Mortgage Default and Default Resolutions: Their Impact on Communities

Charles A. Capone, Jr.
Senior Analyst
Washington, DC 20515
202.226.2649
ccapone@cbo.gov

Albert Metz
Principal Analyst
U.S. Congressional Budget Office
Washington, DC 20515
202.226.1649
Albert.Metz@cbo.gov

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by Charles A. Capone, Jr. and Albert Metz

Abstract

Community development efforts promoting homeownership among moderate- and low-income households invariably mean increased risk of mortgage default. Sustainable community development must include proactive measures to contain that risk and to minimize the chance that default episodes will end in foreclosure. During the 1990s, the mortgage industry came a long way in its understanding and ability to manage default risk of affordable housing programs. This study examines the experience of one such effort, the loss mitigation program at the FHA. That program, introduced in 1996, now has five years of data that can be examined to understand how loan servicers are using post-default loan workout tools to lessen foreclosure rates and stabilize neighborhoods. The results of statistical analysis show that the chances of defaulted borrowers retaining their homes are substantially higher today than they were five years ago, or even two years ago, simply due the program's maturity. Beyond those dramatic effects, such factors as house price changes, property price class, and borrower race also have measurable effects on the probability than any given borrower who cannot self-cure the default will succeed in keeping the home.

I. Introduction

Community development efforts promoting homeownership among moderate- and low-income households are associated with increased risk of mortgage default because so-called affordable lending programs target households with limited financial resources. When unexpected spikes in household expenses or loss of income create either short- or long-term imbalances between mortgage payments and household income, default and foreclosure become very real possibilities. The implication is that sustainable community development must include proactive measures to contain this risk and especially to minimize the chance that default episodes will end in foreclosure.

The 1990s saw much progress in this area. The decade was marked by a renewed public policy focus on lending to "underserved" groups, which helped mobilize an industry movement to create new tools for minimizing the risks of default and foreclosure.

This study examines the experience of one such effort, the loss mitigation program at the Federal Housing Administration (FHA), which continues to be an important point of entry into homeownership for first-time, low-income, and minority homebuyers. Its loss mitigation program, launched in 1996, benefited from loans servicers' having already been trained to use these tools for their conventional market investors, yet it still took several years for these servicers to fully adapt their internal systems and procedures for this program. Here we examine five years of experience to see how loan servicers are using post-default loan workout tools to lessen foreclosure rates and stabilize neighborhoods.

We continue this introduction with discussions of the need for risk-management in affordable lending programs and of the tools developed for this purpose during the 1990s. In section II, loss mitigation tools and history are discussed and in section III we examine the growth of the FHA loss mitigation program from 1998 to 2002. Multivariate statistical analysis of program usage is shown in section IV, then implications for affordable housing and community development efforts are offered in section V.

Sources of Increased Risk in Affordable Housing Programs

Increased default risk in affordable-housing programs comes from many sources.[1] First, target households can have low levels of disposable income, so that debt leverage ratios are more important for them than for higher-income households. Even modest debt ratios may leave small amounts of disposable income for these homeowners, making borrowers more susceptible to payment difficulties when unexpected household expenses arise. Second, target households tend to have less experience managing credit, or may have had problems with past credit experience. Third, homeownership requires new skill sets and disposable income to support ongoing property maintenance. Finally, low down payments create highly leveraged positions in properties, which in turn increase the risk of using default and foreclosure to meet the relocation needs of households.

[1] A summary of research on this topic can be found in Charles A. Capone, Jr., *Research Into Mortgage Default and Affordable Housing: A Primer* (Washington, DC: Center for Home Ownership, Local Initiatives Support Corporation, March 2002).

The Cost of Failure in Homeownership

The cost of failure in homeownership is high for all parties involved — borrower, lender/investor, and neighborhood. The normative question faced by policymakers and industry leaders then is, what probability of failure is acceptable? How far should the envelope of homeownership be pushed? Is a one-in-ten failure rate acceptable? What about a one-in-seven (15 percent), or a one-in-five (20 percent)? Active development of risk-management tools in the 1990s lessened the need to face this question for affordable-housing programs, but it is still the critical question.

Foreclosure of property rights eliminates wealth that was invested in a home, leaving the affected household worse off than before the initial home-purchase decision. To purchase another home requires a new down payment and new mortgage settlement costs. For clients of affordable lending programs, doing this the first time took assistance from various sources. Getting such assistance a second time, after a failed experience in homeownership, will be much more difficult.

Lenders and investors in the mortgage, too, are worse off in foreclosure because of legal expenses, lost interest, and declines in property value, compounded by a lack of home maintenance before and during the default period. An industry rule of thumb is that foreclosed properties sell for between 5 percent and 10 percent less than comparable properties in the neighborhood. Add to this the legal costs of processing foreclosures, property management and sales expenses, and foregone interest income, and losses start at 25 percent of the mortgage balance and go up from there.

Empty houses and depressed sale prices for foreclosed properties have feedback effects on the market value of surrounding properties, creating a potential snowball effect of downward prices. Once a neighborhood foreclosure cycle starts and prices are depressed, it becomes progressively harder for other households to sell their homes. Abandoned properties and blight can destroy neighborhoods where low-down-payment, affordable housing programs are prevalent.

Lastly, all homeowners suffer the consequences of high failure rates because they pay higher effective interest rates for mortgage credit, either directly or through higher costs for mortgage insurance. On net, then, foreclosure is a losing proposition for homeowners, mortgage investors, and neighborhoods. This problem received little attention in the mortgage industry until regional housing-market downturns across the United States in the 1980s and early 1990s created greater and greater national foreclosure rates and higher and higher credit losses for the industry. HUD (1996) estimated that home foreclosures in the United States rose from less than 100,000 in 1981 to more than 300,000 in 1992, before falling off slightly in 1993. Between 1986 and 1988, six of 14 conventional mortgage insurers were forced to cease issuing new policies and wind down their existing businesses. Losses at the FHA jeopardized the long-term solvency of its single-family insurance operations and led to congressional action in 1990 that included a temporary doubling of insurance premiums.

Options for Mitigating Default Risk in Affordable Housing Programs

Home mortgage default risk can and is being mitigated in a number of ways. The advances in risk management during the 1990s were truly revolutionary in their effects on homeownership initiatives. First came the introduction of automated underwriting systems (AUS) that weigh the tradeoffs between risk factors. The statistical work underlying AUS models helped the industry identify sources of problems in early affordable-housing initiatives, where too many underwriting criteria were being relaxed simultaneously in order to generate loan volumes. By creating relative weighting factors for individual underwriting criteria, AUS models also help identify viable tradeoffs that allow homebuyers to extend the reach of one underwriting criteria more than would otherwise be allowed under traditional guidelines and manual underwriting.

