August 1, 2011

Office of the Comptroller of the Currency (OCC)
250 E Street, SW, Mail Stop 2-3
Washington, DC 20219
Docket No. OCC-2010-0002 / RIN 1557-AD40

Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549-1090
Elizabeth M. Murphy, Secretary
File No. S7-14-11 / RIN 3235-AK96

Board of Governors of the Federal Reserve System
20th Street and Constitution Avenue, NW
Washington, DC 20551
Jennifer J. Johnson, Secretary
Docket No. R-1411 / RIN 7100-AD70

Federal Housing Finance Agency
1700 G Street, NW, Fourth Floor
Washington, DC 20552
Attn: Alfred M. Pollard, General Counsel
Attn: Comments / RIN 2590-AA43

Federal Deposit Insurance Corporation
550 17th Street, NW
Washington, DC 20429
Attn: Robert E. Feldman, Executive Secretary
Attention: Comments / RIN 3064-AD74

Department of Housing and Urban Development
Regulations Division
Office of General Counsel
451 7th Street, SW, Room 10276
Washington, DC 20410-0500
Docket FR 5504-P-01 / RIN 2501-AD53

Subject: Credit Risk Retention

Mortgage Guaranty Insurance Corporation (MGIC) respectfully offers its response to the request for comments made in the notice of proposed rulemaking (NPR)[1] issued to implement the credit risk retention requirements of Section 15G of the Securities Exchange Act of 1934 (Section 15G), as added by Section 941 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank). Our response focuses on those aspects of the NPR that relate to residential mortgages and is organized as indicated below. **Please note that the location within our response of the answers to the questions asked in the NPR is in Appendix D.**



[1] Credit Risk Retention, 76 Fed. Reg. 24090 (proposed April 29, 2011), *available at* http://edocket.access.gpo.gov/2011/pdf/2011-8364.pdf. MGIC will refer to the issuing entities — the Board of Governors of the Federal Reserve System (FRB), Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), Securities and Exchange Commission (SEC), Department of Housing and Urban Development (HUD) and Federal Housing Finance Agency (FHFA) — collectively as "the Agencies" in this response.

## I. Executive Summary

MGIC agrees with the Agencies' objective of aligning the economic interests of securitizers with those of investors in residential mortgage-backed securities (RMBS) without creating unintended harm to a still fragile US housing market. However, the NPR falls short of this objective.

The narrow definition of Qualified Residential Mortgage (QRM) in the NPR (the QRM Definition) subjects all prudently underwritten, private sector, low down payment mortgages to risk retention and creates a standard for private sector mortgage lending that excludes a majority of creditworthy borrowers. At the same time, Dodd-Frank and the NPR exempt from risk retention all mortgages insured under FHA and other governmental programs (Public MI) — primarily low down payment mortgages — without regard to any specified underwriting standards.[2] The combination of the narrow QRM Definition and the broad exemption for Public MI will have the following adverse consequences and disproportionately affect 35% to 40%[3] of borrowers:

- The government's already outsized role in housing finance will expand as a result of the incentives in the NPR to use Public MI over private capital alternatives. This is contrary to the articulated housing policy goals of the Obama Administration and Congress;

[2] Unless otherwise specified, statistics for "Public MI" provided in this response relate solely to FHA programs. FHA programs represent a preponderance (~80%) of Public MI programs; use of statistics relating solely to FHA programs should not limit the comprehensive critique intended to be conveyed in this response.

[3] Represents the percentage of loans originated in 2008-2010 that were low down payment loans. Source: Loan origination data from MGIC's LenderLandscape, a web-based mortgage data service that contains over 24 million residential loans, or approximately 42% of the residential loans outstanding nationwide.

- Creditworthy low down payment borrowers will have fewer choices and face higher costs of credit (or be denied access to credit) because of a reluctance by the private sector to originate high-quality, non-QRM loans due to:
    - The higher costs to lenders and securitizers that result from implementing the proposed rules; and
    - The perception fueled by the NPR that loans falling outside the QRM "gold standard," regardless of quality, are unsafe and less desirable to investors; and
- The private mortgage securitization market will suffer liquidity problems as a result of the smaller number of QRM loans available to be securitized and an overall decrease in the number of loans originated.

