAN2	0.0884	0.0376	0.1245	0.0152	0.0798	0.0533
LOAN3	0.1220	0.0669	0.1355	0.0346	0.1047	0.0846
LOAN4	0.1358	0.1091	0.1383	0.0604	0.1176	0.1198
LOAN5	0.1296	0.1324	0.1211	0.0867	0.1262	0.1371
LOAN6	0.1115	0.1466	0.1041	0.1085	0.1196	0.1345
LOAN7	0.0966	0.1400	0.0782	0.1216	0.1108	0.1140
LOAN8	0.0862	0.1201	0.0585	0.1278	0.0893	0.0852
LOAN9	0.1010	0.1390	0.0589	0.1962	0.1061	0.1200
LOAN10	0.0627	0.0911	0.0276	0.2446	0.0834	0.1224
Economic variables						
LOGINT	-2.3616	-2.4716	-2.4058	-2.6387	-2.2936	-2.4928
REFINANCE DUMMY	-	-	0.3406	0.1120	-	-
RELEQLO	0.9419	0.9841	0.9736	-	0.9588	0.9820
RELEQHI	1.0622	1.0547	1.0289	-	1.0797	1.0469
REFIN	0.1255	0.0590	0.1143	-	0.1943	0.0572
REFIN2	0.0840	-	0.0778	-	0.1343	-
INTVOL	0.4942	0.4651	0.4743	0.4661	0.4995	0.4525
YC	0.0498	0.0385	0.0451	0.0411	0.0488	0.0463

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	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
LIVUNT2	-	-	-	-	0.3039	0.2654
LIVUNT3	-	-	-	-	0.0840	0.1005
LAGUNEMP	-2.7891	-2.8617	-2.8267	-2.8688	-2.7719	-2.8600
JUDICIAL	0.3982	0.3023	0.4074	0.4284	0.4750	0.4274
Policy year dummy variables						
YEAR1	0.1267	0.1898	0.1449	0.1814	0.1255	0.1827
YEAR2	0.1257	0.1809	0.1424	0.1784	0.1241	0.1776
YEAR3	0.1195	0.1612	0.1343	0.1679	0.1170	0.1623
YEAR4	0.1078	0.1436	0.1230	0.1484	0.1055	0.1453
YEAR5	0.0942	0.1276	0.1110	0.1239	0.0931	0.1295
YEAR6	0.0792	0.1088	0.0966	0.0870	0.0811	0.1083
YEAR7	0.0650	0.0520	0.0666	0.0491	0.0695	0.0576
Loan-to-value dummy variables						
LTV0	0.0353	0.7673	0.2457	0.0566	0.0135	0.2717
LTV1	0.0103	-	0.0632	-	-	-
LTV2	0.0884	0.0536	0.2397	0.0532	0.2257	-
LTV3	0.0958	0.0740	0.0945	0.1259	0.5409	-
LTV4	0.1934	0.0547	0.1151	0.2740	0.0629	-
LTV5	0.1723	0.0276	0.0761	0.3377	0.0457	-
LTV6	0.1781	0.0028	0.0890	0.0583	0.0473	-
LTV7	0.1591	0.0098	0.0611	0.0748	0.0424	-
LTV8	0.0672	0.0041	0.0155	0.0177	0.0161	-
Equity variables						
LAGEQLOW	0.1263	0.0740	0.1674	-	0.1535	0.1422
LAGEQHIGH	0.1128	0.0135	0.1533	-	0.1097	0.0492
BOOKNEG	0.1336	0.0945	0.1645	0.1180	0.1660	0.1597
BOOKPOS	0.0970	0.0159	0.1500	0.0146	0.1092	0.0462
CHANGEPOS	-	-	-	1.2829	-	-
CHANGENEG	-	-	-	-0.5957	-	-
CAPPEDPOS	-	-	-	0.2131	-	-
CAPPEDNEG	-	-	-	-0.1253	-	-