A second method for controlling risk that existed previously, but gained common acceptance in the 1990s, is pre-purchase counseling and homebuyer education. While many programs report mixed success, there appears to be a strong element of self-selection in which participants choose to follow through with a home purchase.[2] Thus, one primary benefit of counseling and education is to help potential homeowners understand and weigh the costs and benefits of the investment, thereby indirectly controlling mortgage default and foreclosure rates.

Another new option used by the private mortgage insurance industry is to require borrowers to agree to early delinquency intervention, either by loan servicers or credit

counselors. This activity is paid for out of higher insurance premiums. The goal is to help delinquent borrowers understand the options available for managing the delinquency period and reinstating the mortgage as quickly as possible.

A post-default risk-management initiative introduced in the 1990s is loss mitigation for loans that are 90 days delinquent. This time in the delinquency cycle is often referred to as the point of default: The material breach of loan terms is significant enough to warrant property-rights foreclosure. At this time, three payments have been missed and a fourth is due and payable. Without intervention, it is quite possible that up to half of the borrowers in this situation could lose their homes in foreclosure. Loss mitigation has come to mean pro-active intervention by loan servicers to judge where the interests of homeowner and investor coincide.[3] Any viable option short of foreclosure is nearly always preferred by the investor.

II. Loss mitigation Tools and History

Loss mitigation options in use today can be divided into the following five groups:

(Special) forbearance. To forbear means to withhold judgment. In the mortgage industry, it means not to exercise the rights of the lender to "accelerate" payment of the entire mortgage balance when the borrower is in default (*i.e.*, to foreclose). Special forbearance plans supported by Fannie Mae, Freddie Mac, the FHA, and the Department of Veterans Affairs (VA), allow servicers to craft long-term

[2] A review of studies on this issue is provided in Capone (2002), *op. cit.*

repayment plans for accumulated arrearages. These plans work well for borrowers who have had temporary financial difficulties but whose current and expected future income is at least as high as previous levels and whose non-mortgage debt is not large.

Loan modification. This is essentially a no-cost refinance for borrowers who had good mortgage payment histories prior to the current default episode. When market interest rates are lower than the current mortgage rate, it may be possible to add delinquent payments to the mortgage balance, recast the terms for another 30 years under a new interest rate, and still lower monthly payments for the borrower.

Pre-foreclosure or "short" sale. Assistance in selling properties can be beneficial when it is clear that homeowners need to move either to lower-cost housing or else to a new location (with new employment opportunities), but they cannot afford to sell their mortgaged properties. In the conventional mortgage market, the split of losses on sale between homeowner/borrower and investor is negotiated. Often, the mortgage insurer will provide an interest-free loan to the borrower for the latter's share of losses. Borrowers are most amenable to this solution in states where it is easy for the investor or insurer to obtain a Court-ordered deficiency judgment against them for losses, should foreclosure be the final solution. With the FHA and VA, borrowers are not required to pay any of the losses, but there

[3] Conventional market investors have also developed statistical tools that help determine which delinquencies require pro-active management, even as early as 15 days from the due date of the first missed payment.

are limits on how much of a loss these agencies will accept in a pre-foreclosure sale.

Deed in Lieu of Foreclosure. In some hardship cases involving death of the borrower or a failed attempt at a sale, borrowers are offered cash simply to sign over the deed of the property to the investor, rather than force a costly foreclosure.

History of Loss Mitigation

While there is a prehistory to loss mitigation efforts during the late 1980s, the watershed point in the mortgage industry's understanding of the cycle of foreclosure and neighborhood decline came in May 1991. That was when Fannie Mae sent a memorandum to its mortgage servicers offering them financial incentives to work with defaulted borrowers on salvaging mortgages, rather than rushing immediately into foreclosure proceedings.[4] Private mortgage insurers quickly adopted similar incentive plans, and Fannie Mae began to conduct training seminars across the nation that focused on changing how servicing personnel handled defaulted mortgage borrowers.

This sea change would take many years to complete, but the change was irreversible. Private mortgage insurers quickly followed Fannie Mae's lead. The U.S. Department of Veteran's Affairs published formal guidelines for loan servicers in 1993.[5] Freddie Mac

[4] Robert Engelstad, *Foreclosure Prevention and Loss Mitigation* (Washington, DC: Fannie Mae Corporation, Memorandum to Seller-Servicers, May 17, 1991).
[5] See, 38 CFR 36 (58 Federal Register 29114, May 19, 1993).

joined the effort in 1994, and the FHA in 1996.[6] As of 2002, Fannie Mae, Freddie Mac, and the FHA all report that their loss mitigation workout strategies are preventing over 50 percent of what ten years ago would likely have been foreclosures.

Efficiency Gains

Prior to the era of loss mitigation, there was a tremendous inefficiency in the system of managing delinquent accounts. Standard procedures called for servicing agencies to turn 90-day delinquent accounts over to collections specialists and foreclosure attorneys. They in turn used hard-ball tactics that gave delinquent borrowers one choice: either pay all back payments plus all collections and legal expenses, or else lose the property. The chances of troubled borrowers raising the cash decline rapidly as delinquency periods increase from three to four, or five, or more months. Before loss mitigation, foreclosure was the result in up to half of all 90-day delinquencies (three missed payments and a fourth due and payable) and became virtually inevitable once that delinquency reached six months.

What Fannie Mae discovered through some experiments in the late 1980s was that many defaulted borrowers had temporary financial difficulties that did not jeopardize their long-term abilities to support the mortgaged properties. Working with them to save the mortgage was, in most cases, a fraction of the cost of foreclosure. For households whose

[6] The FHA did implement a nationwide pre-foreclosure sale program in 1994. The delay for other options resulted from the need for legislation to replace its Single-Family Mortgage Assignment Program with the new tools. In the Assignment program, HUD would prevent foreclosure by purchasing defaulted loans from lenders and giving extended forbearance. Assignment was expensive and cured only a small percent of the defaults it handled. See Charles A. Capone, Jr., *Single Family Mortgage Assignment: Historical Experience and Future Directions for Borrower Relief Efforts* (Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research, September 1995).

long-term ability to support the property had diminished, savings could still be obtained by providing assistance in homeowner sales of the properties rather than taking possession through foreclosure actions. What had been a lose–lose proposition — borrower default — now began to resemble a win–win proposition, or what economists would call a gain in Pareto efficiency.

