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Zero Down Payment Mortgage Default

by

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Abstract

Previous research has focused on equity as a prime determinant of mortgage default propensities. This paper extends the analysis of mortgage default to include mortgages that require no down payment from the purchaser. A continuous time hazard model is used to estimate the conditional probability of a serious delinquency, or a claim, as a function of a host of standard control variables, and indicators for the presence and source of the down payment. The data consist of a nationally representative random sample of about 5,000 FHA insured single family mortgages endorsed in Fiscal Years 2000, 2001, and 2002, observed through September 30, 2006, and samples of about 1,000 FHA loans each from the Atlanta, Indianapolis, and Salt Lake City MSAs in the same time period. The results indicate that borrowers who provide down payments from their own resources have significantly lower default propensities than do borrowers whose down payments come from relatives, government agencies, or non-profits. Borrowers with down payments from seller-funded non-profits, who make no down payment at all, have the highest default rates. Additionally, borrowers who do not make down payments from their own resources tend to have higher loss given default in the small subset of loans that had completed the property disposition process.

1. Introduction and Literature Review

The idea that equity plays an important role in the homeowner's decision to default is longstanding in the academic literature[i]. Empirical estimates of the relationship between equity and default go at least as far back as Herzog and Earley (1970), and a firm theoretical underpinning for the decision to default was provided by Kau and Kim (1994). Equity can come in two flavors – initial equity in the form of the down payment when a home is purchased, and contemporaneous equity, which adds in price appreciation (or depreciation) post purchase, amortization, and sometimes changes in the market value of the mortgage balance. Research finds that contemporaneous equity has a strong influence on credit risk, and some papers, such as Harrison, Noordewier, and Yavas (2004) find that initial equity has a modest additional impact, over and above its effect on contemporaneous equity, perhaps because it reflects the household's ability to save, or because it is more precisely measured than accumulated equity.

In standard financial models of loan default, so-called "ruthless default", such as Kau and Kim (1994), the source of the down payment should be irrelevant. If property value is sufficiently below the loan balance, the borrower should default. Many empirical models, however, have stressed the importance of "trigger events" such as unemployment, illness, or divorce. These events may produce cash flow problems leading to diminished equity, as the delinquent payments are added to the loan balance, and may result in eventual default. Source of down payment has not previously been considered in default modeling, but the relationship between default and the source of the borrower's down payment may be related to trigger events. Borrowers who are capable

of increasing their saving, or increasing their labor earnings, in response to unforeseen events may be less susceptible to trigger events. The need to save for a down payment may serve to separate those who can more readily increase saving and earnings from those who find it more difficult. Krumm and Kelly (1989) find that savings and the transition to homeownership are endogenous, while Haurin, Wachter, and Hendershott (1995) find that labor earnings of households often increase prior to entering homeownership. Both of these studies covered time periods in which zero down loans were generally unavailable. Presumably the need to accumulate a down payment drives this savings and earnings behavior, and eliminating the need to accumulate a down payment would draw in others in less flexible circumstances. It is also possible that cash constrained borrowers spend less on maintenance, reducing the appreciation rate on these properties, and making these borrowers more subject to "trigger events" such as the failure of a major system. Harding, Rosenthal, and Sirmans (2007) estimate that housing depreciates at a gross rate of about 2.5%, and average annual maintenance expenditures are about 0.5%.

Another reason that source of down payment may be important is the case of seller-funded non-profits. Lenders and insurers generally limit the amount of assistance that sellers can provide to buyers, presumably because this assistance can make a round-trip, to the extent that selling prices are increased when seller-funded assistance is present. Fannie Mae, Freddie Mac, and private mortgage insurers often limit the amount of seller-assistance to 3% of the transaction price, and FHA limits the amount of seller-assistance to 6%. However, since 1997 FHA has allowed seller-funded non-profits to donate funds to purchasers using FHA mortgages, and then bill the sellers for the amount of the

donation plus a transaction fee. This funding is not counted against the 6% limitation on seller provided funds. HUD's Office of the Inspector General (HUD 2000, 2002) and GAO (2005b)[ii] have found that sales prices of homes using seller-funded non-profits tend to reflect the assistance. If this assistance causes sellers to raise the price beyond the market clearing price based on arms' length transactions, the maximum allowable loan value increases. The apparent equity in these transactions would not exist and they would be, in effect, nothing down mortgages, as the loan amount would cover the full cost of the transaction, price plus closing costs.

A handful of studies sponsored by HUD or by seller-funded non-profits have examined the relationship between source of down payment and claim and delinquency rates. In the two HUD OIG studies cited above, 90 day delinquency rates were compared for FHA single family loans originated in 4 MSAs, Sacramento, Stockton, Indianapolis, and Las Vegas, over the time period 1997-1999. About 2,000 loans that had received seller-funded assistance through the largest down payment assistance program, Nehemiah, were compared to other FHA loans in these 4 cities. In the first study, examining delinquencies through 1999, assisted loans had double the delinquency rate of unassisted loans, while the second study examined delinquency on the same set of loans through February 2002, and also found seller funded assistance doubled the delinquency rate. In response to these studies, a coalition of seller-funded non-profits, the Homeownership Alliance of Nonprofit Downpayment Providers (HAND), commissioned a CPA firm to examine delinquency rates for FHA borrowers in states where seller-funded non-profits were active, and compare delinquency rates for loans with non-profit assistance to loans with other forms of down payment assistance, such as gifts from relatives or government

programs (Reznick, Fedder and Silverman 2003). This study found elevated delinquency rates for all forms of assistance, and found that non-profit assistance delinquency was comparable to delinquency rates of loans with assistance in other forms. Both the OIG studies and the HAND study fail to hold constant many important variables. For example, the OIG studies do not differentiate between loans with various loan-to-value ratios, and use a data source that does not include the borrower's credit score. The HAND study does limit it's sample to high LTV loans, but does not have credit scores and, more importantly, compares loans over different "default windows." Delinquency status as of May 2003 was examined for loans originated between 1997 and 2001. Since the use of seller-funded non-profit assistance has grown rapidly, from less than 1% of FHA purchase loans in 1997 to about 10% of FHA purchase loans in 2001 (GAO 2005b), the failure to control for the length of the default window means that the loans with seller-funded down payment assistance had, on average, much shorter default windows than did the loans to which they were compared.

While the source of the down payment has not generally been considered in academic studies of default, several studies have looked at the importance of down payment assistance to homeownership. Linneman and Wachter (1989) first examined the extent to which households are down payment constrained. Mayer and Engelheart (1996) document first time home buyer's growing reliance on gift assistance, often from relatives. However, none of these studies consider the effect of lowered down payment constraints from conventional lenders, or the proliferation since 1997 of seller-funded down payment assistance non-profits. Herbert and Tsen (2005) consider the potential for down payment assistance in the current environment. Two HUD sponsored studies of

seller funded nonprofits by the Concentrance Corporation document the substantial growth in gift assistance in the FHA portfolio, and summarize focus groups with borrowers, lenders, and real estate agents, who report higher prices, and higher delinquency and claim rates for loans with seller-funded assistance. The borrower focus groups staged by Concentrance (Concentrance 2005) also report substantial confusion among borrowers as to the source of the assistance and the involvement of the seller and the non-profit in the transaction. One study of seller-funded nonprofits, done by the Millken Institute and sponsored by Nehemiah, (Wong, Murphy, Fogelbach and Koepp 2004), interviewed users of seller-funded gift assistance from Nehemiah, and examined property tax records for homes purchased with Nehemiah assistance. The authors found that local jurisdictions collected substantial tax revenue from these properties, but did not estimate tax collections in a counter-factual case of no Nehemiah assistance. They also found substantial satisfaction with the program among the buyers, but since the sample design only included purchasers who were still in their homes several years after purchase, the sample frame would have missed borrowers who had experienced foreclosure, or a forced sale to prevent foreclosure.

The rest of the paper is laid out as follows. Section 2 describes the data, and the trends in default and gift assistance. Section 3 discusses the estimation strategy and the CTM software used to estimate the model. Section 4 provides the results for 90 day delinquency, claims, prepayments, and loss given default. Section 5 offers concluding remarks and some observations regarding policy.