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Predictor variable name	Loan type					
	Long-term FRM	Long-term FRM refinance	Short-term FRM	ARM	Investor	Investor refinance
DOWNPAY	-	0.0337	-	-	-	0.1103
Census division dummy variables						
DV_A	0.0708	0.0468	0.0746	0.0565	0.1556	0.1160
DV_E	0.0740	0.0398	0.0892	0.0478	0.0504	0.0733
DV_G	0.0885	0.1167	0.1265	0.1178	0.0708	0.0874
DV_M	0.1375	0.2050	0.1311	0.1269	0.1445	0.1808
DV_N	0.0082	0.0118	0.0072	0.0320	0.0240	0.0207
DV_P	0.1425	0.1405	0.0720	0.2025	0.1473	0.1294
DV_R	0.1156	0.0759	0.1334	0.1614	0.1294	0.1249
DV_S	0.2050	0.2127	0.1553	0.2073	0.1724	0.1771
DV_W	0.1579	0.1509	0.2107	0.0479	0.1057	0.0904

Note: ARM = Adjustable rate mortgage; DV = Division; FRM = Fixed-rate mortgage.

Source: U.S. General Accounting Office.

Estimation Results

As previously described, we used logistic regressions to model loan foreclosures and prepayments as a function of a variety of predictor variables. We estimated separate regressions for fixed-rate purchase money mortgages (and refinanced loans) with terms over and under 25 years, ARMs, and investor loans. We used data on loan activity throughout the life of the loans for loans originated from fiscal years 1975 through 1995. The outstanding loan balance of the observation weighted the regressions.

The logistic regressions estimated the probability of a loan being foreclosed or prepaid in each year. The standard errors of the regression coefficients are biased downward, because the errors in the regressions are not independent. The observations are on loan years, and the error terms are correlated because the same underlying loan can appear several times. However, we did not view this downward bias as a problem because our purpose was to forecast the dependent variables, not to test hypotheses concerning the effects of independent variables.

In general, our results are consistent with the economic reasoning that underlies our models. Most important, the probability of foreclosure declines as equity increases, and the probability of prepayment increases as the current mortgage interest rate falls below the contract mortgage interest rate. As shown in tables 4 and 5, both of these effects occur in each regression model and are very strong. These tables present the estimated coefficients for all of the predictor variables for the foreclosure and prepayment equations.

Table 4 shows our foreclosure regression results. As expected, the unemployment rate is positively related to the probability of foreclosure and negatively related to the probability of prepayment. Our results also indicate that generally the probability of foreclosure is higher when LTV and contract interest rate are higher. The overall quality of fit was satisfactory: Chi-square statistics were significant on all regressions at the 0.01-percent level.

Because the coefficients from a nonlinear regression can be difficult to interpret, we transformed some of the coefficients for the long-term, nonrefinanced, fixed-rate regressions into statements about changes in the probabilities of foreclosure and prepayment. The overall conditional foreclosure probability for this mortgage type is estimated to be about 0.6 percent.[40,41] In other words, on average, there is a 6/10 of a 1 percent chance for a loan of this type to result in a claim payment in any particular year.[42] By holding other predictor variables at their mean values, we can describe the effect on the conditional foreclosure probability of changes in the values of predictor variables of interest. For example, if the average value of the unemployment rate were to increase by 1 percentage point from its mean value (in our sample) of about 6 percent to about 7 percent, the conditional foreclosure probability would increase by about 17 percent (from 0.6 percent to about 0.7 percent). Similarly, a 1 percentage-point increase in the mortgage contract rate from its mean value of about 9.4

[40]The conditional foreclosure probability is calculated as $F(Z) = EXP(Z)/[1+EXP(Z)]$, where $Z = \sum_i (X_i*B_i)$, where X_i refers to the mean value of the ith explanatory variable and B_i represents the estimated coefficient for the ith explanatory variable.

[41]Conditional foreclosure probabilities for the other mortgage types were estimated as follows: long-term, fixed-rate, refinancing mortgages (0.4); short-term, fixed-rate mortgages (0.1); ARMs (0.4); investor, nonrefinancing mortgages (0.6); and investor, refinancing mortgages (0.3).

[42]This average is for the dollar worth of a loan, not the number of loans.

percent to about 10.4 percent would also raise the conditional foreclosure probability by 17 percent (from about 0.6 percent to about 0.7 percent). Values of homeowners' equity of 10 percent, 20 percent, 30 percent, and 40 percent result in conditional foreclosure probabilities of 0.7 percent, 0.5 percent, 0.3 percent, and 0.2 percent, respectively, illustrating the importance of increased equity in reducing the probability of foreclosure.