The inevitable logic of loss mitigation is detailed in an analysis by Ambrose and Capone,[7] who derive break-even success probabilities for various loss mitigation strategies under multiple economic conditions. Mortgage investors and insurers maximize profits by offering default workouts to all borrowers whose probabilities of success exceed the break-even thresholds. In a situation where home prices are falling by five percent per year, Ambrose and Capone estimate that break-even probabilities are still above 40 percent for most workout options. In healthy markets where home prices are rising, break-even probabilities can be under 20 percent for options that keep borrowers in their homes. That means that savings to the mortgage investors and insurers from preventing one foreclosure (a successful workout) are large enough to pay the added costs of four workout failures. In other words, a low break-even success probability for workouts means that the added costs of a failure are a small fraction of the expected losses associated with immediate foreclosure without the workout plan. Workout failures are costly because of the time delays (lost interest, unpaid property taxes, etc.) and administrative costs of running the program. Thus foreclosures after failed workouts are more expensive than foreclosures without attempting workouts.

[7] Brent Ambrose and Charles A. Capone, Jr., "Cost Benefit Analysis of Single-Family Foreclosure Alternatives," *Journal of Real Estate Finance and Economics* 13 (1996), 105–120.

III. Use of the FHA Loss Mitigation Program

Our analysis of the FHA loss mitigation program focuses on defaults in the period between 1998:IQ and 2002:IIQ. How the program was used during that period is shown in tables 1–5, where data are aggregated by variables of interest to affordable housing research: time, product type, loan-to-value class, borrower race, and property value. In tables 2–5, the first two rows contrast rates of home retention (workout) to loss of home, and the fourth row shows the corresponding default rate for loans in each category (columns). These default rates define the data used here. They are the ratio of new defaults reported to the FHA by its servicers in each quarter less borrower reinstatements and property sales, to the number of active loans in each class at the start of each quarter. These non-cured defaults represent somewhere between 40 percent and 50 percent of all defaults reported to the FHA, thus the default rates used here are lower than official default rates recorded by the FHA. However, these are the borrowers of policy interest because they are the ones who, in the absence of the loss mitigation program, are susceptible to losing their homes.

The summary statistics presented in each table are for loans insured under the Mutual Mortgage Insurance Fund, representing nearly 90 percent of all FHA-insured single-family loans, but possibly a somewhat smaller percentage of total FHA default and loss mitigation activity. Thus, readers are cautioned that these are *not* official FHA statistics.

Table 1 shows the growth and maturing of the FHA loss mitigation program over time. One clear story in table 1 is that lender forbearances have replaced foreclosure as the dominant type of resolution. In 1998, foreclosures accounted for over 77 percent of all resolutions, whereas in 2002 forbearances were 74 percent of resolutions. During the first three quarters of 2002, foreclosures accounted for 14.5 percent of resolutions, and other workout tools (including pre-foreclosure sales) make up the remaining 11.4 percent. The dominance of forbearances over other workout tools is not surprising, given that the FHA's explicit policy is for loan servicers to use this option whenever possible.[8] The incentives appear to be working: Since 1999, the use of other foreclosure-avoidance tools has been contained and very consistent.

Table 2 contrasts rates of workout versus property loss (foreclosure and pre-foreclosure sales) by product type. The ordering of workout rates follows a traditional underwriter's understanding of the inherent credit risk of each product, with low-risk products receiving the highest rates of workouts. Fifteen-year, fixed rate mortgages have the highest workout rates, followed by 30-year fixed rate mortgages, graduated equity mortgages, adjustable rate mortgages, and graduated payment mortgages.

Table 3 identifies workout rates by original loan-to-value class. As with table 2, the figures shown here correspond with an underwriter's view of the ranking of credit risk; lower loan-to-value classes have higher workout rates.

[8] See p. 18 of Mortgagee Letter 00-05, *Loss Mitigation Program*.

Table 4 lists workout rates by borrower race. Borrower race is frequently missing from loan applications, and so the missing-values class is rather large. Other than missing, the only two categories with sizeable numbers of defaulted loan records are for White and Black borrowers. There appears to be a clear difference between the two, with Black borrowers having an eleven-point advantage over Whites in workout rates. However, the default rate for Blacks is more than three times that of Whites, so that the increased use of workouts does not mean an overall increased ability to retain homes through difficult times.

In table 5, the variable of interest is property value relative to area medians. Three property-value classes are chosen. In class 1, property value is less than 50 percent of the area median price. This represents what are often called "starter homes," typically the bottom 25 percent of the house price distribution in an area. In class 2, values range from 51 percent to 100 percent of the area median, which represents the largest concentration of the FHA business. Finally, class 3 includes all properties with values above the area median. There is a strong trend of increased workout usage for higher valued properties. At the same time, the highest value class also has the lowest average default rate, which means very low foreclosure rates for borrowers whose property values exceed the median.

IV. Multivariate Statistical Analysis

While the loss mitigation workout rates shown in tables 1–5 are helpful for seeing trends in program usage, those trends must be confirmed by multivariate statistical analysis.

Higher or lower rates of program usage seen in high-level aggregations might mask the true sources of differences and lead us to incorrect conclusions.

Our multivariate analysis focuses on one aspect of loss mitigation activity—the probability that borrowers who cannot cure defaults successfully on their own will keep their properties. This is a conditional probability with many parts. It includes the probability of default, the probability of not having the resources to cure the default, the probability of being offered a workout option (conditional on default), the probability of accepting the offer (conditional on receipt), and the probability of success (conditional on acceptance).

Our preliminary analysis does not attempt to decompose success into these many parts. Indeed, a complete decomposition is probably not possible with available data and may not be helpful if it were. We know from FHA records that success probabilities given workout offer tender and acceptance is very high, on the order of 95 percent. This would suggest that workout options are being tailored very specifically to match borrowers' payment abilities and that profitable risks indicated by break-even success rates discussed earlier are not being considered. Also, offers are only made to willing borrowers who express a serious interest in keeping their homes and are willing to go through the application process, which they understand includes checking for financial need. Therefore, questions of need and of accepting offers once they are made are not likely to be interesting areas of study.

The probability of success in keeping one's home is a function of FHA guidelines and the perceived probability of success for each individual case, compared with what appear to be very-low-risk thresholds.[9] How servicer personnel view risk — the difference between the probability of workout success and their threshold success rate — may be influenced by borrower, loan, and economic characteristics. Our statistical analysis essentially examines how the FHA loss mitigation program has been implemented through the lens of the relative influences of various factors on workout use. The results give us an initial picture into when, where, and by whom foreclosures are most likely to be avoided.

Data Sources

We start with 489,917 records of loans insured under the FHA Mutual Mortgage Insurance Fund, where defaults were reported to the FHA between 1998:IQ and 2002:IIQ. These are 90-day delinquencies that borrowers did not cure on their own. Loans in foreclosure proceedings after the sample period (2002:IVQ) are marked as foreclosures for this analysis. Mortgage, property and borrower characteristics from the FHA data records are matched with contemporary economic data for the statistical analysis.