2. Data

2.1 Concentrance Sample

The data for this paper consist of a nationally representative sample of just over 5,000 FHA single family purchase money loans, endorsed in Fiscal Years 2000, 2001, and 2002, that is, from October 1999 to September 2002. These loans were drawn by Concentrance Corp, a HUD contractor, for a HUD sponsored study of down payment assistance.[iii] This file is one of only two large random samples of seasoned FHA loans with FICO scores[iv], as HUD only began the routine collection of FICO scores as part of their Single Family Data Warehouse (SFDW) in 2004. In addition to FICO scores, the file contained many fields from the SFDW, such as the initial LTV ratio, mortgage payment, borrower income, type of mortgage, term, interest rate, and street address of the borrower. This file was merged with a July 2005[v] extract of the SFDW containing dates for prepayment of the loans that paid off early, date of first 90 day delinquency reported by the lender, and date of claim for loans that terminated with a loss to FHA, and the loss (or, for 12 foreclosures, profit) for loans that had completed the property disposition process. In October of 2006 HUD provided to GAO another extract from the SFDW with the dates of delinquency, and of claim and non-claim terminations through September 30, 2006, and the loss figures for all REO cases resolved through September 2006.[vi]

In addition to the national file, Concentrance drew random samples of about 1,000 loans from each of three MSAs, Atlanta, Indianapolis, and Salt Lake City, over the same time period. These MSAs were selected by HUD because of their high incidence of seller-funded down payment assistance.

The samples were limited to loans with LTV ratios greater than 95%, as defined in HUD's SFDW. Since HUD's definition of LTV excludes the upfront mortgage insurance premium, which is generally rolled into the mortgage, in effect almost all of these loans had LTV ratios, as conventionally defined, greater than 96.5%, as FHA's upfront premium was 1.5% for most of the sample period. Loans with LTVs greater than 96.5% constitute almost 90% of FHA's purchase money loans, and constitute over 90% of FHA's claims. Because FHA allows some closing costs to be financed, and allows the financing of the upfront premium, FHA loans can, in some circumstances, slightly exceed 100% LTVs. In this sample almost 85% of the records had LTVs in the narrow range of 98% to 100%, and about 99% were between 95% and 101%, as conventionally defined.

The median price in the national sample was $110,000. About 99% of the loans were for a term of 30 years, with the remainder generally for 15. About 6% of the loans were for condominiums, and about 8% of the loans were 1 year ARMs, with the balance being fixed rate mortgages (FHA did not offer hybrid ARMs at that time). Just over 80% of the loans were to first time home buyers, and about 40% were in underserved area census tracts. See Table 1 for sample summary statistics.

2.2 Source of Down Payment

The Concentrance sample included 4 fields for source of gift, and 4 fields for the dollar amount of the gift, so that transactions involving multiple gifts could be tracked. No

transaction actually had 4 gifts, and only 3 out of the 8,000 transactions had 3 gifts. The gift source codes identified gifts from relatives (the single largest category), gifts from government agencies, employers or unions, or non-profits (the second largest category). The coding scheme did not differentiate between seller-funded non-profits and more traditional non-profits. The sample did include fields for name and Taxpayer ID Number (TIN), when available, of the non-profit in the gift letter. GAO, for its 2005 report on seller-funded nonprofit assistance, used the name and TIN to classify each nonprofit loan as seller-funded, not seller-funded, or unknown. The latter category included both cases in which the named nonprofit could not be found, and nonprofits, such as Indiana's Habitat for Humanity, that ran both types of programs. This was accomplished via an analysis of the nonprofit's website, IRS filing, or a phone call to the nonprofit. About 94 percent of the nonprofit assisted loans in the sample were seller-funded, with the rest evenly split between the not seller-funded category and the unknown category.

Two indicator variables were created to indicate the source of the down payment. One variable, GIFT, was set to 1 for loans where a gift was the source for at least some of the borrower's contribution. The other, DAP (Down payment Assistance Program), was set to 1 when more than half of the gift money came from a nonprofit known to be seller-funded, such as Nehemiah or AmeriDream. Some attempts were made to consider the size of the gift as an independent variable, but in over 80% of the cases without DAP involvement, the gift was in the range of 2.75% to 3.75% of the sale price, while in the case of DAP assisted loans, more than 90% of the transactions had total gift money of 2.75% to 3.75%. Thus, the assistance was very close to the 3% borrower contribution required by FHA[vii]. Therefore, there was insufficient variability to test for effects based

on the size of the gift. Also, there were only a handful of cases that involved assistance from both seller-funded nonprofits and other sources. In most of these cases, the nonprofit provided the bulk of the gift funds.

2.3 Delinquency and Termination Data

In the national sample about 17% of the loans experienced at least one episode of serious delinquency by September 30, 2006. About 7.9% of the loans resulted in a claim on the FHA insurance by September 30, 2006, generally through foreclosure. For the small number of loans with a claim that had completed the property disposition process, the average net loss was 38% of the original mortgage balance. Over 80% of the loans in the sample had terminated by the September 30, 2006 end of the observation window, either through prepayment or claim termination. Interest rates reached a local minimum in 2003, and prepayment rates were fairly high for these cohorts.

The MSA sample had higher rates of delinquency, foreclosure, and termination. About 20% of these loans experienced at least one episode of serious delinquency, and almost 12% had terminated in a claim. Loss rates were higher than those for the national sample in Salt Lake City and Indianapolis, but a little lower in Atlanta. About 85% of the loans in the MSA sample had terminated by the end of the observation window.

Figures 5 through 8 show raw delinquency and claim percentages for the National and MSA samples. Loans with involvement from Down payment Assistance Program's

(DAPs), which effectively had no down payment, consistently showed the highest delinquency and claim percentages. Loans with a down payment from a source other than the borrower, such as a relative or government program, had lower claim and delinquency propensities, while loans with down payments from the borrower's resources consistently showed the lowest rates of claim and delinquency.

2.4 External Data

These files were merged with several external sources to incorporate time-varying covariates for the hazard analysis. State level unemployment rates were obtained from BLS, the state level constant quality house price index was obtained from OFHEO, 30-year fixed-rate mortgage rates were taken from Freddie Mac's Primary Mortgage Market Survey, and one-year Treasury rates were taken from the Fed. Price appreciation and unemployment were used to model the incentives to default or prepay, the 30 year mortgage rate was used to calculate the market value of equity for fixed rate loan default incentives and the ratio of market to book equity for fixed rate loan prepayment incentives, and the one-year Treasury rate was used to annually update the payment information for one-year ARMs.

2.5 Trends

In both the national and the MSA samples, gift assistance grew over time. Use of seller-funded nonprofit assistance grew rapidly, while gifts from other sources (primarily

relatives) slowly declined. In the national sample, gifts from relatives fell from 24% of loans in FY 2000 to 17% in FY 2002, while gifts from seller-funded nonprofits rose from 6% to 16%. Other gifts, such as those from employers, government agencies, or other nonprofits, fell from 6% to 3%. In total, gift assisted loans rose over the 2000 to 2002 period from 36% to 37% of FHA endorsements.[viii] See Fig. 1.

In the MSA sample, seller-funded nonprofit assistance was a much higher percentage, other assistance was somewhat smaller, and overall assistance was somewhat higher than for the national sample. This is because HUD chose these 3 MSAs for their high rates of DAP usage. Seller-funded nonprofit assistance also grew over time. Salt Lake City had the smallest percentage of DAP usage, rising from 19% to 33% between FY 2000 and FY 2002. Indianapolis had the largest rate of DAP usage, rising from 32% to 48% over this time, and Atlanta was in the middle, but rising quickly from 16% to 45%. Total gift usage rose from 58% to 63% in Salt Lake City, 51% to 59% in Indianapolis, and 42% to 59% in Atlanta. See Figure 2.

Despite the booming housing market over the 2000-2006 period, FHA claim rates have been rising. Data on foreclosure initiations from the Mortgage Banker's Association shows annual FHA foreclosure initiations rising from almost 2.5% in 2000 to almost 4% in 2004, before retreating slightly to about 3.5% in 2005-2006, while VA and conventional rates have stayed fairly flat. See Figure 3. This may, in part, be explained by the rising incidence of assistance, especially of seller-funded assistance. Figures 4 through 7 show claim and delinquency rates for FHA loans by fiscal year of endorsement and type of assistance. Assisted loans have consistently higher rates of delinquency and

claim, with seller-funded assistance loans showing worse performance than do loans with other types of assistance. The MSA sample has higher rates of poor performance, and generally larger differences between assistance categories. This is consistent with the fact that the three MSAs in the sample had lower rates of house price appreciation than did the nation as a whole. Atlanta, with an annual appreciation rate of about 5%, was just below the median for FHA loans, at 6% annual appreciation. Indianapolis and Salt Lake City had annual rates of appreciation of about 4%.[ix]

3. Estimation Strategy

In order to estimate the effect of the source of the down payment on claim and delinquency propensities, the instantaneous conditional claim (or delinquency) rate was modeled using James Heckman's CTM program (Yi, Walker and Honoré, 1985). Prepaid loans were treated as censored on the date of prepayment. The hazard rate framework was chosen to allow for the inclusion of time varying covariates, such as post origination price appreciation.