Table 5 shows our prepayment regression results. The overall conditional prepayment probability for long-term, fixed-rate mortgages is estimated to be about 5.0 percent. This means that, in any particular year, about 5 percent of the loan dollars outstanding will prepay, on average.[43] Prepayment probability is quite sensitive to the relationship between the contract interest rate and the currently available mortgage rate. We modeled this relationship using RELEQHI and RELEQLO. Holding other variables at their mean values, if the spread between mortgage rates available in each year and the contract interest rate widened by 1 percentage point, the conditional prepayment probability would increase by about 78.5 percent to about 8.9 percent.

Table 4: Coefficients from Foreclosure Equations and Summary Statistics

	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
INTERCEPT	3.2482	8.6087	5.2438	4.5287	4.7529	6.3348
Loan size dummy variables						
LOAN1	0.4475	0.2204	0.6348	0.4215	0.2254	-0.1478
LOAN2	0.2020	0.3541	0.3597	0.5471	0.1341	0.4173
LOAN3	0.1137	0.2015	0.2922	0.5013	0.0945	0.0454
LOAN4	0.0553	0.0699	0.2003	0.2360	-0.0041	-0.1314
LOAN5	-0.0040	0.1134	-0.0218	0.0372	0.1084	0.0482
LOAN7	0.0581	0.0920	0.0959	0.0193	-0.0508	0.0383
LOAN8	-0.0057	0.2395	0.0364	0.0472	-0.0228	0.4049

[43]Conditional prepayment probabilities for the other mortgage types were estimated as follows: long-term, fixed-rate, refinancing mortgages (9.4); short-term, fixed-rate mortgages (4.0); ARMs (7.0); investor, nonrefinancing mortgages (5.3); and investor, refinancing mortgages (8.0).

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	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
LOAN9	0.0620	0.3808	0.3060	0.0420	-0.1013	0.2619
LOAN10	0.1989	0.6909	0.2731	-0.0175	0.1111	0.5410
Economic variables						
LOGINT	1.9020	2.7726	3.4284	0.9887	2.6879	2.3728
REFINANCE DUMMY	-	-	-0.1142	0.0614	-	-
REFIN	0.2470	0.1066	-0.0759	-	0.2678	0.1213
REFIN2	-0.0432	-	-0.2014	-	0.1206	-
LIVUNT2	-	-	-	-	0.2047	-0.6477
LIVUNT3	-	-	-	-	0.3231	-0.4930
LAGUNEMP	1.1972	1.9900	1.2845	1.0957	1.1842	1.4017
INTVOL	0.1592	-0.1074	0.3448	-1.3628	0.1896	-0.3889
Policy year dummy variables						
YEAR1	-3.8304	-4.5046	-3.9463	-4.9161	-3.5745	-3.8716
YEAR2	-1.2274	-1.6576	-1.6136	-1.6722	-0.7272	-1.4782
YEAR3	-0.2382	-0.4544	-0.5396	-0.3623	0.1692	-0.6043
YEAR4	0.0755	-0.0616	-0.2060	0.1418	0.3430	-0.1892
YEAR5	0.2002	0.1373	-0.1027	0.3275	0.4363	-0.1745
YEAR6	0.1837	0.0696	-0.0256	0.3163	0.4006	0.1026
YEAR7	0.1127	-0.0529	-0.0537	0.0951	0.2844	0.0122
Loan-to-value dummy variables						
LTV0	0.5672	-0.0352	1.3795	-0.9882	0.0154	0.2335
LTV2	-0.0662	-	0.9989	-0.9975	0.2300	-
LTV3	0.1975	-	1.2487	-1.2774	0.3365	-
LTV4	0.3526	-	1.5503	-1.1087	0.2860	-
LTV5	0.4168	-	1.7318	-1.1391	0.2021	-
LTV6	0.4756	-	1.8358	-1.1195	0.2116	-
LTV7	0.4531	-	1.7967	-1.3134	0.2832	-
LTV8	0.4878	-	1.5050	-1.3180	0.3618	-
Equity variables						
DOWNPAY	-	0.0363	-	-	-	-0.5062
LAGEQLOW	-1.5225	-1.7177	-1.3348	-	-1.7443	-1.1904
LAGEQHIGH	-3.9020	-4.5746	-3.3756	-	-3.9786	-8.4145
BOOKNEG	-	-	-	-3.5071	-	-
BOOKPOS	-	-	-	-7.7044	-	-