House-price appreciation rates are from the *HPI Report* of the Office of Federal Housing Enterprise Oversight (OFHEO), 2002:IIIQ. They are matched to FHA loan records using a property location key that matches loans either to one of the top 25 MSAs where the

[9] The latest comprehensive FHA guidelines are in Mortgagee Letter 00-05, *Loss Mitigation Program* —

FHA does business, or else to the appropriate Census division. Census division indexes are adjusted to remove the effects of MSA price fluctuations, using relative population weighting.

Another house-price series used here is the median sale price series published by the National Association of Realtors (NAR). These prices are matched to property values at mortgage origination (purchase price or appraisal) to classify FHA-insured properties within the house-price distribution. NAR price series are used for the same 25 MSAs as are used for matching the OFHEO HPI and for the four Census regions (NAR does not publish state- or division-level price series).

Unemployment rates by state are from the Bureau of Labor Statistics. Mortgage interest rate series are median interest rates of FHA-insured loans, by calendar quarter, with separate series for fixed- and adjustable-rate mortgages.

Sample Statistics

Tables 6 and 7 report sample statistics for the explanatory factors used in the regression analysis, tabulated by "success" and "failure" in ultimately keeping the home. Of 489,917 usable records, there are 284,595 successes and 205,322 failures, or a ratio of 1.39:1.

The demographic characteristics considered include gender, marital status, and race. Because some loan records did not include these data, we define a "not reported" category for each characteristic. Concerning race, there are too few observations for

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Comprehensive Clarification of Policy and Notice of Procedural Changes, January 19, 2000.

categories other than "White" and "Black, non-Hispanic," so these are included in the "other/not reported" category.

Economic factors include a house price index, average house price growth in the four quarters prior to and following the default event, and the state unemployment rate in the year of default. The house-price index measures cumulative appreciation of average properties, by MSA and census division, from loan origination to the time of default. We also include a dummy variable indicating whether each property is in a census tract classified by HUD as "underserved."

Characteristics specific to the mortgage include mortgage product type, age of the mortgage at the time of default, original loan-to-value ratio, and spread, at the time of default, between the coupon rate on the mortgage and the prevailing market rate. We also include classifications of the ratio of the mortgage payment to income and classifications of the property value at mortgage origination relative to median MSA or regional house prices. In addition, we control for whether the mortgage is used for purchasing a new home or refinancing an existing one.

Finally, to control for the fact that the default workout program itself has been developing over time, we include dummy variables for year of default from 1998 through 2002.

Multivariate Logistic Regression Results

Using multivariate logistic regression, we estimate the effect of these demographic, economic, and mortgage product characteristics on the probability that a default event will ultimately be resolved with the owner's keeping the home ("success") or losing the

home ("failure"). Multivariate regression allows us to assess the relative importance of the various factors when examined jointly; in some cases, the results reverse inferences of simple univariate sample statistics.

Table 8 presents regression results, including parameter estimates, standard errors and t-statistics, while tables 9 and 10 present regression statistics and measurements of fit. The results are generally consistent with expectations. Readers will note that we allow additional non-linear effects for *spread*, *unemployment*, and *mortgage age* by including their squares in the regression. Also, most non-economic variables have non-linear effects because the variables appear in categorical form. The estimated coefficients for each category provide differences in effects relative to an omitted comparison class.

Coefficients on the various mortgage product classes represent effects relative to the 30-year fixed rate mortgage (FRM). We see that the 15-year FRM is strongly associated with successful resolutions, while the graduated payment mortgage and, to a lesser extent, the graduated equity mortgage are associated with unsuccessful resolutions. The effect of the adjustable rate mortgage is so small that it is almost indistinct from the 30-year FRM. Moving from product type to loan purpose, purchase loans have lower probabilities of success than do refinance loans, but the effect is numerically unsubstantial.

Higher ratios of payment to income are significantly and negatively related to success. While it is numerically true that the highest category has a smaller effect (in absolute value) than the second-highest category, the difference there is not statistically significant (p-value 0.40). The positive coefficient on the square of unemployment is unexpected; it

implies that unemployment rates greater than 10.9 percent are positively associated with success. However, the sample contains only 2,350 such cases, or less than 0.5 percent, so this may be a numerical artifact. It must also be remembered that the state unemployment rate is only a proxy for the more local unemployment rate.

Simulation Results

Simple simulations are helpful for understanding the meaning of logistic regression results, as the coefficients themselves are something like elasticities: Their impact on the probabilities of events depends on the values of the input variables. Thus, we start with a base-case scenario, with variable values as given in the last column of table 8. The resulting success probability is 85 percent, which is essentially the average success rate for loans defaulting in 2002, as shown in table 1. From there, we change one variable at a time to see which factors are most important for determining success in keeping one's home though financial difficulties. The simulations are summarized in table 11.

Our first simulations change housing market conditions from advancing to declining. If property values in the year preceding default drop by 4 percent, rather than grow by 4 percent, the probability of success declines to 79.1 percent.[10] If prices had been falling by 4 percent annually since loan origination, so that the area's house price index at default is only 89 percent of its original value, the success probability would drop to 73.9 percent. The development of the program itself is of dramatic importance here. If this same case of declining prices through the life of the mortgage had defaulted in 1999

[10] The growth rate of property values after default has a much smaller impact on success probabilities, so we do not highlight simulation sensitivities that vary it.

instead of 2002, the success probability would have been only 26.1 percent. In 1998, the success probability for this case would have been only 14.5 percent.

Switching the borrower's race from White to Black increases the success probability from 85 percent to 91.2 percent. However, because default rates are higher among Blacks (see table 4), this does not translate into a higher net rate of successful homeownership outcomes for Blacks.[11]

Property value and, by implication, neighborhood has a measurable impact on success probabilities. Having a home in the bottom half of the house price distribution drops the success probability by 5.1 percentage points for Whites (to 79.9 percent) and 3.2 percentage points for Blacks (to 88 percent). Having a home in the top half of the price distribution only increases the success probability by 3.5 percentage points above the Base-case result. The combined result is a swing of 8.6 percentage points in success probabilities when going from low-value neighborhoods to high-value neighborhoods.

Original loan-to-value ratio and current mortgage interest-rate spreads have little effect on success rates. A borrower making a down payment of 10 percent, rather than 3 percent, gains only a 1.9 percentage point increase in the success probability. Likewise, if a defaulted borrower is in a situation where current mortgage rates are 2 percentage points above his/her contract rate, rather than 2 percentage points below as in the base case, the probability of success falls only 2.3 percentage points. The lack of any significant effects from changes in spreads between coupon rates and current market rates

on mortgages may represent some balancing between use of loan modifications when interest rates fall and loan forbearances when they rise.