The possible alternative approach discussed in the NPR[4] (the Alternative QRM Definition) would have the same adverse consequences, albeit to a lesser extent. We believe that these adverse consequences can be mitigated, and the policy goals of both the risk retention legislation and housing finance reform advanced, by allowing an exemption from risk retention for a broader category of prudently underwritten mortgage loans meeting specific underwriting standards (MGIC's Proposed Standards). MGIC's Proposed Standards would allow for lower down payments than allowed by the QRM Definition (and the Alternative QRM Definition) and would require private mortgage insurance (Private MI) for low down payment loans, *i.e.*, those with loan-to-value ratios (LTVs) greater than 80%.

Private MI is a requirement of MGIC's Proposed Standards for higher-LTV loans because it provides the following benefits:

- Aligns incentives and interests of borrowers, originators, servicers and investors to promote sustainable borrowing and lending;
- Promotes the use of sound underwriting standards;
- Ensures wide availability of credit at a reasonable price;
- Provides a source of private capital to the housing finance market;
- Reduces risk of default; and
- Reduces credit risk.

MGIC's Proposed Standards would allow 54% more borrowers to qualify for private sector mortgages without risk retention than would otherwise qualify under the QRM Definition and

[4] *See* 76 Fed. Reg. at 24129.

they would allow 16% more borrowers to qualify than under the Alternative QRM Definition.[5] This significant increase in eligible borrowers preserves consumer choice and results in lower default rates than those historically produced by Fannie Mae or Freddie Mac (together, the GSEs) or the FHA.

The Agencies can implement MGIC's Proposed Standards in any one of several ways, each of which is allowed under Section 15G. Our recommended approach is to define "Qualified Residential Mortgage" as a loan complying with MGIC's Proposed Standards. We recommend this approach because it sets a reasonable, single standard for lending that allows the private sector to efficiently serve a majority of borrowers.

We also recommend that Private MI be allowed as a form of risk retention. In addition to the benefits above, Private MI provides 2 to 7 times more credit risk retention than the NPR's 5% risk retention requirement and remains in place for the practical life of the loan. Last, to adequately discourage potentially unsafe lending, we recommend the Agencies consider higher risk retention requirements for loans falling outside MGIC's Proposed Standards.

## II. Policy Goals of Risk Retention Legislation and Housing Finance Reform

Section 15G was intended "to create incentives that will prevent a recurrence of the excesses and abuses that preceded the crisis, restore investor confidence in asset-backed finance, and permit securitization markets to resume their important role as sources of credit for households and businesses"[6] and to ensure high underwriting standards, encourage appropriate risk management

[5] Based on 2001-2010 borrowers whose loans otherwise met the Qualified Mortgage (QM) criteria set out in the regulations proposed pursuant to Dodd-Frank in connection with the Truth in Lending Act. *See* Credit Risk Retention, 15 U.S.C.A. § 78o-11(e)(4)(C); and 76 Fed. Reg. 27390 (proposed May 11, 2011). We limited our analysis to loans meeting the QM definition based on the interplay between the QRM and QM definitions in Dodd-Frank and because those loans failing the QM definition (such as interest-only loans, negative amortization loans, loans with maturities longer than 30 years and loans that did not have full income verification) likely will not be widely originated in the future since originators and securitizers could be exposed to substantial additional risk by originating and securitizing loans failing to meet the QM definition.