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	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
CHANGENEG	-	-	-	-0.1689	-	-
CHANGEPOS	-	-	-	-0.1359	-	-
CAPPEDNEG	-	-	-	0.3590	-	-
CAPPEDPOS	-	-	-	-0.0521	-	-
Census division dummy variables						
DV_A	-0.0099	-0.5780	0.1229	-0.5983	-0.3525	0.2875
DV_E	-0.1879	-0.6610	0.0802	-0.9281	0.2039	-0.3442
DV_G	0.1372	-0.3796	0.2421	-1.0558	0.3292	-0.2784
DV_M	0.4131	-0.4091	0.5057	-0.7121	0.6765	-0.1520
DV_N	0.3296	0.2313	1.1054	-0.1953	0.5449	1.2292
DV_R	-0.0401	-0.6704	0.0230	-0.5256	-0.1075	-0.5336
DV_S	0.1926	-0.3051	0.2480	-0.3892	0.3419	-0.1205
DV_W	0.4089	-0.2715	0.6314	-0.6648	0.7777	-0.1457
JUDICIAL	-0.1268	-0.2249	-0.0553	-0.3880	-0.1609	-0.6069
Summary statistics						
Percentage of concordant pairs	75.6	81.2	77.9	77.9	78.2	81.6
Percentage of tied pairs	3.6	3.3	8.9	3.3	2.7	3.8
Number of unweighted observations	1,415,181	417,351	470,127	324,834	638,465	39,508

Note: ARM = Adjustable rate mortgage; DV = Division; FRM = Fixed-rate mortgage.

Source: U.S. General Accounting Office.

Table 5: Coefficients from Prepayment Equations and Summary Statistics

	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
INTERCEPT	-16.4525	-19.1547	-24.7524	-6.7953	-16.8554	-16.2149
Loan size dummy variables						
LOAN1	-0.4880	-0.6988	-0.5681	-0.3627	-0.6638	-0.5795
LOAN2	-0.3716	-0.5338	-0.3791	-0.3232	-0.4130	-0.2219
LOAN3	-0.2557	-0.3188	-0.2294	-0.2500	-0.2542	-0.1071
LOAN4	-0.1428	-0.2230	-0.1482	-0.1900	-0.1502	0.0056

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	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
LOAN5	-0.0932	-0.0919	-0.0567	-0.1222	-0.0585	-0.0020
LOAN7	0.0739	0.0646	0.0766	0.0410	0.0848	0.0853
LOAN8	0.1556	0.1625	0.1341	0.0847	0.1459	0.1424
LOAN9	0.2538	0.2186	0.1976	0.1568	0.2450	0.2379
LOAN10	0.3296	0.2459	0.2188	0.2386	0.3223	0.2632
Economic variables						
JUDICIAL	-	-	-	0.0863	-	-
RELEQLO	4.4215	1.5685	10.0019	-	6.9996	2.2599
RELEQHI	8.4268	10.2719	10.8365	-	6.4431	9.0518
REFINANCE DUMMY	-	-	0.1925	0.0341	-	-
REFIN	-0.3935	-0.6908	-0.4111	-	-0.2048	-0.5610
REFIN2	-0.9508	-	-0.4845	-	-0.8704	
LIVUNT2	-	-	-	-	-0.2879	-0.4480
LIVUNT3	-	-	-	-	-0.3922	-0.4716
LAGUNEMP	-0.2701	-1.1570	-0.3359	-1.5208	-0.2674	-0.5189
INTVOL	-0.1024	-1.2011	0.0622	-0.0979	0.3306	-0.5775
YC	0.6885	0.8419	1.0384	-0.4600	0.9744	0.7896
Policy year dummy variables						
YEAR1	-1.9008	0.0631	-1.3964	-1.4215	-1.6517	-0.2573
YEAR2	-0.4079	1.0418	-0.2208	-0.1486	-0.3997	0.7932
YEAR3	0.0919	1.0217	0.0265	0.4024	-0.0350	0.9102
YEAR4	0.2652	0.7777	0.0403	0.6811	0.1096	0.7018
YEAR5	0.1551	0.4668	0.0165	0.5235	0.0296	0.6927
YEAR6	0.0975	0.3597	-0.0188	0.4072	-0.0503	0.5834
YEAR7	0.2168	0.1701	0.0436	0.3691	0.2097	0.3999
Loan-to-value dummy variables						
LTV0	0.0720	0.7797	0.2636	0.0980	-0.3081	0.0588
LTV2	-0.1175	0.4439	0.0807	-0.3452	-0.2383	-
LTV3	-0.0750	0.6455	0.2296	-0.2604	-0.2945	-
LTV4	-0.0287	0.6397	0.2161	-0.1843	-0.0706	-
LTV5	-0.0239	0.5802	0.2606	-0.1585	-0.1903	-
LTV6	-0.1142	0.9316	0.1636	-0.5627	-0.2438	-
LTV7	-0.1513	0.6998	0.1268	-0.6300	-0.2865	-
LTV8	-0.2324	0.6186	0.0935	-0.5439	-0.3329	-
Equity variables						