Other interesting results are that being unmarried lowers the success probability by 4.9 percentage points, having a graduated payment mortgage lowers it by 9.7 percentage points, and having a home in a HUD-designated underserved area drops it by 4.2 percentage points, when compared to the base-case scenario.[12]

To illustrate the second-order effects of including squared terms in the regression, figures 1 through 6 present the associated probabilities and marginal effects of changes in *spread*, *unemployment*, and *mortgage age*. All other regressors are set to their respective baseline values, as in table 8. While the directional impact of *spread* is somewhat unexpected, figure 3 shows that it has little numerical impact on the probability of success until very large spreads, on the order of 500 bps. Figure 5 presents a similar profile for *mortgage age*: There is little impact until *age* exceeds about 60 quarters (15 years).

V. Implications for Affordable Housing and Community Development Efforts

Community development efforts are successful with homeownership initiatives only to the extent that they control both the default rates and the rate of home loss in foreclosure

[11] A higher rate of self-cure out of 90-day default by Blacks was found by Ambrose and Capone, "Do Lenders Discriminate in Processing Defaults?" *Cityscape* vol. 2 (February 1996), 89–98.

[12] Underserved areas are Census tracts where the median income is less than or equal to 90 percent of the area (MSA) median income, or else the minority concentration is at least 30 percent and the median income is less than or equal to 120 percent of area median income.

when borrowers do default. Earlier in this paper we mentioned that the introduction of loss mitigation was a true sea change in mortgage servicing during the 1990s. The regression results for year-of-default bear this out for the FHA. The largest single effect on success rates in keeping their homes, when borrowers default and cannot cure on their own, is simply the presence of a mature loss mitigation program. When starting with the regression effect for defaults in 2002, it is difficult to change other variable inputs to construct a case where the probability of success falls below 60 percent.

The economics of loss mitigation for the mortgage industry are irrefutable because the cost savings of successful workouts, versus foreclosure, are substantial. They are substantial both for investors and for homeowners. It is not an exaggeration to say that the cost saving to the FHA from having a mature loss mitigation program is what made it possible for the agency to lower insurance premiums by nearly 40 percent in 2001. Lower insurance premiums mean that FHA loss mitigation not only preserves existing homeowners, but also helps increase rates at which families can afford homeownership. Loss mitigation may be one of the most significant changes in the history of the FHA. The agency has often been criticized as being responsible for decaying neighborhoods with large numbers of foreclosed and abandoned properties. That problem should now be substantially diminished.

Our statistical results show that the largest effects on probabilities of successful workouts appear to come from the economics. In the depths of a housing-market recession, when jobs may be difficult to find and borrowers may be less willing to put in the effort necessary to save their homes, success probabilities drop measurably.

In terms of results germane to affordable housing programs, low down-payment loans have significantly higher rates of default, but their borrowers have only a slightly smaller probability of maintaining their homes through a default episode. Black borrowers have much higher rates of unmanageable default than do White borrowers (see table 4). This is partially offset by a probability of successful workout that is six percentage points higher. Yet that positive effect is counterbalanced by a three-percentage-point decrease in success probability if they live in a low-income, low-house-price area.

This research uses five years of data on the experience of the FHA loss mitigation program with loans insured under the Mutual Mortgage Insurance Fund. The focus here is exclusively on rates of home retention for borrowers who did not cure 90-day defaults on their own. We hope in future research to combine this with an examination of all 90-day defaults to understand what factors most contribute to each individual default resolution when all types are considered together — borrower self cures, borrower home sales, workouts, and foreclosure.

Table 1: Resolution Type for Defaults Not Cured Directly by Borrowers, by year of 90-day default[a] (percentage)

Year	Default Resolution Type					Total Number of loans[b]
	Forbearance	Modification	Partial Claim	Pre-foreclosure Sale	Foreclosure	
1998	17.00	3.47	1.87	0.17	77.48	87444
1999	29.56	6.51	3.31	0.14	60.49	89831
2000	52.02	4.48	3.88	0.22	39.41	106,672
2001	66.60	6.38	4.74	0.70	21.58	134,641
2002[c]	74.13	6.32	4.44	0.60	14.52	73,329
Average	48.98	5.46	3.74	0.38	41.43	Σ = 491,912

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] Dates are determined by when the default was reported to the FHA, through its single-family default monitoring system, or else are calculated from the 30-day default date recorded in the FHA loss mitigation data system.
[b] These are loans reported to the FHA as having a 90-day default in the respective time periods. Loans for which the default was cured by the borrower without formal intervention through loss mitigation tools are not included in these totals.
[c] Calendar year 2002 defaults include only the first three quarters of the year. In the regression analysis, only the first two quarters of 2002 are used.

Table 2: Resolution Type for Defaults Not Cured Directly by Borrowers, by Mortgage Product Type, 1998Q1-2002Q3 (percentage)

	Product Type					
	Fixed rate, 30 year	Fixed rate, 15 year	Adjustable rate	Graduated payment	Graduated equity	Overall average
Workout	59.14	69.41	52.18	34.13	57.17	58.18
Lose Home	40.86	30.59	47.82	65.87	42.83	41.82
Product class weights (%)	83.24	1.39	15.07	0.21	0.09	100.00
Class default rates[a]	3.17	0.83	5.97	0.23	3.55	3.18

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] Default rates are averages across 1998Q1-2002Q3, by quarter. Each quarter's default rate is the ratio of number of newly reported defaults, not cured directly by borrowers, to the number of active loans at the start of the quarter. Rates reported here are weighted averages, where the weights are the number of active loans in each quarter.

Table 3: Resolution Type for Defaults Not Cured Directly by Borrowers, by Loan-to-Value Class, 1998Q1-2002Q3 (percentage)

	Loan-to-Value Class				
	Up to 80%	81-90%	91-95%	96-100%	Over 100%
Workout	74.77	64.89	65.51	59.10	54.21
Lose Home	25.23	35.11	34.49	40.90	45.79
Class weights (%)	1.17	3.26	3.36	61.37	30.84
Class default rates[a]	0.71	1.19	1.42	4.45	2.84

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] See note a on table 2.

Table 4: Resolution Type for Defaults Not Cured Directly by Borrowers, by Race of Primary Borrower , 1998Q1-2002Q3 (percentage)

	Race of Primary Borrower						
	White	Black	Native American	Asian	Hispanic	Other	Unknown[a]
Workout	58.97	69.01	60.53	56.52	61.99	47.37	59.79
Lose Home	41.03	30.99	39.47	43.48	38.01	52.63	40.21
Number of loans	273177	109634	38	161	1205	57	27396
Class default rates[b]	2.78	8.81	0.89	0.59	1.15	1.20	7.28

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] Borrower demographic data is an optional item on loan application forms so it is not surprising to have a larger percent of unreported or unknown values.
[b] See note a on table 2.

