

# Prime & Subprime Mortgage Foreclosure Analysis

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In recent years, as nominal interest rates have declined globally and liquidity has sought a home, the market for non-traditional mortgages has expanded rapidly to levels exceeding \$1 trillion per annum of subprime and Alt-A originations. While it has been clear to all participants that borrowers in the subprime and Alt-A arenas are higher risk than their prime counterparts, the perceived level of incremental risk has declined over the years, as losses remained low for all mortgage products.

## Analysis

Mortgage originators have indicated that the primary drivers of defaults and ultimate losses are common across the classes of borrowers (i.e., prime, Alt-A, and subprime).

These common threads include:

- Unemployment levels
- House prices, to the extent that borrowers in default may sell their home as a last resort, rather than enter foreclosure
- Interest rates, particularly as they affect monthly payments on adjustable rate mortgages (ARMs)

We therefore carried out an analysis of the relationships between prime and subprime loan foreclosures and the following macroeconomic factors:<sup>1</sup>

- Unemployment rates (at both federal and state levels)
- Median house prices (federal and regional)
- 10-year rates
- 3-month LIBOR

We examined correlations between foreclosures and these macro factors both contemporaneous and lagged, at both state/regional and federal levels.

## Preliminary Results

Our analysis uncovered some unexpected results. While our findings are preliminary, they do appear to challenge certain common assumptions embraced by market participants to date. In particular, we found that:

- Subprime mortgage foreclosures exhibit low correlation with prime ARM foreclosures (around 22 percent), suggesting that there are additional factors affecting subprime foreclosures.<sup>2</sup>
- Correlations between subprime loans and macro factors are lower than in the prime space.

	USA 10yr Ylds	USA Hse Prc	USA Unempl't
Prime ARM	0.50	(0.73)	(0.32)
Prime FRM	(0.43)	0.10	0.40
All Subprime	0.23	(0.25)	(0.13)

- Subprime foreclosures show significantly lower contemporaneous correlation, relative to prime foreclosures, with the chosen macroeconomic factors, again indicating that there are incremental factors driving foreclosure for subprime loans.
- The highest correlation between prime ARMs and 3-month LIBOR is 0.89, and occurs at a 15-month lag. This seems plausible—it takes time for increases in interest rates to filter through to defaults and foreclosures in the mortgage markets. For subprime loans, the correlation peaks at a lower level, 0.64, and at an 18-month lag.
- Prime ARM and subprime foreclosures are **negatively** correlated with unemployment on both a contemporaneous and lagged basis at the federal level and in many states. This result is counterintuitive: we would expect foreclosures to increase rather than decrease as unemployment goes up. Possible explanations include:
  - Sustained home price appreciation since the mid-1990s implies that both prime and subprime borrowers have been able to sell their homes before reaching foreclosure. This makes particular sense in California, which emerged from a housing bust at the same time that subprime lending began to accelerate. We found similar patterns of strongly negative correlations in California, New York, Maryland, and Illinois.
  - In Texas and North Carolina, by contrast, we found strong and positive correlations between unemployment and foreclosure rates on contemporaneous and lagged bases. House price appreciation in these two states has been less dramatic, making borrowers who lose their jobs more susceptible ultimately to foreclosure.
  - Individual states set their own foreclosure laws, which may impact both the timing and the quantity of foreclosures in each state.

## Data

Quarterly data on prime and subprime ARM and fixed rate mortgage (FRM) residential mortgage delinquencies and foreclosures from first quarter 1998 to third quarter 2006 was provided by the Mortgage Bankers Association (MBA). The data include both national and state-level foreclosure rates for prime FRMs and ARMs, as well as foreclosure rates for all subprime loans. In addition to national foreclosure levels, we analyzed foreclosures for the following 13 states: AZ, CA, FL, IL, MA, MD, MI, NC, NV, NY, OH, TX, WA. Data on macroeconomic factors was obtained from Economagic.com.

## ABOUT THE AUTHORS

**Mr. Temple** is a Co-Director of Research and a Research Analyst on the Global Research Platform. Prior to joining Lazard in 2001, Ron held positions with Deutsche Asset Management and Deutsche Bank Americas in New York, Deutsche Bank Asia/Pacific in Singapore, Deutsche Morgan Grenfell in London, Bank of America NT & SA in San Francisco, and Fleet Financial Group in Boston. He began working in the investment field in 1991. Ron received a MPP from Harvard University and a BA in Economics & Public Policy from Duke University.

**Dr. Rasiel** completed her PhD in finance at The Fuqua School of Business, Duke University, in 2003. Dr. Rasiel also received an MBA from the Wharton School of the University of Pennsylvania in 1990, and bachelor's and master's degrees in mathematics from Oxford University. Before beginning her PhD program at Fuqua, Dr. Rasiel was an Executive Director in the London office of Goldman Sachs, a leading investment bank, where she traded bond options. Dr. Rasiel is the Director of Undergraduate Studies in the Economics Department at Duke University.