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	Loan type					
Predictor variable name	**Long-term FRM**	**Long-term FRM refinance**	**Short-term FRM**	**ARM**	**Investor**	**Investor refinance**
BOOKNEG	1.3850	1.1641	0.8966	3.1229	1.2066	2.1158
BOOKPOS	0.7538	1.8008	1.2857	0.6881	0.7251	2.6915
CHANGENEG	-	-	-	-0.0268	-	-
CHANGEPOS	-	-	-	-0.0210	-	-
CAPPEDNEG	-	-	-	-0.1422	-	-
CAPPEDPOS	-	-	-	-0.3254	-	-
DOWNPAY	-	-	-	-	-	-1.5991
Census division dummy variables						
DV_A	-0.4333	-0.3799	-0.3345	-0.5137	-0.2588	-0.5105
DV_E	-0.1131	0.2776	0.0920	-0.0742	-0.1015	0.0622
DV_G	0.1323	0.2054	0.0801	-0.4398	0.1106	0.0850
DV_M	0.1122	0.4687	0.2301	0.0713	0.0085	0.2713
DV_N	-0.1944	-0.4707	0.0811	-0.6576	-0.1082	-0.8192
DV_R	0.0730	0.3670	0.2244	-0.1595	0.0960	0.2854
DV_S	-0.2765	-0.1145	-0.1266	-0.5416	-0.2497	-0.2040
DV_W	-0.3410	-0.0045	-0.2690	-0.3150	-0.3083	-0.0595
Summary statistics						
Percentage of concordant pairs	78.4	73.1	73.6	71.9	76.3	73.8
Percentage of tied pairs	0.5	0.7	0.7	0.7	0.6	0.8
Number of unweighted observations	1,415,181	417,351	470,127	324,834	638,465	39,508

Note: ARM = Adjustable rate mortgage; DV = Division; FRM = Fixed-rate mortgage.

Source: U.S. General accounting Office.

Model Predictions for Historical Period

To test the validity of our models, we examined how well they predicted actual patterns of FHA's foreclosure and prepayment rates through fiscal year 1995. Using a sample of 10 percent of FHA's loans made from fiscal years 1975 through 1995, we found that our predicted rates closely resembled actual rates.

To predict the probabilities of foreclosure and prepayment in the historical period, we combined the models' coefficients with information on a loan's characteristics and information on economic conditions described by our predictor variables in each year from a loan's origination through fiscal

year 1995. If our models predicted foreclosure or prepayment in any year, we determined the loan's balance during that year to indicate the dollar amount associated with the foreclosure or prepayment. We estimated cumulative foreclosure and prepayment rates by summing the predicted claim and prepayment dollar amounts for all loans originated in each of the fiscal years 1975 through 1995. We compared these predictions with the actual cumulative (through fiscal year 1995) foreclosure and prepayment rates for the loans in our sample. Figure 12 compares actual and predicted cumulative foreclosure rates, and figure 13 compares actual and predicted cumulative prepayment rates for long-term, fixed-rate, nonrefinanced mortgages.[44]

Figure 12: Cumulative Foreclosure Rates by Book of Business for 30-Year, Fixed-Rate, Nonrefinanced Mortgages, Actual and Predicted, Fiscal Years 1975–1995

Source: GAO analysis of HUD data.