Table 5: Resolution Type for Defaults Not Cured Directly by Borrowers, by Property Value Class, 1998Q1-2002Q3 (percentage)

	Property Value Class		
	Up to 50% of area median price[a]	51-100% of area median price	Over 100% of area median price
Workout	50.38	59.14	66.6
Lose Home	49.62	40.86	33.4
Number of loans	107,381	321,720	62,811
Class default rates[b]	3.14	3.36	2.55

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] Value class is determined by the relationship of house value at time of mortgage origination to the median existing home price as reported by the National Association of Realtors. For this analysis, properties are matched either to one of the 25 MSAs where FHA volumes are highest, or else they are considered rural and are matched their respective Census region.
[b] See note a on table 2.

Table 6: Sample Statistics for Categorical Data in Regression Analysis

	Total		Workout			Lose Home		
	Cases	%	Cases	%	% Total	Cases	%	% Total
TOTAL	489,917	100.0%	284,595	100.0%	58.1%	205,322	100.0%	41.9%
YEAR OF 90-DAY DEFAULT[a]								
1998	87,324	17.8%	19,504	6.9%	4.0%	67,820	33.0%	13.8%
1999	89,672	18.3%	35,303	12.4%	7.2%	54,369	26.5%	11.1%
2000	106,670	21.8%	64,397	22.6%	13.1%	42,273	20.6%	8.6%
2001	134,638	27.5%	104,646	36.8%	21.4%	29,992	14.6%	6.1%
2002[b]	71,613	14.6%	60,745	21.3%	12.4%	10,868	5.3%	2.2%
GENDER								
Male	332,010	67.8%	189,561	66.6%	38.7%	142,449	69.4%	29.1%
Female	124,766	25.5%	76,144	26.8%	15.5%	48,622	23.7%	9.9%
Not Reported	33,141	6.8%	18,890	6.6%	3.9%	14,251	6.9%	2.9%
MARITAL STATUS								
Married	236,585	48.3%	145,603	51.2%	29.7%	90,982	44.3%	18.6%
Separated	5,739	1.2%	3,355	1.2%	0.7%	2,384	1.2%	0.5%
Unmarried	182,552	37.3%	100,464	35.3%	20.5%	82,088	40.0%	16.8%
Not Reported	65,041	13.3%	35,173	12.4%	7.2%	29,868	14.5%	6.1%
RACE								
White	257,482	52.6%	146,352	51.4%	29.9%	111,130	54.1%	22.7%
Black, non-Hispanic	102,335	20.9%	68,749	24.2%	14.0%	33,586	16.4%	6.9%
Other/Not Reported	130,100	26.6%	69,494	24.4%	14.2%	60,606	29.5%	12.4%
HUD-DESIGNATED UNDERSERVED AREA								
No	224,619	45.8%	140,628	49.4%	28.7%	83,991	40.9%	17.1%
Yes	265,298	54.2%	143,967	50.6%	29.4%	121,331	59.1%	24.8%
MORTGAGE PRODUCT TYPE								
30 year FRM	407,721	83.2%	240,726	84.6%	49.1%	166,995	81.3%	34.1%
15 year FRM	6,800	1.4%	4,717	1.7%	1.0%	2,083	1.0%	0.4%
ARM	73,902	15.1%	38,539	13.5%	7.9%	35,363	17.2%	7.2%
GPM	1,041	0.2%	354	0.1%	0.1%	687	0.3%	0.1%
GEM	453	0.1%	259	0.1%	0.1%	194	0.1%	0.0%
PAYMENT TO INCOME RATIO (P/Y)								
P/Y <= 0.3	302,194	61.7%	175,221	61.6%	35.8%	126,973	61.8%	25.9%
0.3 < P/Y <= 0.4	84,508	17.2%	48,148	16.9%	9.8%	36,360	17.7%	7.4%
P/Y > 0.4	7,647	1.6%	4,722	1.7%	1.0%	2,925	1.4%	0.6%
Not Reported	95,568	19.5%	56,504	19.9%	11.5%	39,064	19.0%	8.0%
RELATIVE PURCHASE PRICE (Pr)								
Pr <= 0.5	107,160	21.9%	53,916	18.9%	11.0%	53,244	25.9%	10.9%
0.5 < P5 <= 1.0	320,248	65.4%	189,095	66.4%	38.6%	131,153	63.9%	26.8%
Pr > 1.0	62,509	12.8%	41,584	14.6%	8.5%	20,925	10.2%	4.3%
LOAN PURPOSE								
Purchase	422,613	86.3%	244,873	86.0%	50.0%	177,740	86.6%	36.3%
Refinance	67,304	13.7%	39,722	14.0%	8.1%	27,582	13.4%	5.6%

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] See note a on table 1. This also applies to all sample data presented in this table.
[b] See note c on table 1.

Table 7: Sample Statistics for Continuous Data in Regression Analysis

	Total Sample					Workout	Lose Home
	min	max	mean	median	std	mean	mean
House Price Index, at default	0.852	4.782	1.215	1.157	0.190	1.247*	1.169
House Price Growth, pre-default	-0.008	0.172	0.066	0.063	0.024	0.070*	0.060
House Price Growth, post-default	-0.008	0.404	0.074	0.065	0.054	0.078*	0.069
Mortgage Rate Spread	-5.375	10.0	0.792	0.750	1.259	0.730	0.877*
State Unemployment Rate	2.2	13.3	4.662	4.6	1.049	4.716*	4.588
Loan-to-Value Ratio	0.304	1.150	0.990	0.997	0.048	0.987	0.993*
Mortgage Age, quarters	1.0	90.0	17.643	13.0	14.322	18.543*	16.395

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
* Difference of means is statistically significant at a 99% confidence level. The asterisk is placed on the greater value.