CTM (Continuous Time Models) is a FORTRAN based package with a long history in labor econometrics. It estimates competing risk termination models with a flexible (Box-Cox) parametric baseline hazard, and allows for the choice of any of several parametric forms of unobserved heterogeneity, or Heckman-Singer non-parametric heterogeneity (Heckman, Singer 1985). Unobserved heterogeneity is usually referred to in mortgage modeling as “burnout” - the tendency for some loans to terminate faster than observationally similar loans, so that conditional termination rates fall over time, despite

unchanging conditions. Essentially, borrowers who are "slow terminators" for some reason not observed by the econometrician remain in the pool after all the "fast terminators" have left.

CTM was first applied to mortgage analysis in GAO's third report on the actuarial soundness of the FHA single family program (GAO 1996), and has also been used to model FHA multifamily mortgage terminations (Ondrich and Huang 2001). Regressions incorporating unobserved heterogeneity have also been estimated with other routines. For example, Stanton (1996) estimates a single termination risk model of prepayment with a gamma heterogeneity distribution, and Deng, Quigley, and VanOrder (2000) estimate a competing risk model with Heckman-Singer non-parametric heterogeneity using McCall's software program[x].

CTM estimates an equation of the form

$$h_{ij}(t_{ij}\ \{x(u)\}_0^{\infty}, \theta) = \exp\{\gamma_{ij0} + \Sigma(t_{ij} + \tau_{ijk})\beta_{ijk} + \tau_{ij}(t^{\lambda} - 1)/\lambda \quad + c_{ij}\theta$$

where i indexes the origination state (active loan), j indexes the destination state, default or prepayment, t is time (measured in days divided by 100), tau and beta are independent variables and their coefficients, lambda is the Box-Cox parameter on time for the baseline hazard and gamma is the coefficient on time, and the c's and thetas are points of support for the non-parametric heterogeneity distribution and their coefficients (factor loadings).

Two strategies were employed in choosing other covariates for the termination

regression. In one, time-invariant variables of the type used in FHA's TOTAL scorecard automated underwriting system were chosen. These are FICO score[xi], LTV at origination, an indicator for whether the borrower will have at least 2 months of reserves after closing, and the Front End ratio. These variables were augmented by other loan, borrower, and property variables that might influence credit risk, such as indicators for first time home buyers and properties in underserved areas. A time-varying covariate is also included to measure post origination price appreciation. This is defined as the state level percentage change in the OFHEO price index, measured quarterly. For the first two quarters of the loan's life, this value is set to 1; starting with the third quarter, the value is calculated as the ratio of the price index 2 quarters prior to the current quarter and the price index at origination (the claim process is fairly lengthy for FHA loans).

The second strategy was designed to control for more covariates, despite the relatively small sample size (about 5,000 in the national sample and about 3,000 in the 3 MSA sample). In 2001 GAO estimated competing risk hazard models using millions of FHA loans originated between 1975 and 1999[xii]. Explanatory variables for credit risk included LTV at origination, an estimate of contemporaneous LTV, geographic controls for Census division and judicial foreclosure states, contemporaneous unemployment rates, and, for ARM loans, changes in payments over time. Separate models were run for 30 year fixed, investor, 15 year fixed, and ARM loans. The coefficients from these regressions were combined with the Concentrance data to form a mortgage score, and this score (GAORisk), was used as an independent variable along with important variables not in the GAO model, such as FICO score and reserves.

The final regressions were of the form

1a) (Default $_{t,}$/Survivor$_t$) = Exp(f(Risk Covariates$_{t,}$, Source of Down Payment, Unobserved Heterogeneity))

and

1b) (Prepayment $_{t,}$/Survivor$_t$) = Exp(f(Risk Covariates$_{t,}$, Source of Down Payment, Unobserved Heterogeneity))

4. Estimation Results

Tables 2.1 and 3.1, present results for the national sample, with 90 day delinquency[xiii] or claim as a termination state, and prepayment as the competing risk. The first specification shows results with the GAORisk variable, which incorporates LTV, loan type, post-origination appreciation, unemployment rate, etc. into one combined variable, while the second uses the variables used by FHA in its TOTAL scorecard automated underwriting, in both cases augmented with other variables that might potentially influence credit risk. Tables 2.2 and 3.2 show the same analysis for the MSA sample. Although CTM jointly estimates default, prepayment, and heterogeneity, in the interest of space the prepayment results are presented only for the national sample claim regressions.

Signs were as expected for both gift indicator variables. When the dependent variable was 90 day delinquency, the GIFT variable indicated that serious delinquencies were about25% higher for loans with gift down payments, relative to comparable loans with down payments from the buyers' own funds. The DAP coefficient indicates that seller funded non-profit gift assistance, essentially loans with no down payment, had delinquency rates about 42% higher than the rate for comparable loans with gifts from non-seller-funded sources. When Claim is the dependent variable, the results are similar, with gift assistance raising claims by 34% to 39%, and DAP adding a further 30% to 40%. All estimated effects are significant at 5% for delinquency and claims. The difference between DAP and other gift loans is significant at 5% in a one-tailed test for both claims and delinquency specifications.

Results were mixed for other covariates. The FICO score has a very strong effect with the expected sign, as does the Frontend ratio, and the measure of post-origination price appreciation. The GAORisk variable is also positive and highly significant where in the claim regressions, but is not predictive in for delinquency. Significance levels and goodness of fit statistics are generally better for the specification using the GAORisk variable, indicating the usefulness of capturing risk characteristics with a mortgage score in small samples where including a large number of covariates might not be feasible. LTV is not significant, presumably because there is so little variation in LTV in this sample of very high LTV loans. Reserves are also not significant: however, few FHA borrowers have significant reserves after closing. The indicators for first time home buyers, condominium loans, loans where the seller was a builder (generally new

construction), and loans in underserved areas were not significant, but there was no theoretical expectation for a particular sign for these variables.

The heterogeneity results are similar to those found in GAO (1996) or Deng, Quigley, and VanOrder (2000). For the national sample, the model estimates that there are three categories of borrowers, with about 50% in the very slow prepayment category, about 35%% in the medium speed prepayment category, and the remainder in the rapid prepayment category. Because the factor loadings are opposite in sign for the claim and prepayment regressions, borrowers who are fast prepayers are predicted to be slow claim terminators, a result consistent with adverse selection at time of prepayment. The Box-Cox baseline hazard parameter, lambda, is negative and generally about -1 for the claim and prepayment regressions (but not for the delinquency regressions), implying that a baseline of the form 1/time gives the best fit to the data, a remarkably sensible form for the baseline, as it allows a rapidly rising hazard in the early part of a loan's life followed by an essentially flat hazard. Except for GAO (1996) which finds a similar form, to the best of my knowledge no one has used such an inverse transform for a baseline mortgage termination hazard.

Tables 2.2 and 3.2 provide results for the MSA sample. Again, there are two specifications, one using the GAORisk variable, and the other using the TOTAL scorecard variables. The results for source of down payment are even stronger in this set of cities with low price appreciation. For delinquency, gift assistance raises the rate by 30% to 34%, and DAP adds an additional 40%. For claims, gift assistance raises the rate by 36% to 45%, and DAP adds an additional 45%. All results are significant at 5%;

some are significant at 1%. Separate regressions for each MSA were tried, although not reported. The sample size was too small to yield significant results, with one exception. When each MSA was run separately, delinquency coefficients were very similar to each other and the 3 MSA results, claim coefficients for DAP were slightly smaller for Atlanta and Indianapolis, and much higher for Salt Lake City, yielding results that were significant at 1% for the Salt Lake City regressions.