[6] S. REP. NO. 111–176, at 128 (2010), *available at* http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_reports&docid=f:sr176.111.pdf.

practices and improve access to credit on reasonable terms[7] (collectively, the Risk Retention Policy Goals). Section 15G provisions related to residential mortgages were not supposed to be considered in a housing policy vacuum. Prior to issuance of the NPR (and also pursuant to Dodd-Frank), the Administration stated its intention to reduce the government's role in housing finance and encourage the return of private capital[8] without harming a still fragile housing market (collectively, the Housing Finance Policy Goals). The Risk Retention Policy Goals, together with the Housing Finance Policy Goals, are referred to in our response as the Policy Goals. In our response, we will explain how MGIC's Proposed Standards and the use of Private MI advance the Policy Goals while avoiding the adverse consequences listed above that would result from implementing the NPR as issued.

## III. Attributes of Private Mortgage Insurance that Advance the Policy Goals[9]

MGIC, the oldest and largest Private MI company, founded the modern Private MI industry more than 50 years ago to provide borrowers and lenders an alternative to FHA and VA programs for low down payment housing loans.[10] Private MI today does, and buttressed by the Proposed Standards Private MI will, provide many important benefits to the housing finance system, including:

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[7] *Id*. at 131. Section 946 of Dodd-Frank required the Chairman of the Financial Stability Oversight Council to conduct a study on the macroeconomic effects of the risk retention requirements, with emphasis placed on potential beneficial effects with respect to stabilizing the real estate market. *See* Timothy F. Geithner, Financial Stability Oversight Council, "Macroeconomic Effects of Risk Retention Requirements" (Jan. 2011), *available at* http://www.treasury.gov/initiatives/wsr/Documents/Section%20946%20Risk%20Retention%20Study%20%20(FINAL).pdf. Section 951(c) of Dodd-Frank required the Board of Governors of the Federal Reserve System to conduct a study of the combined impact on each class of asset-backed security of the new credit risk retention requirements, including their effect on increasing the market for Federally subsidized loans. *See* Board of Governors of the Federal Reserve System, "Report to the Congress on Risk Retention" (Oct. 2010), *available at* http://www.federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf. The Federal Reserve study is limited with respect to residential mortgages because Footnote 3 states the "study focuses on so-called private-label securities backed by nonconforming mortgages, which exclude securities guaranteed by an agency of the federal government or by the housing-related government-sponsored enterprises Fannie Mae and Freddie Mac." *Id*. at n.3. Given that the GSEs and Public MI programs are responsible for more than 95% of current housing finance volume with no material reduction in those percentages expected pending GSE reform, the Federal Reserve study lacks important context which should inform the policy debate on risk retention. The statute and these two reports constitute the basis for the Risk Retention Policy Goals.

[8] Section 1074 of Dodd-Frank required the Department of the Treasury to prepare a report on housing finance reform with a view toward encouraging the return of private capital to the US housing finance system. This report constitutes the basis for the Housing Finance Policy Goals. "**Under our plan, private markets — subject to strong oversight and standards for consumer and investor protection — will be the primary source of mortgage credit and bear the burden for losses**." US Dept of the Treasury, "Reforming America's Housing Finance Market: A Report to Congress" 1 (Feb. 2011) (emphasis added), *available at* http://www.treasury.gov/Initiatives/Documents/Reforming%20America's%20Housing%20Finance%20Market.pdf.

[9] This part of MGIC's response is intended to address **Questions 145 and 146(b)** of the NPR.

[10] *See* Promontory Financial Group, LLC, "The Role of Private Mortgage Insurance in the US Housing Finance System" (Jan. 2011), *available at* http://www.promontory.com/assets/0/78/110/286/974d1fb8-ac46-413e-a62a-4b5472f4df14.pdf, for a recent overview of Private MI including a discussion of the formation of MGIC, the role of Private MI in the US housing finance system and a fairly comprehensive literature search regarding Private MI.

- Assisting consumers, especially first-time homebuyers, to affordably finance homes with less than a 20% down payment;

- Exerting a unique form of external oversight and influence over loan origination and servicing activity; and

- Reducing lenders' and investors' credit risk so that high-LTV loans with Private MI have lower credit risk than uninsured 80 LTV loans.