Table 8: Logistical Regression Results

Variable	Coefficient	Standard error	T-statistic	Baseline Values[a]
Constant[b]	-0.725	0.096	-7.6	1
Program Year: 1999	0.736	0.012	63.8	0
Program Year: 2000	1.432	0.013	113.5	0
Program Year: 2001	2.321	0.012	190.3	0
Program Year: 2002	2.814	0.015	188.3	1
Comparison class: 1998	-			
Gender: Male	-0.257	0.021	-12.2	1
Gender: Female	-0.032	0.022	-1.4	0
Comparison class: unreported	-			
Marital Status: Married	0.273	0.017	15.9	1
Marital Status: Separated	0.014	0.036	0.4	0
Marital Status: Unmarried	-0.070	0.018	-3.9	0
Comparison class: unreported	-			
Race: White	0.060	0.009	6.8	1
Race: Black, non-Hispanic	0.669	0.011	62.2	0
Comparison class: Other, including unreported	-			
House Price Index at Default	1.913	0.038	49.9	1.13
Annual House Price Growth: pre-default	2.920	0.182	16.0	0.04
Annual House Price Growth: post-default	0.656	0.078	8.4	0.04
Interest Rate Spread	-0.042	0.004	-9.6	-2
Interest Rate Spread Squared	-0.020	0.001	-13.5	4
Unemployment Rate	-0.459	0.012	-37.5	6
Unemployment Rate Squared	0.042	0.001	41.4	36
HUD underserved Area: Yes	-0.299	0.007	-41.7	0
Product: 15-year fixed rate	0.572	0.032	18.0	0
Product: adjustable rate	0.024	0.011	2.1	0
Product: graduated payment	-0.622	0.076	-8.2	0
Product: graduated equity	-0.259	0.110	-2.3	0
Comparison class: 30-year fixed rate	-			
Payment Ratio (P/Y): P/Y <= 0.30	-0.019	0.009	-2.1	1
Payment Ratio (P/Y): 0.30 < P/Y <= 0.40	-0.095	0.012	-8.1	0
Payment Ratio (P/Y): 0.40 < P/Y	-0.072	0.028	-2.6	0
Relative Purchase Price (Pr): 0.50 < Pr <= 1.00	0.351	0.009	40.4	1
Relative Purchase Price (Pr): 1.00 < Pr	0.659	0.013	51.6	0
Loan-to-value Ratio at Loan Origination	-2.215	0.078	-28.4	0.97
Loan Purpose: New Purchase	-0.021	0.010	-2.1	1
Comparison class: Refinance	-			
Mortgage Age	0.035	0.001	40.7	12
Mortgage Age Squared	-0.001	0.000	-39.0	144

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.
[a] Baseline values are used in the simulations shown in table 11
[b] The Constant term measures the combined effects of the comparison classes on all categorical variables.
All reported effects for categorical variables are marginal effects, as measured against the comparison case.

Table 9: Regression Statistics

Test	Value	Critical Value	p-Value
Number of Observations	489,917		
Likelihood Ratio Index	0.2062		
Likelihood Ratio Test: All slopes equal 0	6,939.18	46.19	0.00
Wald Test: All slopes equal 0	4,981.49	46.19	0.00

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.

Table 10: Goodness-of-Fit for Regression Results: Comparison of Predicted to Actual Outcomes

Predicted value equals 1 if probability of success exceeds 50%

	Predicted Category		
Actual Category	**0**	**1**	**%**
0	128,376	76,946	62.5
1	54,375	230,220	80.9
		Cumulative Score:	73.20

Predicted value equals 1 if probability of success exceeds 58.09% (sample proportion)

	Predicted Category		
Actual Category	**0**	**1**	**%**
0	145,894	59,428	71.06
1	74,404	210,191	73.86
		Cumulative Score:	72.68

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.

Table 11: Simulation Results

Scenario	Probability of Keeping Home	Change from Baseline Case
Base-case Scenario	85.0%	
House Price Growth (pre- default): -0.04	79.1%	-5.8%
House Price Growth (life of mortgage): -0.04	73.9%	-11.1%
House Price Growth (life of mortgage): -0.04, Default Year: 1999	26.1%	-58.8%
House Price Growth (life of mortgage): -0.04, Default Year: 1998	14.5%	-70.5%
Race: Black, non-Hispanic	91.2%	6.2%
Relative Purchase Price (Pr): Pr <= 0.5	79.9%	-5.0%
Relative Purchase Price (Pr): Pr <= 0.5, Race: Black, non-Hispanic	88.0%	3.0%
Relative Purchase Price (Pr): Pr > 1.0	88.5%	3.5%
Loan-to-Value Ratio: 0.90	86.9%	1.9%
Interest Rate Spread: +2.0%	82.7%	-2.3%
Marital Status: Unmarried	80.1%	-4.9%
Mortgage Product Type: graduated payment	75.2%	-9.7%
HUD Underserved Area: Yes	80.7%	-4.2%

Source: Calculations by authors; FHA records of loans insured under the Mutual Mortgage Insurance Fund.