One potential disadvantage to working with conditional hazard rates is the potential for the competing risk of prepayment to influence the default regression results. It would be possible, for example, for gift indicators to have an impact on conditional claim rates, but not on unconditional claim rates, if gift assisted loans had higher prepayment rates. The conditional claim rates would be high, not because claims were high, but because survival was low. To test for this possibility, the conditional prepayment rate was jointly modeled as a function of standard prepayment variables, such as the ratio of book to market value of the mortgage (splined at 1), standard underwriting variables, and gift down payment indicator variables. CTM jointly models the competing risk of claim and prepayment termination (or delinquency vs. prepayment termination). In the interest of space, prepayment results are only presented for the national samples (Table 3.1), but results were similar for the MSA sample regressions. The GIFT and DAP indicators both had small, negative and significant impact on prepayment rates, indicating the effect of a gift down payment on cumulative claim rates would be slightly higher than the estimated impact on conditional claim rates.

Turning to loss given default, OLS regressions indicate that loss rates, defined as the

dollars lost on a defaulted loan divided by the original mortgage balance, are influenced by the source of the down payment. (Table 4.1). In both the national sample and the MSA samples, the presence of a gift down payment increases loss severity. In the national sample, seller-funded nonprofit gifts result in loss rates 8 percentage points higher than other loans, while other gifts, such as gifts from relatives, have no effect. This is consistent with DAP gifts starting out with lower equity than that recorded in the underwriting. Original mortgage amount and post origination price appreciation are also significant determinants of losses, with smaller losses in faster appreciating states, and smaller (percent) losses on larger loans, consistent with a substantial fixed cost component of total losses (foreclosure costs, for example).

Effects are smaller in the MSA sample, and gifts in general raise loss severities. Examining the effects of gifts in each MSA produces some conflicting results. In Atlanta, DAP gifts alone raise loss severities, while in Salt Lake City all gifts raise severity rates, with the biggest effect coming from non seller-funded gifts. Neither type of gift has much effect in Indianapolis. But sample sizes are fairly small for each MSA, and no effect is precisely estimated, except for the effect of gifts in general in Salt Lake City.

5. Conclusions

Both GAO (1993) and Deng, Quigley, and VanOrder (1995) estimated the cost of "no down payment mortgages." Both found the costs fairly modest, so long as house prices were increasing. However, neither analyzed a program in which no cash would be

required from the borrower. In the 1993 GAO report, performance of no down payment VA mortgages was analyzed, but VA limits the closing costs that can be financed by the seller, so buyers are generally required to bring cash to the table to make a purchase with VA. Deng , Quigley, and VanOrder (1995) extrapolated Freddie Mac borrower behavior to a program with 100% LTVs, but did not explicitly address closing costs[xiv]. They projected 16% lifetime foreclosure rates for mid-range price appreciation in their worst case income and unemployment simulations. The 3 MSAs examined in this paper have comparable price appreciation to their mid-range case, and claim rates over 18% for the seller-funded nonprofit category, although they are only in their 5th through 7th years. Apparently, no cash from borrower, fully financed mortgages are even more risky than the Deng, Quigley, and VanOrder (1995) or 1993 GAO projections would indicate. It is interesting to note that even heavily targeted affordable programs, such as GSE community lending programs, generally require some cash from borrowers. For example, the GSEs have 3-2 programs for community lending, in which 3% of a 5% down payment could come from gifts, and 2% from the borrowers.

This paper examines the case of literally "no money from the buyer" mortgages, and finds delinquencies and claim rates much higher than those for comparable loans with cash from the borrower. The results for non-seller-funded gifts are not consistent with a "ruthless" equity driven default decision, as these loans should have equity for gifts that are truly gifts. The extra difference in claim rates for gifts from seller-funded nonprofits is broadly consistent with an equity based explanation, as a 20% increase in claims for a 3% decrease in equity (this assumes that 3% seller-funded assistance yields a 3% increase in sales price) is consistent with results from FHA termination models that included a

broad range of LTVs, such as GAO's 1996 FHA actuarial model.

The results are consistent with most non seller-funded gifts being true gifts, and with the implications of Krumm and Kelly (1989), or Haurin, Wachter, and Hendershott's (1995) work on transitions to homeownership. Some renters are flexible, able to adjust consumption and labor force participation, and these renters are better positioned to save for down payments. Mortgage market innovations that allow borrowers to purchase with no savings may lower the bar to less flexible households, who are at greater risk in the face of price downturns or trigger events.

The results would also be consistent with a moral hazard problem. Borrowers may be more willing to undertake risky investments, such as buying from a developer without a track record, or purchasing a property in areas with high price volatility, if they are not investing any of their own funds. The evidence here is fairly indirect – borrowers with no cash invested have higher delinquency and claim rates, but nothing is known about prior earnings and saving behavior for these borrowers. Further research should be done along the lines of Boehm (1993), Krumm and Kelly (1989), Reid (2005), or Haurin, Wachter, and Hendershott (1995), to examine the earnings and savings histories of home buyers who make use of gift assistance, and determine the extent to which saving and earning flexibility may explain these higher claim rates.

Because of the prevalence of subprime refinancing over this time period, and the large numbers of mortgages from this sample that terminated in prepayment, the 15% to 20% claims to date found for gift down payment mortgages in slowly appreciating MSAs are

likely to be a lower bound estimate of the rate of "homeownership failure." It is still fairly early in the lives of these mortgages, and an unknown number may terminate in foreclosure in the future. Additionally, many of these no-cash-from-borrower mortgages may have terminated through a refinancing, with the new mortgage later terminating in a claim, as over half of these borrowers prepaid within 4 years. Some prepayments may also be from borrowers who exited homeownership but avoided an investment loss. This work may confirm the results of Reid (2005), who finds that many low to moderate income first time homebuyers transit back to rental status in the first five years.

This research does make clear that, for whatever reason, borrowers with no cash invested in the transaction have higher credit risk than comparable buyers who bring cash to the transaction. Designers of government assistance programs, mortgage insurers or other holders of credit risk, and planners concerned about pockets of foreclosure in neighborhoods should take these elevated risks into account.

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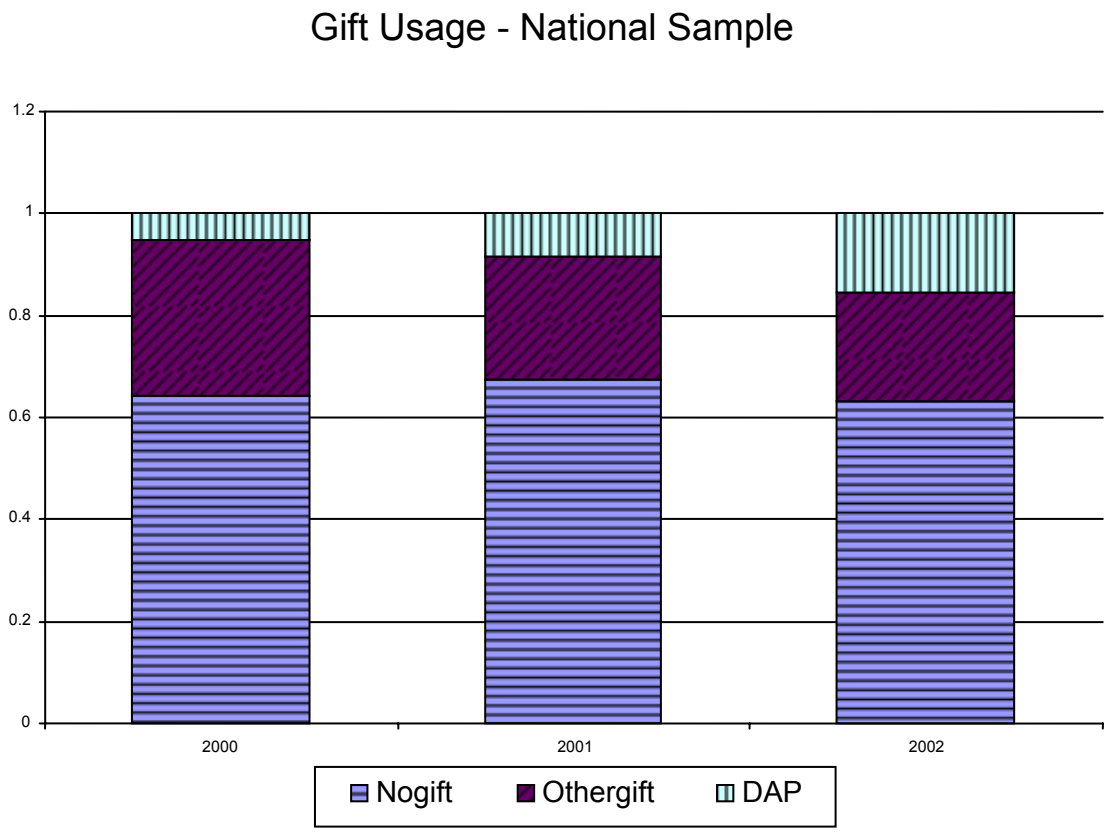
Figure 1