[44]Although we present figures comparing actual and predicted rates only for long-term, fixed-rate, nonrefinanced mortgages, the close resemblance holds true for all loan types.

Figure 13: Cumulative Prepayment Rates by Book of Business for 30-Year, Fixed-Rate, Nonrefinanced Mortgages, Actual and Predicted, Fiscal Years 1975–1995

Source: GAO analysis of HUD data.

Data for Figures Used in This Report

Foreclosure rates in the following tables are expressed as a percentage of loan amounts. Specifically, for tables 6 through 15 we compute all rates using the original loan amount of the foreclosed loans compared to the original loan amount of like loans insured by FHA for the corresponding year. For tables 16 we compute foreclosure rates using the unpaid balance of foreclosed loans as a percentage of the total value of mortgages originated.

Table 6: National 4-Year Cumulative Foreclosure Rates for All FHA Loans Originated during Fiscal Years 1990–1998 (Figure 1)

Year of origination	Foreclosure rate	Original amount of foreclosed loan	Total loans originated
1990	2.87%	$1,468,904,919	**$51,171,603,963**
1991	2.78	1,334,851,353	**47,977,729,478**
1992	1.86	923,919,357	**49,542,579,739**
1993	1.69	1,367,705,598	**80,735,908,098**
1994	2.24	1,956,485,804	**87,234,242,852**
1995	3.30	1,517,690,292	**46,021,098,615**
1996	3.34	2,294,973,060	**68,615,725,261**
1997	3.16	2,297,495,007	**72,668,032,499**
1998	2.28	2,232,185,460	**97,830,968,343**

Source: GAO's analysis of data obtained from HUD.

Table 7: National 4-Year Cumulative Foreclosure Rates for Long-Term, Fixed Rate Loans Originated during Fiscal Years 1990–1998 (Figure 2)

Year of origination	Foreclosure rate	Original amount of foreclosed loans	Total loans originated
1980	3.33%	$340,425,000	**$10,235,649,629**
1981	7.42	578,087,000	**7,788,823,419**
1982	9.94	569,819,000	**5,735,087,556**
1983	5.02	1,200,882,000	**23,930,937,692**
1984	8.11	1,154,103,000	**14,231,238,175**
1985	7.85	1,782,238,000	**22,708,988,850**
1986	4.34	2,468,155,000	**56,917,684,653**
1987	2.74	1,914,245,000	**69,782,899,762**

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Year of origination	Foreclosure rate	Original amount of foreclosed loans	Total loans originated
1988	3.26	1,208,982,000	**37,113,171,210**
1989	3.07	1,209,371,000	**39,405,607,204**
1990	2.89	1,308,801,408	**45,326,035,945**
1991	2.84	1,149,372,455	**40,464,875,909**
1992	1.93	675,069,579	**35,006,571,763**
1993	1.61	901,944,638	**55,892,535,448**
1994	1.98	1,110,636,930	**56,140,577,134**
1995	2.91	820,737,707	**28,195,589,414**
1996	3.10	1,332,871,376	**43,011,763,810**
1997	3.02	1,201,681,220	**39,805,525,095**
1998	2.18	1,609,113,831	**73,826,808,921**

Note: 1980-1989 loan amounts were estimated from a 10 percent sample.

Source: GAO's analysis of data obtained from HUD.

Table 8: National 4-Year Cumulative Foreclosure Rates for FHA Fixed- and Adjustable Rate Mortgage Loans Originated during Fiscal Years 1990–1998 (Figure 3)

Year of origination	FRM[a] foreclosure rates	ARM foreclosure rates
1990	2.89%	1.79%
1991	2.84	1.71
1992	1.93	1.72
1993	1.61	2.18
1994	1.98	3.30
1995	2.91	4.29
1996	3.10	4.20
1997	3.02	3.65
1998	2.18	3.59

[a] Long-term fixed-rate loans.