Low down payment lending is not a housing bubble phenomenon; it is an established part of the larger residential mortgage market, recently averaging 35% to 40% of the overall market.[11] The role of low down payment lending has always been to provide a homeownership option for renters (thus providing a form of rental price protection for consumers) and to enable homeowners to "trade up" by selling their existing homes to purchase homes more suitable to their changing needs.

Like low down payment lending, Private MI is not a housing bubble phenomenon. Lenders and investors traditionally have required additional security in the form of mortgage default insurance on low down payment loans. During the period from 1995 through 2010, Private MI companies insured 23.0 million loans[12] (with an aggregate loan amount of approximately $3.4 trillion). The following table shows the volume of new loans insured by Private MI companies from 1995 through 2010. It also shows the significant increase in the volume of loans insured by the FHA and VA beginning in 2008, a topic of concern that will be addressed later in this response.

[11] *See supra* note 3.
[12] *See* Mortgage Insurance Companies of America (MICA), Fact Books and Monthly Reports, *available at* http://www.micanews.com/.

**Table 1 - Primary Mortgage Insurance Activity (1995-2010)**

| | Private MI | | FHA & VA | | Total |
|---|---|---|---|---|---|
| | $ billions | % of Total | $ billions | % of Total | $ billions |
| 1995 | $ 110 | 61% | $ 69 | 39% | $ 179 |
| 1996 | 127 | 55% | 103 | 45% | 230 |
| 1997 | 121 | 54% | 101 | 46% | 222 |
| 1998 | 187 | 56% | 146 | 44% | 333 |
| 1999 | 189 | 52% | 172 | 48% | 361 |
| 2000 | 163 | 59% | 115 | 41% | 278 |
| 2001 | 283 | 63% | 167 | 37% | 450 |
| 2002 | 337 | 64% | 187 | 36% | 524 |
| 2003 | 405 | 64% | 231 | 36% | 636 |
| 2004 | 264 | 67% | 129 | 33% | 393 |
| 2005 | 268 | 77% | 82 | 23% | 350 |
| 2006 | 266 | 77% | 78 | 23% | 344 |
| 2007 | 357 | 77% | 105 | 23% | 462 |
| 2008 | 193 | 40% | 295 | 60% | 488 |
| 2009 | 82 | 15% | 450 | 85% | 532 |
| 2010 | 70 | 16% | 367 | 84% | 437 |

Source: Inside Mortgage Finance

Private MI is particularly important to first-time homebuyers. First-time homebuyers have long been a major component of the housing market, recently accounting for 50% of all homes purchased.[13] Given that most first-time homebuyers tend to be young (median age in 2010 was 30),[14] they often have not accumulated enough assets to make a 20% down payment. Recently, 70% of first-time homebuyers made a down payment of 10% or less, with a median down payment of only 4%.[15] If a 20% down payment is required for QRM loans, a family earning the median income would have to delay the purchase of a home for nearly 14 years to save for the down payment and closing costs. If a 10% down payment is required, the same family would have to delay the purchase for 9 years.[16]

While the NPR does not prohibit either low down payment lending or the use of Private MI, it provides significant incentives for the low down payment market to be served by Public MI. It would be unwise to strongly favor Public MI to serve the low down payment market and to ignore the positive incentive-enhancing effects of Private MI in a rulemaking intended to encourage more responsible origination, servicing and securitization behavior in private markets.

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[13] National Association of Realtors, "Profile of Home Buyers and Sellers 2010" Exhibit 1-9, at 14 (Nov. 5, 2010) (based on a survey of consumers who purchased homes between July 2009 and June 2010).

[14] *Id*. Exhibit 1-13 at 17.

[15] *Id*. Exhibit 5-3 at 71.