Gift Usage - National Sample
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1
0.8
0.6
0.4
0.2
0
2000
2001
2002
Nogift
Othergift
DAP

Figure 2

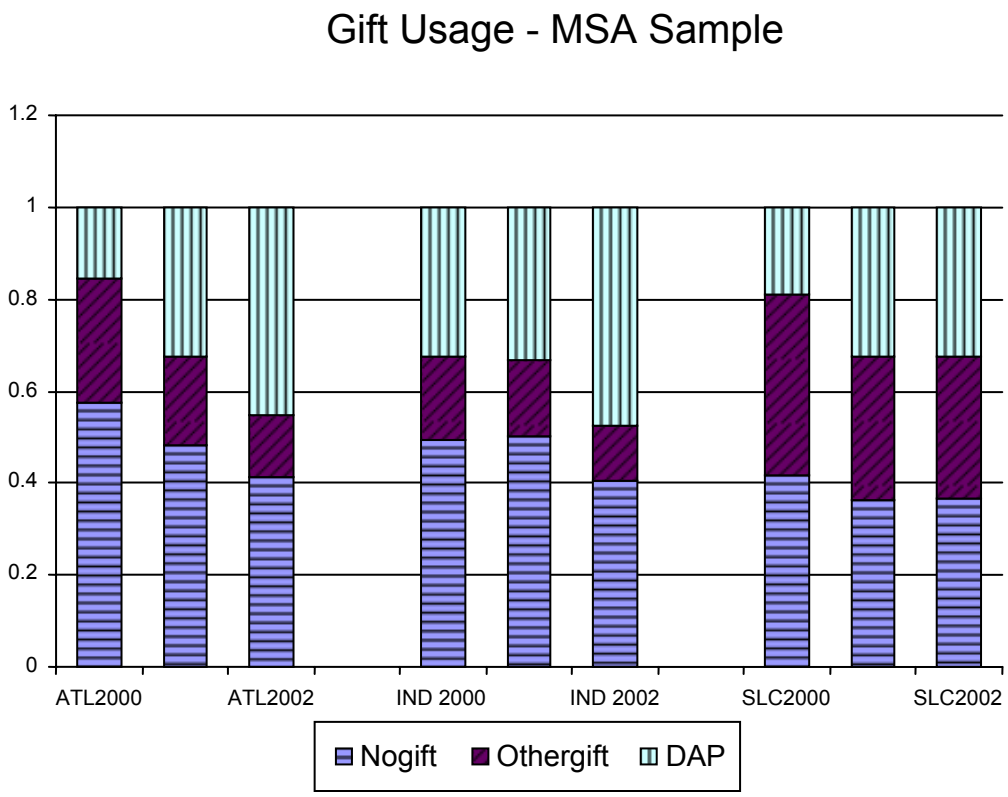
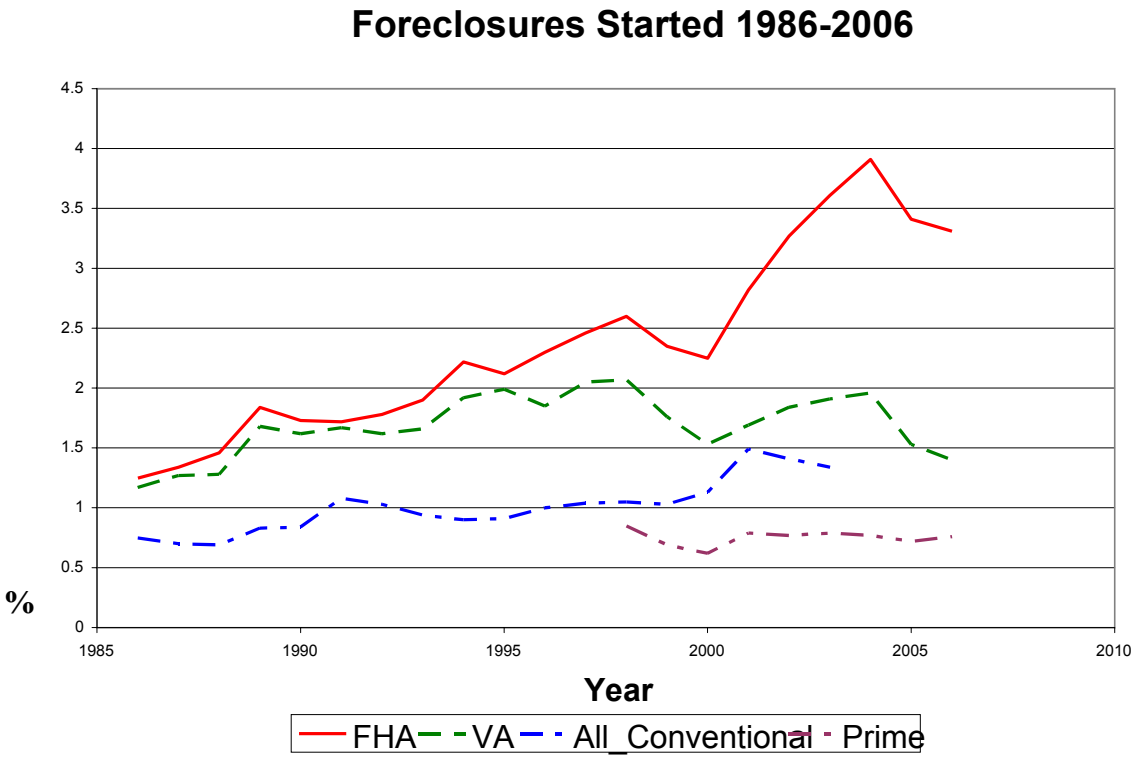

Gift Usage - MSA Sample
1.2
1
0.8
0.6
0.4
0.2
0
ATL2000
ATL2002
IND 2000
IND 2002
SLC2000
SLC2002
Nogift
Othergift
DAP

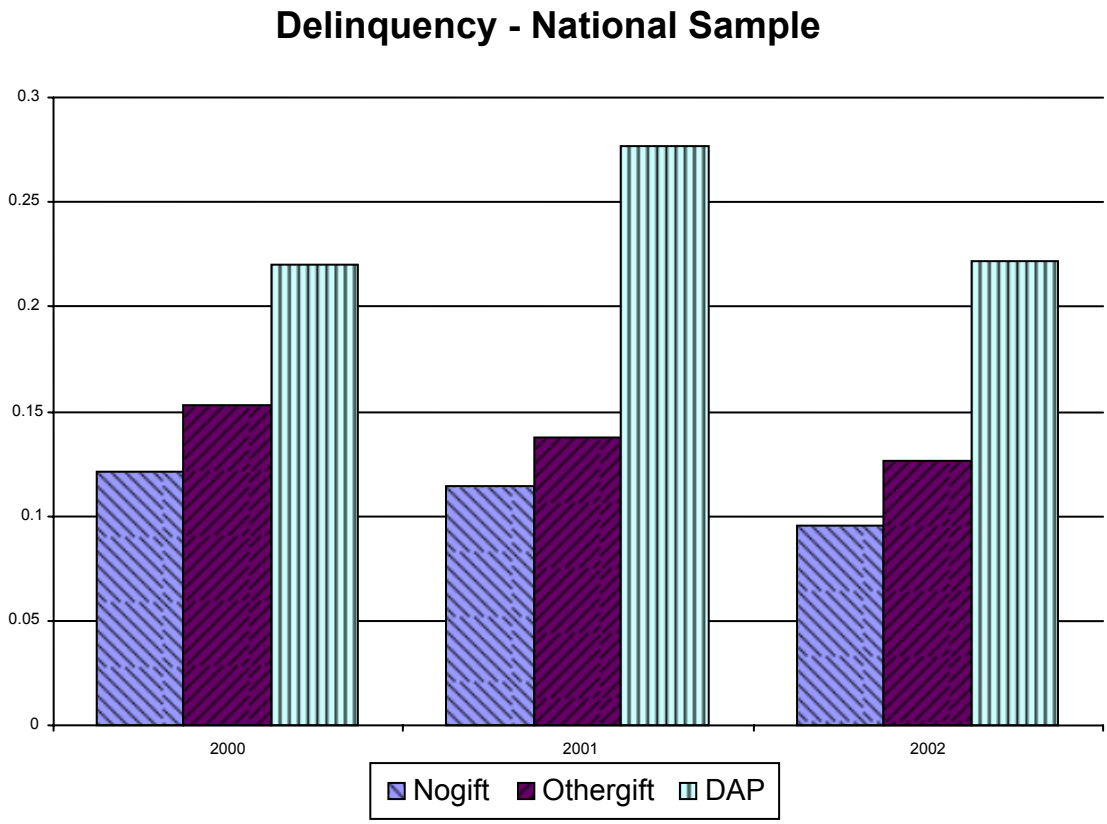
Figure 3



Source : Mortgage Bankers Association..