We note the following limitations of our data set:

- Subprime mortgage issuance was barely on the radar prior to 1996, and 1996 total subprime issuance was less than \$100 billion (only 12 percent of total residential mortgage issuance). In contrast, by 2005, subprime issuance was over \$600 billion (representing approximately 20 percent of total residential mortgage issuance). Hence early years of data on subprime foreclosures represents percentages of a relatively small number of total loans.
- Delinquency and foreclosure data represent the results of MBA surveys of their members—responses as a percentage of all MBA issuers are reported by MBA to be around 80 percent.
- Our analysis focused on total subprime foreclosures, based on information from MBA that this data set is more complete and reliable than subprime broken down into ARM and FRM loans.
- We were unable to obtain quarterly house price data at the state level. Regional breakdowns were available from the following four regions: Northeast, South, Midwest, and West.

- House prices increased almost monotonically throughout our analysis period; thus we treat the apparent relationship between foreclosures and house prices with caution.

## Investment Implications

At Lazard Asset Management, we have researched and successfully invested in the U.S. mortgage industry for years. Our analysis led us to question the assumptions of market participants in terms of ultimate loss potential on the non-traditional mortgages. These assumptions regarding credit risk are critical to understanding the sustainability of returns generated by, and perhaps even the viability of, the non-traditional mortgage origination firms.

Rather than merely accepting the assertions as reality, we worked to leverage our own industry expertise by accessing a unique source of knowledge at Duke University. It is important to note that we are keenly aware of the limitations of the research as delineated in this document. That said, the most important element of this research is the reality that unemployment is not related to foreclosures in the way industry participants have assumed. It appears that there is an unexpected relationship between unemployment, home price appreciation, and foreclosures in which unemployment has been **negatively** correlated with foreclosures in states with significant home price appreciation (HPA) and **positively** correlated in states without strong HPA. Put simply, our hypothesis is that unemployment is a trigger, but not necessarily **the** trigger, that can lead to some borrowers being unable to pay. To the extent the borrower still has the ability to pay off the loan by monetizing embedded appreciation, he may well do so even while others have no equity to monetize and hence end up in foreclosure.

The other significant conclusion for us vis-à-vis the non-traditional mortgage industry is that one could argue that the industry was built on selling call options on home prices to borrowers who were not creditworthy. Not only did the industry sell the call options, it also financed them in many cases with loan-to-value ratios exceeding 100 percent in some extreme cases. As long as home prices appreciated, the profits were significant for the lenders and, in some cases, the borrowers. However, with housing prices declining now across much of the nation, the returns of the industry have substantially declined and the viability of many originators has either clearly been decided in the negative or is in question.

How will we use this knowledge to invest? We have incorporated the research into our analysis of a range of companies as follows:

- We are spending more time with mortgage originators, securitization agents, and servicing companies discussing their analysis of loss drivers. Our goal is to ensure that we are not missing other elements of the analysis that might have been outside of the scope of this study. This discussion, in and of itself, has elevated our dialogue with market participants as we have developed a unique source of knowledge. Moreover, one can develop interesting insights into the quality of management in discussions such as these as we are able to assess the analytical processes underlying their decision making.
- We have adjusted our scenario analysis to include the possibility that defaults and foreclosures could increase meaningfully even if unemployment does not increase. The Duke research does not lead directly to this application, but we believe the combination of this study and other research related to the subprime mortgage credit environment suggest that HPA alone might be the most important driver of losses.
- Given home price declines in most major markets as measured by the Office of Federal Housing Enterprise Oversight (OFHEO) and S&P/Case-Shiller, we have incorporated more negative scenarios into our analysis regarding ultimate losses in the event unemployment does increase.
- Beyond the actual mortgage industry, we are evaluating the impact of decreased origination of non-traditional mortgages on a range of market participants such as investment banks, credit rating agencies, and a range of investors.

Overall, the research we have commissioned is one part of a broad analysis of the industry and the range of participants, from public debt markets to the end borrowers. This study is merely one example of the type of work we do to ensure that we commit our clients' capital to investments where the market is implying lower future returns than we expect.

**NOTES:**

- 1 Other possible macro variables affecting foreclosure rates include GDP growth, personal income growth, and new construction. We found these factors to be highly correlated with the variables that we ultimately used. We retained 3-month LIBOR even though it is highly correlated with unemployment because ARM rates are adjusted based on similar short-term indices and the correlation with unemployment may vary from state to state.
- 2 By 2005, subprime mortgages are primarily ARMs; thus we use prime ARM data (rather than prime FRMs) in our analysis of the differences between prime and subprime foreclosures.

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