[16] National Association of Realtors, "Median Sales Price of Existing Single-Family Homes for Metropolitan Areas" (2009 median single-family home price of $172,100), *available at* http://www.realtor.org/wps//connect/497de980426de7ccb96eff03cc9fa30a/REL10Q1T_rev.pdf?MOD=AJPERES&CACHEID=497de980426de7ccb96eff03cc9fa30a; U.S. Census Bureau, "Current Population Reports" (Sept. 2010) (2009 median household income of $49,777), *available at* http://www.census.gov/prod/2010pubs/p60-238.pdf; and U.S. Department of Commerce Bureau of Economic Analysis, "Personal Savings Rate" (2010 personal savings rate of 5.2%), *available at* http://research.stlouisfed.org/fred2/data/PSAVERT.txt. Assumed investment rate on savings of 2% and closing costs equal to 5% of the loan amount.

Public MI (most often provided by the US Government on a full faith and credit basis) may offer the highest level of counterparty security, particularly if the credit protection covers the entire loan obligation. However, reliance on Public MI credit enhancement can have a distorting effect on lending behavior. Complete credit risk protection thwarts the Risk Retention Policy Goals of ensuring high underwriting standards and encouraging appropriate risk management practices because it reduces investor incentives to remain diligent, especially when reviewing individual loans underlying securitization bonds. Public MI, with its unlimited call on the public treasury, need not worry about going out of business as it sets credit criteria or operating performance standards. In addition, complete dependence on Public MI thwarts the Housing Finance Policy Goals because it increases government's role in housing finance. The periodic reliance on Public MI for countercyclical purposes threatens to become permanent through all phases of the housing credit cycle.

In contrast, the numerous attributes of Private MI described below advance the Policy Goals, establishing Private MI as an important component of any effort to create a sustainable private securitization market for residential mortgage loans.

### A. Private MI Aligns Incentives[17]

Unlike the FHA, which insures 100% of the credit risk of a loan, Private MI provides coverage on a coinsured basis. Private MI companies take a horizontal, first-loss layer of credit risk of a loan, typically ranging from 12% to 35%, with the insured lender retaining the remainder of the risk. This first-loss position creates significant exposure for Private MI companies if originators fail to make high-quality loans or if servicers fail to service them properly, whether those loans are securitized or not. In effect, Private MI companies assume 2 to 7 times the credit exposure required to be retained by securitizers under Dodd-Frank. What's more, partial coverage and contractual rescission rights in Private MI policies (in combination with representation and warranty obligations of the sellers of loans) also ensure that originators and servicers retain a meaningful portion of the risk of each loan made or transferred.[18] Private MI provides useful information to market participants and regulators on the amount of fraud and other unwelcome behavior in the market, as well as deteriorating local credit conditions (based on increasing loan loss severities). Thus, investors are given a means to identify originators and servicers most likely to produce and administer the high-quality loans that collateralize well-performing RMBS. Because Private MI has considerable capital at risk (concentrated in a single-purpose "monoline" business entity in which commercial reputation is paramount), there is a strong incentive to prevent defaults *ex ante* and enforce contract rights *ex post* — each providing useful discipline in

[17] This part of MGIC's response is intended to address **Questions 90 and 146(c)** of the NPR.

[18] MGIC's insurance policy generally allows MGIC to rescind insurance coverage for, among other reasons, fraud and certain material misrepresentations made in connection with the issuance of the insurance policy, or if the insured loan was never eligible for coverage under the policy. (For ease of reference, throughout this response we refer to the reasons that underlie rescission as involving fraud or misrepresentation.) Rescission may serve as the basis for a repurchase request to the servicer (and ultimately to the originator) for the loan by the sponsor or investor in a securitization transaction, thereby reinforcing the integrity of representations and warranties given in connection with such transaction. These contractual rights are consistent with Dodd-Frank's (and the private sector's) emphasis, in Sections 943 and 945, on improving the quality and use of representations/warranties and due diligence in securitization transactions.

a private market. It is for these reasons that The Joint Forum of the Basel Committee on Banking Supervision, in its recent report on asset securitization incentives, includes the use of mortgage insurance in its list of recommended standards for residential mortgages that are securitized.[19]

### B. Private MI Promotes the Use of Sound Underwriting Standards

Private MI companies publish underwriting guidelines that can serve as a check on aggressive lending practices.[20] As discussed below, Private MI companies routinely reject insurance applications because the related loans do not meet the MI company's underwriting guidelines (and thus present an unreasonable risk). These decisions represent avoided — and thus reduced — default risk.