Source: GAO's analysis of data obtained from HUD.

Table 9: Adjustable Rate Mortgages as Share of All FHA Loans Originated during Fiscal Years 1990–1998 (Figure 4)

Year of origination	Percentage	Amount
1990	1%	$376,394,573
1991	4	1,968,220,459
1992	16	7,976,055,601
1993	13	10,509,318,684
1994	18	15,670,591,954
1995	27	12,411,803,262
1996	24	16,806,552,046
1997	34	24,479,889,799
1998	13	12,498,114,087

Source: GAO's analysis of data obtained from HUD.

Table 10: Share of FHA Long-Term, Fixed-Rate Loans Originated in Selected States during Fiscal Years 1990–1998 (Figure 5)

Selected states	Share of all loans	Total loans originated
California	13%	**$55,168,696,004**
Texas	8	**33,963,938,873**
Florida	6	**26,002,603,640**
New York	4	**16,903,498,072**
Illinois	3	**14,340,445,180**
Remaining States	65	**271,291,101,670**

Source: GAO's analysis of data obtained from HUD.

Table 11: National 4-Year Cumulative Foreclosure Rates for FHA Long-Term, Fixed-Rate Loans Originated in Selected States during Fiscal Years 1990–1998 (Figure 6)

Year of origination	California	Texas	Florida	Illinois	New York	Remaining states
1990	4.36%	4.41%	4.04%	2.09%	2.78%	2.40%
1991	6.99	3.69	3.40	2.50	2.93	2.10
1992	6.18	2.30	2.40	1.73	2.56	1.31
1993	6.00	1.45	1.78	1.27	1.63	0.92
1994	6.87	1.78	2.23	1.40	1.90	1.19
1995	7.14	2.66	4.44	2.44	2.25	2.07
1996	7.20	2.71	4.80	2.61	2.45	2.05
1997	5.86	2.93	4.81	2.72	2.22	2.16
1998	3.67	2.00	4.16	1.65	1.35	1.63

Source: GAO's analysis of data obtained from HUD.

Table 12: Share of FHA Adjustable Rate Mortgages Originated in Selected States during Fiscal Years 1990–1998 (Figure 7)

Selected states	Share of all loans	Total loans originated
California	20.5%	**$21,078,783,499**
Illinois	9.6	**9,806,420,567**
Maryland	6.4	**6,576,127,681**
Colorado	5.5	**5,675,242,154**
Remaining States	58.0	**59,560,366,564**

Source: GAO's analysis of data obtained from HUD.

Table 13: National 4-Year Cumulative Foreclosure Rates for FHA Adjustable Rate Mortgages Originated in Selected States during Fiscal Years 1990–1998 (Figure 8)

Year of origination	California	Maryland	Colorado	Illinois	Remaining states
1990	3.16%	0.00%	1.56%	1.71%	1.77%
1991	4.51	1.72	1.04	1.28	1.36
1992	4.97	1.49	0.46	1.40	1.28
1993	5.85	1.36	0.49	1.46	1.26
1994	7.88	2.21	0.74	2.01	1.59
1995	10.20	3.22	1.29	3.02	2.52
1996	10.01	4.02	1.30	2.80	2.57
1997	8.78	3.63	1.01	2.45	2.38
1998	8.58	2.34	0.55	2.48	2.53

Source: GAO's analysis of data obtained from HUD.

Table 14: Distribution of LTV Categories for FHA Loans Originated during Fiscal Years 1990–1998 (Figure 9)

Year of origination	0<LTV<90	90<=LTV<95	LTV>= 95
1990	24%	34%	41%
1991	20	28	48
1992	17	25	46
1993	13	18	37
1994	12	16	38
1995	13	23	61
1996	13	23	54
1997	15	25	56
1998	15	23	47

Source: GAO's analysis of data obtained from HUD.