Note: Conventional category dropped in 2004, Prime category added in 1997.

Figure 4


Delinquency - National Sample
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0.2
0.15
0.1
0.05
0
2000
2001
2002
Nogift
Othergift
DAP

Figure 5

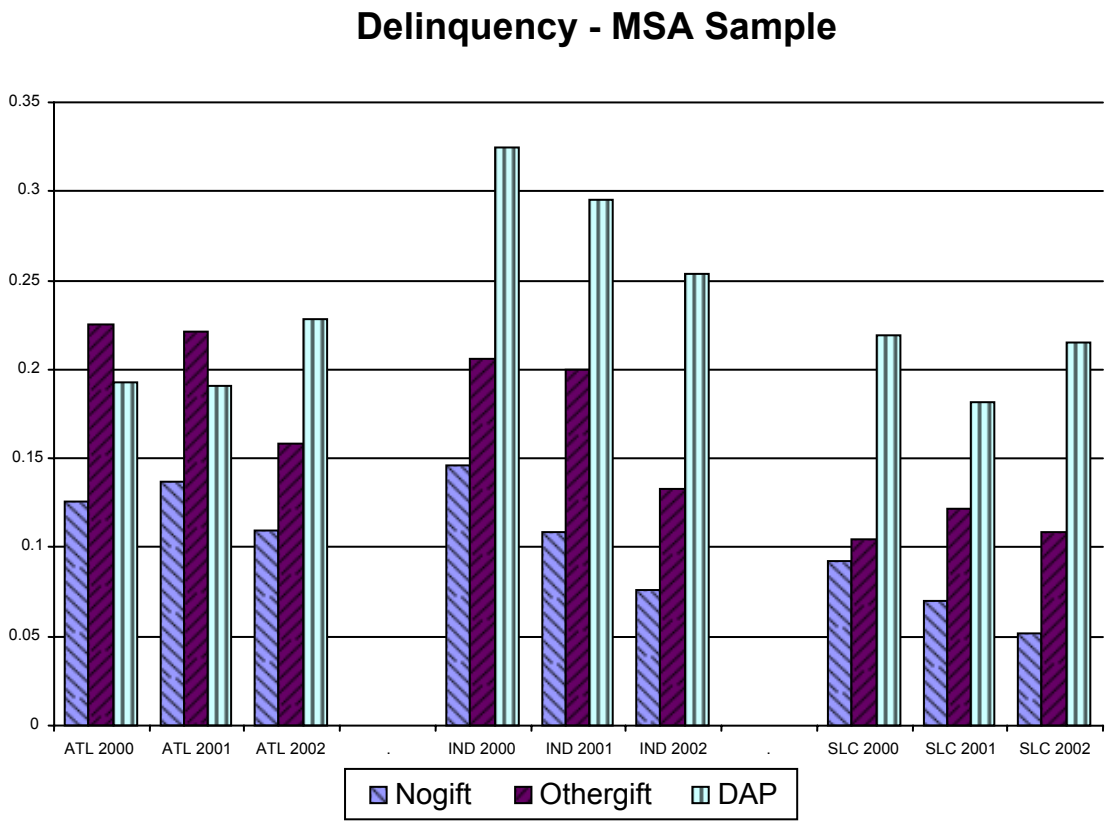
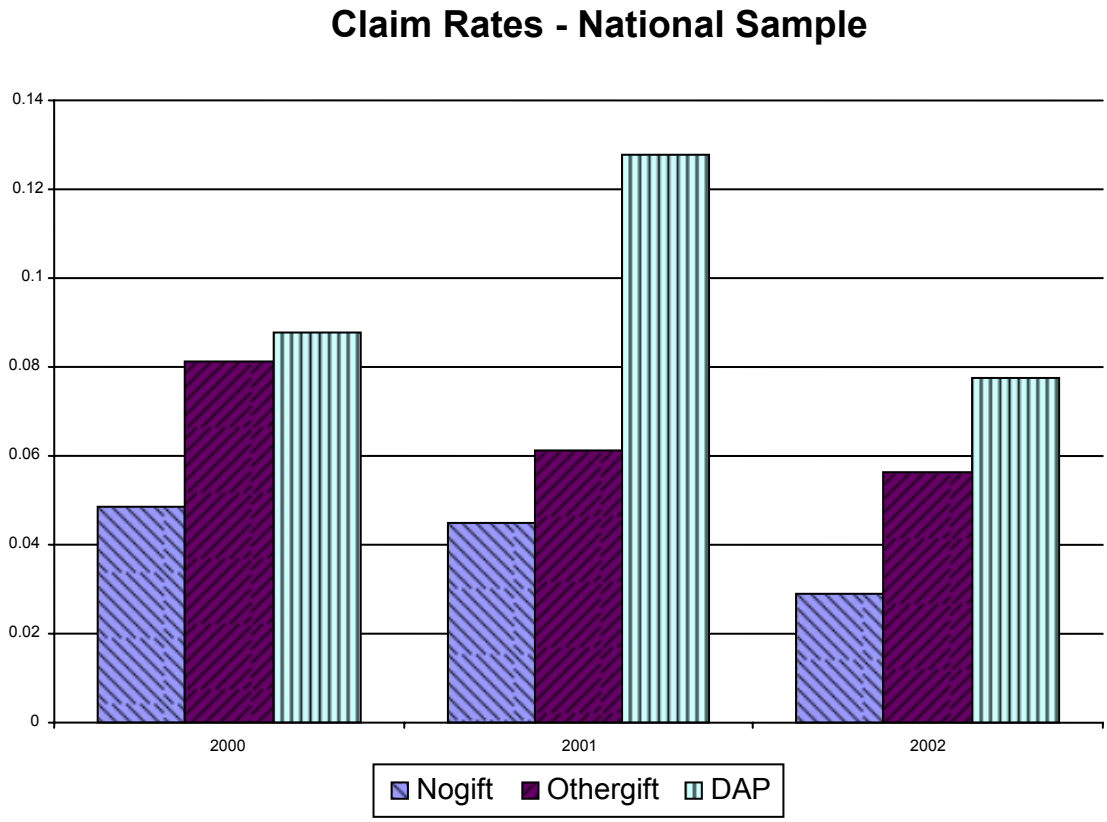

Delinquency - MSA Sample
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
ATL 2000
ATL 2001
ATL 2002
.
IND 2000
IND 2001
IND 2002
.
SLC 2000
SLC 2001
SLC 2002
Nogift
Othergift
DAP

Figure 6


Claim Rates - National Sample
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0.1
0.08
0.06
0.04
0.02
0
2000
2001
2002
Nogift
Othergift
DAP