As holders of first-loss risk on low down payment loans, Private MI companies are the most sensitive participants to the risks created by imprudent lending standards. Indeed, Private MI companies suffered disproportionately from the influence of the automated underwriting systems of the GSEs and their progressively looser underwriting standards. These automated underwriting systems effectively evolved into purchasing systems, often approving loans that were otherwise outside of our standard underwriting guidelines.[21] Our experience with the GSE systems makes a compelling case for the Agencies to establish a prudent and reasonable set of underwriting standards that serve a majority of borrowers. The establishment of these standards for loans exempt from risk retention will create important regulatory guardrails for the US housing finance system to protect against the risk of both deteriorating credit standards and becoming overly reliant on the credit decisioning approach of one or a few influential market participants. The systemic value of Private MI — and its ability to reduce default risk — will be enhanced if Private MI companies are given a meaningful ability to exercise independent underwriting judgment within the boundaries of reasonable public standards.

### C. Private MI Ensures Wide Availability of Credit at a Reasonable Price

Credit risk sharing, private competition and state regulation of premium rates and policy terms ensure that Private MI can help pave a more cost-efficient path to homeownership than Public MI for those who do not have a large down payment. Additionally, competition from Private MI

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[19] *See* Basel Committee on Banking Supervision, The Joint Forum, "Report on asset securitisation incentives" 29-30 (July 2011), *available at* http://www.bis.org/publ/joint26.pdf. It is also important to note that they recommend "[r]aising origination and underwriting practices or standards **for assets that are securitized**," including the use of mortgage insurance, not just loans that may be exempt from risk retention. *Id*. (emphasis added). The Joint Forum's recommendation builds on prior examinations of mortgage insurance within the context of global housing finance practices, in which mortgage insurance is characterized as a constructive influence on residential mortgage origination and securitization. *See* Basel Committee on Banking Supervision, The Joint Forum, "Review of the Differentiated Nature and Scope of Financial Regulation — Key Issues and Recommendations" 17, 51 (Jan. 8, 2010), *available at* http://www.bis.org/publ/joint24.pdf; and Financial Stability Board, "Thematic Review on Mortgage Underwriting and Origination Practices" at 23-25, 31, 36 (Mar. 17, 2011), *available at* http://www.financialstabilityboard.org/publications/r_110318a.pdf.

[20] *See, e.g.,* MGIC's Underwriting Guide, *available at* http://www.mgic.com/pdfs/71-40600-uwguide.pdf.

[21] Refer to Appendix B for a discussion of the evolution of automated underwriting systems and mortgage origination practices.

encourages Public MI to improve service standards and encourage innovation. As an example, the beneficial effect of Private MI competition prompted Canada to solicit a private competitor for its public mortgage insurer in the 1990s.[22] The additional consumer choice resulting from competition comes without compromising counterparty security for lender policyholders and investor beneficiaries. A comprehensive system of solvency regulation, including the use of counter-cyclical contingency reserves, has preserved Private MI capacity amidst steeper home price declines than those experienced during the Great Depression[23] and a high casualty rate among other mortgage market participants.[24]

### D. Private MI Provides a Source of Private Capital to the Housing Finance Market

As noted above, one of the Housing Finance Policy Goals is to encourage the return of private capital to the housing finance markets. The May 31, 2011 letter to the Agencies signed by many members of Congress made clear that the "law recognizes that private capital does not exclusively come from a lender or an investor; it can be provided by a private mortgage insurer."[25] Since the financial crisis began, four Private MI companies, including a new entrant into the market, attracted $4.3 billion in new private capital through equity and debt offerings. The parent companies of two other Private MI companies that are part of diversified organizations attracted an additional $3.6 billion in private capital through equity and debt offerings. These offerings represent critical additions of private capital to the mortgage industry at a time when many investors were pulling out. Rules that encourage the use of Private MI will better position the industry to attract additional private capital. A stronger Private MI industry, in turn, will provide security that will attract investors back to the RMBS sector.