Table 15: National 4-Year Cumulative Foreclosure Rates for Selected LTV Classes of Long-Term, Fixed-Rate Mortgages Originated during Fiscal Years 1990–1998 (Figure 10)

Year of origination	LTV>= 97	95<=LTV< 97	90<=LTV<95	0<LTV<90
1990	4.97%	3.50%	2.69%	1.79%
1991	3.26	3.20	2.78	2.08
1992	2.87	1.95	1.83	1.60
1993	1.58	1.63	1.51	1.22
1994	2.03	1.99	1.75	1.38
1995	3.23	3.01	2.69	2.27
1996	3.58	3.20	2.91	1.99
1997	3.59	3.24	2.93	1.81
1998	3.16	2.42	2.11	1.34

Source: GAO's analysis of data obtained from HUD.

Table 16: Actual and Forecasted Cumulative Foreclosure Rates for FHA Loans Insured during Fiscal Years 1996–2001, as of September 30, 2001 (Figure 11)

Year of origination	Actual foreclosure rate	Forecast foreclosure rate
1996	5.81%	3.44%
1997	4.20	2.62
1998	1.86	1.24
1999	1.05	0.56
2000	0.49	0.24
2001	0.01	0.01

Note: The number of years of data varies by book of business. For example, there are up to 6 years of data on the performance of loans originated in 1996, while there is only 1 year's data for loans originated in 2001. Thus, the foreclosure rates for loans originated in 1996 represent 6-year cumulative foreclosure rates, while the foreclosure rates for loans originated in 2001 represent 1-year cumulative foreclosure rates.

Source: GAO analysis of data obtained from FHA.

Comments from the Department of Housing and Urban Development

U. S. Department of Housing and Urban Development
Washington, D.C. 20410-8000

June 26, 2002

OFFICE OF THE ASSISTANT SECRETARY
FOR HOUSING-FEDERAL HOUSING COMMISSIONER

Mr. Stanley J. Czerwinski
Director, Physical Infrastructure Team
United States General Accounting Office
Washington, DC 20548

Dear Mr. Czerwinski:

Thank you for the opportunity to provide comments on the General Accounting Office (GAO) draft report: MORTGAGE FINANCING: Information on Changes in the Performance of FHA-Insured Loans (GAO –02-773). The Department is especially interested in understanding the factors that affect the performance of one- to four-family mortgages insured by the Federal Housing Administration (FHA) because FHA makes homeownership possible for hundreds of thousands of American families each year, and the financial soundness of FHA's Mutual Mortgage Insurance Fund (the Fund) is vital to its ability to continue in this important role. Your report provides valuable information to help ensure that FHA remains strong.

The Department generally agrees with the findings of the report. We would, however, offer some comments related to the finding that FHA foreclosure rates appear to be somewhat higher for books insured after Fiscal Year (FY) 1995 compared to the books of business insured between FY 1990 and FY 1994.

FHA made several changes to its underwriting guidelines in FY 1995 in order to promote increased homeownership opportunities among low-income and minority homebuyers. By doing so, FHA modestly increased the risk characteristics of its post-1995 books of business, but it succeeded in raising FHA's proportion of first-time homebuyers from 65.4 percent in 1994 to 77.6 percent at the end of the second quarter of FY 2002, and in raising its share of minority homebuyers from 25.3 percent to 42.0 percent in the same time period. FY 1995 was the first year in which FHA exceeded the 2.0 percent capital ratio mandated by the National Affordable Housing Act of 1990. Since then, FHA's capital ratio has continued to increase. It reached 3.75 percent at the end of FY 2001 and is projected to exceed 4.0 percent beginning in FY 2002. These figures suggest that FHA has been successful in its mission of opening homeownership opportunities for underserved groups.

FHA is continually alert to its obligation to promote homeownership while properly managing and pricing the risk that it assumes. By promoting the use of loss mitigation, for example, FHA is simultaneously helping homeowners to stay in their

homes while reducing losses to the FHA Fund. By reducing its mortgage insurance premium in FY 2001, FHA lowered the cost of homeownership to potential homebuyers while maintaining a healthy capital ratio.

The Department is committed to constant improvement in FHA's performance, and appreciates your ongoing suggestions for ways to keep FHA strong while providing greater homeownership opportunities to American families.

Sincerely yours,

John C. Weicher
Assistant Secretary for Housing-
Federal Housing Commissioner

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