Figure 7

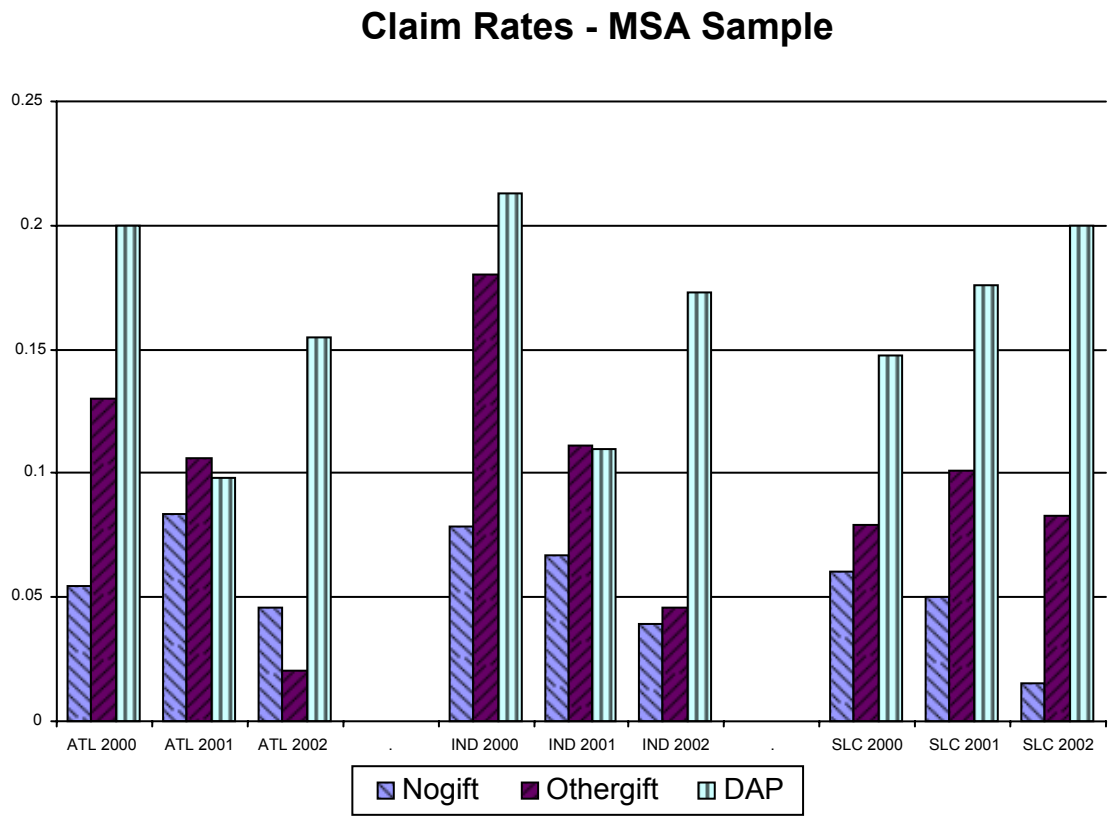
Claim Rates - MSA Sample
0.25
0.2
0.15
0.1
0.05
0
ATL 2000
ATL 2001
ATL 2002
.
IND 2000
IND 2001
IND 2002
.
SLC 2000
SLC 2001
SLC 2002
Nogift
Othergift
DAP

Table 1

Summary Statistics

	National Sample		Atlanta Sample		Indianap Sample		Salt Lake Sample	
Variables	**Mean**	**Sigma**	**Mean**	**Sigma**	**Mean**	**Sigma**	**Mean**	**Sigma**
Dependent								
Cumulative delinquent rate	17.0%		21.4%		23.2%		14.0%	
Cumulative claim rate	6.9%		9.7%		13%		9.6%	
Cumulative prepay rate	75.1%		69.5%		67.3%		83.4%	
Loss severity rate	0.38	0.247	0.277	0.136	0.525	0.175	0.416	0.148
Time Invariant Independent								
frontend ratio	0.258	0.076	0.266	0.068	0.244	0.067	0.290	0.067
LTV ratio	0.990	0.012	0.988	0.012	0.990	0.007	0.986	0.016
FICO (/100)	6.553	0.611	6.424	0.587	6.472	0.670	6.672	0.574
NoFICO	7.6%		7.6%		5.8%		12.0%	
reserves < 2 months	28.0%		24.0%		23.3%		24.0%	
Underserved area	40.8%		41.5%		26.6%		39.6%	
Condominium	8.4%		4.2%		3.3%		12.0%	
first time buyer	80.9%		81.7%		82.2%		84.5%	
ARM	7.0%		9.8%		11.3%		13.2%	
DAP	9.9%		31.9%		40.2%		28.1%	
Gift	35.0%		50.9%		54.7%		62.2%	
Time Varying Independent								
GAOrisk	7.04	2.14	6.80	1.90	6.35	2.07	6.33	2.15
Appreciation	1.10	0.13	1.07	0.07	1.05	0.05	1.03	0.04
N observations	5097		1177		1126		1110	

Table 2.1 National Delinquency

	Coefficient	Std.Error	p-value	Coefficient	Std.error	p-value
Intercept	3.562	0.477	0.001	9.779	3.125	0.002
DAPGift	0.671	0.103	0.001	0.664	0.104	0.001
OtherGift	0.252	0.086	0.002	0.257	0.085	0.001
GAORisk	0.071	0.022	0.001			
Appreciation				0.147	0.224	0.255
LTV				-0.056	0.031	0.033
ARM				-0.423	0.150	0.002
FICO	-0.958	0.066	0.001	-0.986	0.064	0.001
NoFICO	0.468	0.116	0.001	0.451	0.116	0.001
Reserves	0.105	0.084	0.106	0.130	0.084	0.061
FrontEnd	1.144	0.501	0.011	1.184	0.502	0.009
Underserved	-0.005	0.073	0.943	-0.014	0.073	0.851
Condominium	-0.133	0.151	0.379	-0.238	0.163	0.146
FirstTime	-0.097	0.104	0.352	-0.119	0.105	0.254
Builder	-0.055	0.109	0.615	-0.087	0.108	0.424
Gamma	1.265	0.092	0.001	1.356	0.106	0.001
Lambda	0.745	0.134	0.001	0.599	0.109	0.001
Factor_Load	0.152	0.292	0.604	0.215	0.267	0.421

Unobserved Heterogeneity	**Cumulative Probability**	**Location**	**Cumulative Probability**	**Location**
	0.492	0.000	0.139	0.000
	0.851	0.397	0.432	0.612
	1.000	1.000	1.000	1.000

Table 2.2 MSA Delinquency

	Coefficient	Std.Error	p-value	Coefficient	Std.error	p-value
Intercept	1.353	0.622	0.030	1.404	5.336	0.792
DAPGift	0.742	0.112	0.001	0.688	0.106	0.001
OtherGift	0.343	0.129	0.004	0.298	0.125	0.009
GAORisk	0.150	0.031	0.001			
Appeciation				3.947	1.039	0.001
LTV				-0.026	0.053	0.310
ARM				-0.303	0.120	0.006
FICO	-0.874	0.081	0.001	-0.803	0.076	0.001
NoFICO	0.404	0.134	0.001	0.365	0.127	0.002
Reserves	0.061	0.110	0.289	0.043	0.106	0.341
FrontEnd	2.616	0.660	0.001	2.032	0.629	0.001
Underserved	0.101	0.090	0.263	0.054	0.084	0.520
Condominium	0.143	0.195	0.463	0.141	0.201	0.481
FirstTime	-0.075	0.123	0.544	-0.029	0.116	0.806
Builder	-0.085	0.098	0.382	-0.004	0.092	0.966
Gamma	1.694	0.162	0.001	0.465	0.195	0.017
Lambda	0.887	0.140	0.001	-0.137	0.269	0.609
Factor_Load	1.565	0.309	0.001	-0.077	0.264	0.771

Unobserved Heterogeneity	**Cumulative Probability**	**Location**	**Cumulative Probability**	**Location**
	0.139	0.000	0.228	0.000
	0.359	0.633	0.397	0.667
	1.000	1.000	1.000	1.000

Table 3.1 National Claims

Claims

	Coefficient	Std.Error	p.value	Coefficient	Std.error	p.value
Intercept	0.605	0.882	0.493	13.602	6.363	0.033
DAPGift	0.796	0.171	0.001	0.664	0.171	0.001
OtherGift	0.390	0.142	0.003	0.337	0.142	0.009
GAORisk	0.163	0.037	0.001			
Appreciation				-4.154	0.742	0.001
LTV				-0.057	0.064	0.185
ARM				-0.645	0.289	0.013
FICO	-0.843	0.119	0.001	-0.876	0.115	0.001
NoFICO	0.878	0.181	0.001	0.869	0.180	0.001
Reserves	-0.085	0.146	0.281	-0.077	0.145	0.297
FrontEnd	1.499	0.853	0.039	2.317	0.858	0.003
Underserved	-0.023	0.122	0.849	0.039	0.121	0.744
Condominium	-0.276	0.290	0.341	-0.255	0.312	0.413
FirstTime	-0.308	0.158	0.051	-0.289	0.156	0.064
Builder	0.174	0.170	0.305	0.000	0.000	0.001
Gamma	0.433	0.184	0.018	1.345	0.224	0.001
Lambda	-1.446	0.393	0.001	-0.615	0.220	0.005
Factor_Load	1.057	0.706	0.135	-0.667	0.596	0.263
Prepayment						
Intercept	-10.111	0.765	0.001	-12.159	2.923	0.001
DAPGift	-0.237	0.086	0.006	-0.188	0.088	0.031
OtherGift	-0.076	0.061	0.211	-0.047	0.062	0.448
GAORisk	-0.141	0.018	0.001	0.000	0.000	0.001
Appreciation	0.000	0.000	0.001	2.838	0.247	0.001
LTV	0.000	0.000	0.001	-0.091	0.028	0.001
ARM	0.000	0.000	0.001	1.113	0.116	0.001
FICO	0.415	0.044	0.001	0.408	0.043	0.001
NoFICO	-0.372	0.093	0.001	-0.315	0.096	0.001
Reserves	0.072	0.058	0.216	0.045	0.059	0.439
FrontEnd	2.094	0.342	0.001	1.594	0.344	0.001
Underserved	-0.244	0.052	0.001	-0.301	0.052	0.001
Condominium	0.248	0.095	0.009	-0.020	0.105	0.848