### E. Private MI Reduces Risk of Default[26]

Section 15G(e)(4)(B)(iv) directs the Agencies to define QRM considering underwriting and product features that result in a lower "risk of default." The Agencies, in a narrow reading of this section, appear to have construed "risk of default" to mean "likelihood of default."[27] We believe that construing "risk of default" to mean only the "likelihood of default" or "incidence of default" is an incorrect interpretation of the intent of the law. We believe that "risk of default" should refer to the "risk of loss that could result from a default," consistent with the NPR

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[22] *See* Jane Londerville, MacDonald-Laurier Institute of Public Policy, "Mortgage Insurance In Canada" 16 (Nov. 2010), *available at* http://www.macdonaldlaurier.ca/files/pdf/MortgageInsurance.pdf.

[23] Prices declined 30.5% from 1926 to 1933, and 34.0% from 2006Q3 to 2011Q1 (based on nominal home price index data, *available at* http://www.irrationalexuberance.com/).

[24] *See* "The Role of Private Mortgage Insurance in the US Housing Finance System," *supra* note 10. *See also* Robert Stowe England, "Private MI: The Last Man Standing" (Jan. 2011) http://www.robertstoweengland./index.php/writer/484-private-mi-the-last-man-standing.

[25] Letter from the United States Congress (May 31, 2011), *available at* http://www.sec.gov/comments/s7-14-11/s71411-45.pdf.

[26] This part of MGIC's response is intended to address **Question 111(a)** of the NPR.

[27] In considering whether to allow for the effects of Private MI to be considered in the definition of QRM, the Agencies considered whether mortgages with mortgage insurance were "less likely" to default than other mortgages. 76 Fed. Reg. at 24119.

definition of "credit risk."[28] As shown below in Section III.F., Private MI reduces the risk of loss resulting from a default.

Although we believe under Dodd-Frank the Agencies should consider whether Private MI reduces the risk of loss resulting from a default, presumably the Agencies seek evidence that mortgage guarantee insurance reduces the "likelihood of default." In addition, by requiring that the requested evidence relate only to loans that otherwise meet the extremely narrow QRM Definition, the Agencies set an unreasonable standard. Nevertheless, after examining the attributes of Private MI and the available data, we believe that there is substantial evidence that Private MI does indeed reduce the "incidence of default" and the "risk of default," even for loans meeting the narrow QRM Definition.

Private MI reduces incidence of default through:

- Imposition of lender insurance eligibility requirements;
- Lender screening and ongoing performance surveillance;
- Insurance eligibility underwriting;
- Servicer oversight; and
- Default loss management in which borrowers are encouraged to cure defaults and borrowers, servicers and investors are encouraged to minimize ultimate loss given default.

We believe the NPR's request for studies on the effectiveness of Private MI in reducing default risk overlooks those loans that were not made because Private MI could not be obtained.

To begin with, not every lender that seeks to become an insured is approved. Subsequently, those lenders who fail to sustain acceptable performance standards find their ability to obtain insurance reduced or eliminated. For example, MGIC has revoked the eligibility of more than 2,500 lenders since the beginning of 2008.

Similarly, MGIC does not approve every borrower application submitted, as the table below shows.

[28] *See* 76 FR 24156.

**Table 2 - MGIC Insurance Application Approval Rate (2000-2010)**

| Year | Approval Rate |
|---|---|
| 2000 | 89% |
| 2001 | 93% |
| 2002 | 94% |
| 2003 | 95% |
| 2004 | 94% |
| 2005 | 93% |
| 2006 | 93% |
| 2007 | 93% |
| 2008 | 81% |
| 2009 | 74% |
| 2010 | 81% |

Source: MGIC commitments as a % of all applications[29]