Figure 1: Unemployment and Probability of Success

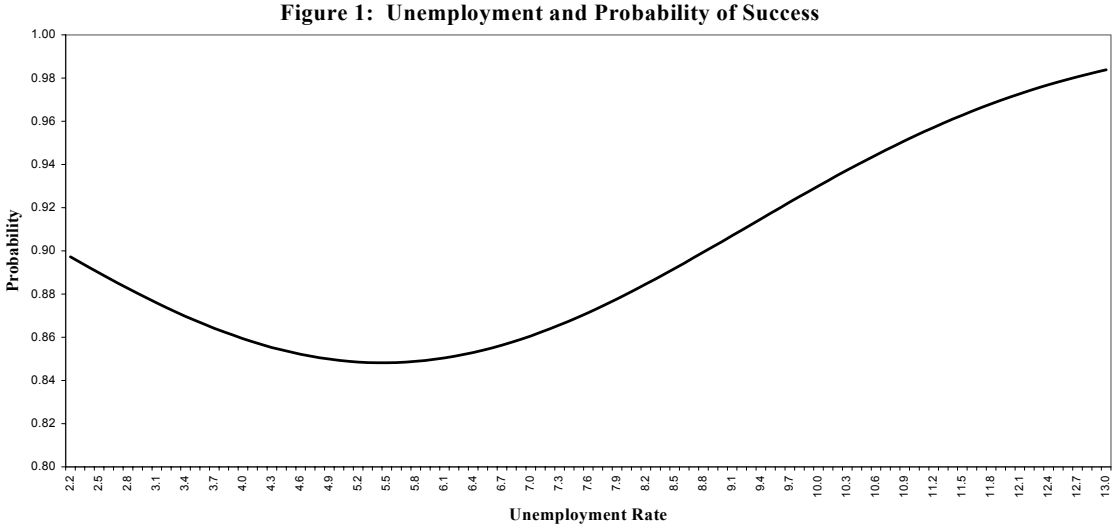

Figure 2: Marginal Effect of Unemployment on Baseline Success Probability

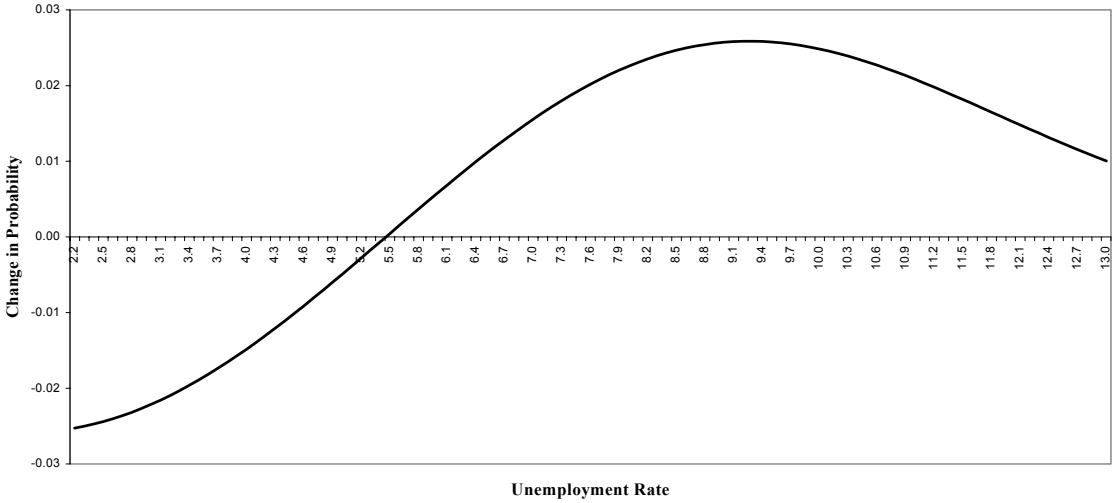

Figure 3: Interest Rate Spread and Probability of Success

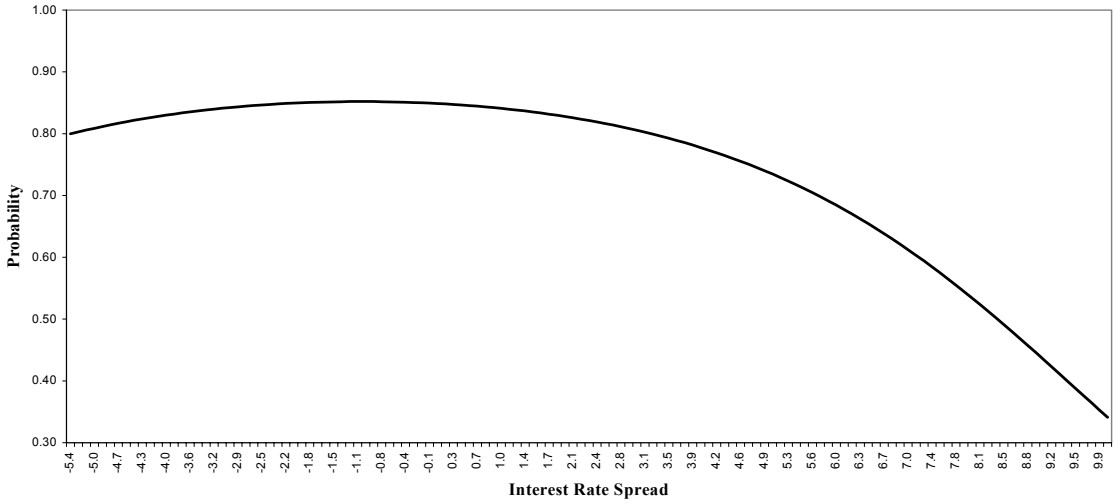

Figure 4: Marginal Effect of Interest Rate Spread On Baseline Success Probability

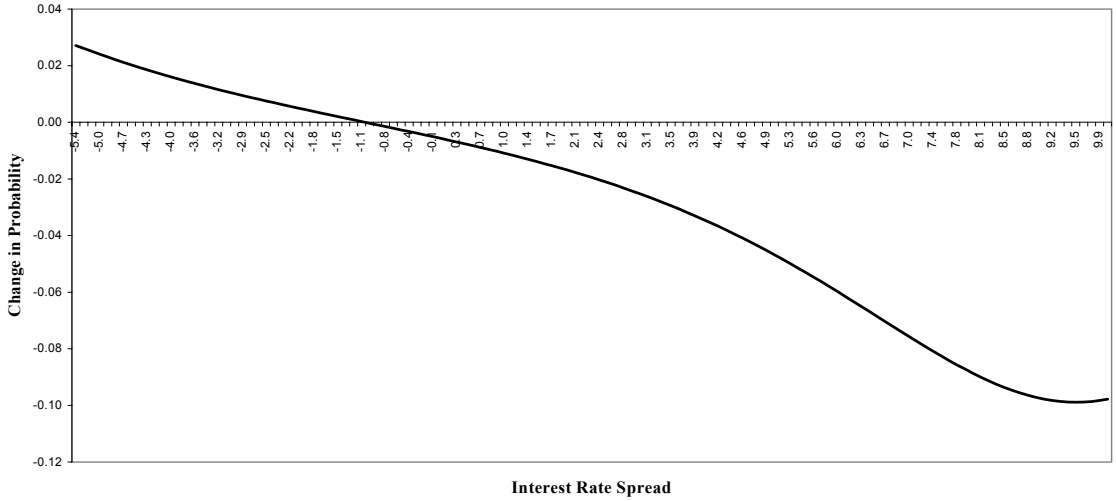

Figure 5: Mortgage Age and Probability of Success

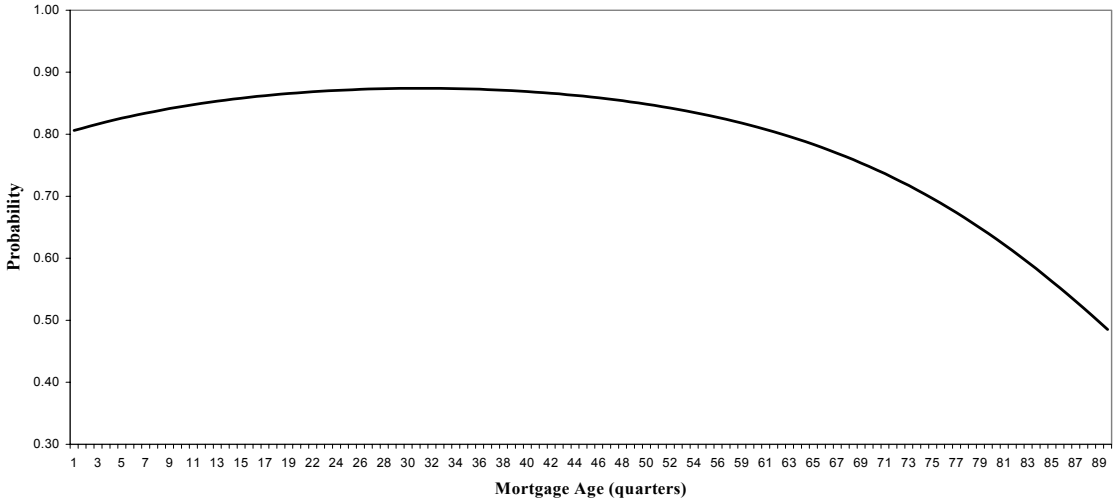

Figure 6: Marginal Effects of Mortgage Age on Baseline Success Probability