FirstTime	-0.278	0.066	0.001	-0.277	0.066	0.001
Builder	0.073	0.074	0.326	0.000	0.000	0.001
releqphi	4.631	0.230	0.001	5.070	0.225	0.001
releqplo	4.110	0.723	0.001	5.789	0.795	0.001
Gamma	0.379	0.082	0.001	0.029	0.017	0.086
Lambda	-0.494	0.123	0.001	-1.499	0.265	0.001
factor_loading	-3.413	0.375	0.001	4.495	0.296	0.001

Unobserved Heterogeneity	**Cumulative Probability**	**Location**	**Cumulative Probability**	**Location**
	0.495	0.000	0.133	0.000
	0.840	0.458	0.430	0.574
	1.000	1.000	1.000	1.000

Table 3.2 MSA Claims

	Coefficient	Std.Error	p-value	Coefficient	Std.error	p-value
Intercept	-1.141	0.750	0.128	7.230	10.262	0.481
DAPGift	0.909	0.143	0.001	0.797	0.142	0.001
OtherGift	0.449	0.168	0.004	0.362	0.169	0.016
GAORisk	0.214	0.038	0.001			
Appreciation				-6.894	1.510	0.001
LTV				0.009	0.104	0.467
ARM				-0.381	0.176	0.015
FICO	-0.407	0.105	0.001	-0.443	0.101	0.001
NoFICO	0.596	0.154	0.001	0.526	0.153	0.001
Reserves	0.081	0.142	0.284	0.037	0.139	0.396
FrontEnd	1.984	0.848	0.010	1.951	0.827	0.009
Underserved	0.111	0.111	0.318	0.162	0.108	0.134
Condominium	0.145	0.241	0.547	0.116	0.290	0.688
FirstTime	-0.006	0.160	0.968	0.032	0.155	0.839
Builder	0.010	0.125	0.935	-0.026	0.123	0.834
Gamma	0.975	0.246	0.001	1.624	0.299	0.001
Lambda	-1.122	0.356	0.002	-0.643	0.267	0.016
Factor_Load	-1.081	0.485	0.026	-0.195	0.450	0.665
Unobserved Heterogeneity	**Cumulative Probability**	**Location**		**Cumulative Probability**	**Location**	
	0.610	0.000		0.228	0.000	
	0.855	0.466		0.403	0.532	
	1.000	1.000		1.000	1.000	

Table 4

Loss Rates

	National Sample		MSA Sample		Atlanta Sample		Indianap Sample		Salt Lake Sample	
	Parameter	T	Parameter	T	Parameter	T	Parameter	T	Parameter	T
Intercept	0.82164	0.46	-1.74091	1.08	3.51942	1.02	-1.24329	0.57	0.42684	0.17
LTV	-0.00199	0.11	0.03921	2.32	-0.03357	0.57	0.02834	1.22	0.02007	0.76
DAP	0.08311	2.04	0.03043	1.25	0.03603	0.89	-0.02722	0.86	0.03626	0.84
OtherGift	-0.00381	0.11	0.02727	0.91	-0.01526	0.48	-0.01179	0.28	0.07301	1.53
FICO	-6E-05	0.21	-0.00017	0.85	-0.00018	0.76	-0.00016	0.69	-0.00045	1.22
NoFICO	0.06169	1.42	-0.00996	0.36	0.01466	0.66	0.07097	1.46	-0.02079	0.6
Appreciation	-0.14589	0.88	-0.80961	4.01	0.16889	0.11	-0.23663	0.72	-1.77617	3.82
Interest	0.04052	2.15	0.00288	0.03	-0.00683	0.97	0.01971	1.54	0.02268	1.1
UPB	-5.5E-06	2.91	-1.2E-05	4.36	1.07E-06	0.58	-1.40E-05	3.94	1.27E-06	0.23
UPB sq	1.25E-11	1.45	4.15E-11	3.2	-6.62E-12	0.27	5.53E-11	3.03	-1.41E-11	0.55
N	233		289		80		118		91	

[i]For a recent review of the literature on mortgage credit risk, see US GAO (2005a).

[ii]The HUD IG studies included reviews of paper files that found numerous instances of appraisal and sale prices scratched out, and new appraisal and sale prices, equal to the scratched-out price plus the amount of gift assistance, written over the old prices. The GAO study compared the ratio of sale price or appraisal to the results of an automated valuation model, and found that sales and appraisals averaged 3% higher for transactions with non-profit gift assistance.

[iii]See Concentrance Consulting Group (2004).

[iv]The other file was collected by HUD as part of their development of FHA's automated underwriting algorithm. The loan years covered precede the widespread proliferation of down payment assistance programs. See Cotterman (2004).

[v] Because of this updating, figures for loan performance characteristics and time-varying variables will differ from those in the GAO report, which used an earlier as-of date.

[vi]In September 2005 FHA imposed a moratorium on loan foreclosures for counties and parishes affected by hurricanes Katrina and Rita. Most of Louisiana, much of south Florida, Mississippi and Alabama, and the northeast corner of Texas were included. Loans in the affected counties or parishes that were still active are treated as censored in September 2005. This affected less than 1 percent of the loans in the national sample.

[vii]"3 percent down payment" is the usual short hand summary of FHA requirements. Technically, there is a fairly complex formula using the purchase price, closing costs, and the location of the loan in a high or low cost state that determines the required contribution from the borrower. But the result of the formula is a cash requirement between 2.75 and 3.5 percent. Although FHA allows the financing of some closing costs, and allows limited direct closing cost assistance from sellers, borrowers (or approved sources such as relatives or non-profits) are required to invest about 3 percent in cash. It is this 3 percent that FHA does not allow to come directly from the seller, but is allowed to come from a non-profit funded by the seller.

[viii]The 2005 GAO report indicates a continuing growth in assistance post 2002. Incomplete data from the first half of FY 2005 indicated that seller-funded nonprofits were involved in 37% of FHA purchase endorsements with LTV's greater than 95% (FHA definition of LTV), and 55% of high LTV FHA purchase

loans had assistance of some sort.

[ix]FHA has a fairly small market share in most of the rapidly appreciating states, such as California or Massachusetts, so the average appreciation rate for FHA loans is below the average for the US. Salt Lake City had the lowest appreciation rate of the 3 MSAs up to the end of the observation window, but appreciation increased dramatically at the end of 2005.

[x] A non parametric baseline with competing risks and unobserved heterogeneity, as in McCall's program, has to be estimated with some care, as unreliable results may be obtained from singularities. See Ridder and Woutersen (2003).

[xi]About 8% of the borrowers did not have a FICO score. For these cases, the median FICO score for the sample was inserted, and a dummy variable (NOFICO) was set to 1. The results, therefore, show the extent to which borrowers without a FICO score are riskier than borrowers with a median score.

[xii]The model, for GAO's fourth study of FHA actuarial soundness, is documented in US GAO (2001).

[xiii]Technically, the dependent variable indicates 90 day delinquency, or other "bad outcomes" such as the initiation of foreclosure proceedings or negotiation of a loss mitigation foreclosure alternative. Although lenders are supposed to report delinquencies to FHA after 90 days, it is sometimes the case that a delinquency is never reported but the loan appears as a claim or claim alternative. In about 90% of the "delinquencies" in this file, the event is 90 day delinquency.

[xiv] Most conventional "100% LTV" products also require some cash from the borrower for closing costs.