Additionally, given the interest shown by the Agencies in promoting loss mitigation (by including servicing standards within the QRM Definition), it is worth noting the close working relationship between Private MI companies and loan servicers on loan surveillance and loss mitigation efforts. Because the claim payment trigger for Private MI is typically a loss upon foreclosure, Private MI companies have an incentive to avoid foreclosures. Consequently, Private MI companies work with servicers on a variety of programs intended to cure loan delinquencies, regularly enabling loan modifications, including through the US Treasury's Home Affordable Modification Program (HAMP), as well as programs developed on a proprietary basis by servicers. Private MI companies also advance the US Treasury's Home Affordable Refinance Program (HARP) by allowing performing loans with current LTVs greater than 100 to refinance into a lower rate. Enabling modifications and allowing borrowers to refinance existing loan obligations without significant premium or underwriting adjustments have made a substantial contribution to ongoing efforts to stabilize US housing markets, as the table below shows.

[29] Data is not available to assess whether applications not approved by MGIC were subsequently approved by another Private MI company or by Public MI.

**Table 3 - Private MI Loan Modifications and Refinances (1/1/09-3/31/11)**

| | Number of Borrowers Benefited | Loan Balance (millions) |
|---|---|---|
| HAMP Trials Started | 467,908 | $ 95,428 |
| HAMP Trials Converted to Permanent | 124,304 | $ 26,531 |
| Active HAMP Trials at 3/31/11 | 80,400 | $ 16,567 |
| Proprietary Modifications | 171,420 | $ 32,813 |
| HARP Approvals | 136,150 | $ 28,133 |
| Completed HARP Refinances | 117,239 | $ 24,368 |

Source: MICA

Proving the impact of Private MI on incidence of default in a controlled study is a difficult exercise for several reasons. First, data is not available to allow a comparison of loans approved for Private MI to loans rejected. Second, the great majority of low down payment loans have been covered by mortgage insurance (public or private), reflecting long-established market custom. Thus, there is not a natural population of similar, uninsured loans against which to compare insured loans in order to determine the effect of Private MI. Additionally, there is substantial evidence that the purchase decision systems of the GSEs adversely selected against Private MI.[30] Nevertheless, as a result of the private securitization boom and the dramatic increase in piggyback lending, there are sufficient loans from the last decade to derive statistically valid results.

The three studies discussed below, each analyzing similar data from CoreLogic,[31] have found a significantly lower incidence of default, all else being equal, for insured versus uninsured loans. The CoreLogic data contains both GSE and non-GSE loans and allows calculation of combined LTV (CLTV) ratios for loans that have second liens identified at closing. It is important to note that this data is incomplete, as many loans were also originated with unreported second liens.[32] Nevertheless, it produces a rich set of insured and uninsured loans, which can be compared holding constant the important risk characteristics.

The first study, prepared by Genworth Mortgage Insurance Corporation,[33] produced an empirical probability analysis that compared ever-to-date default rates, controlling for:

- Geography;

[30] *See* Appendix B for a study of default rates by LTV, using data from FHFA.
[31] The CoreLogic (NYSE: CLGX) servicing database is substantially identical to the LPS (McDash) data used by the Agencies in their research for the NPR. MGIC has participated in peer reviews and an ongoing technical discussion regarding the three studies mentioned.
[32] The strengths and weaknesses of the CoreLogic database have been described in a recent study by the Government Accountability Office. *See* United States Government Accountability Office, GAO-11-656, "Mortgage Reform: Potential Impacts of Provisions in the Dodd-Frank Act on Homebuyers and the Mortgage Market" 61-66 (July 19, 2011), *available at* http://www.gao.gov/new.items/d11656.pdf.
[33] Attached as Appendix G.

- Origination year;
- CLTV;
- Credit;
- Loan purpose; and
- Documentation level.

While not an econometric approach, this type of analysis is free of assumptions and yields easily interpreted results. The study shows clearly that Private MI-insured loans have lower incidence of default than uninsured loans, and the sample sizes (more than 3.8 million insured loans and more than 1.0 million uninsured loans in 5,040 risk segments) are sufficiently large to produce reliable results. The following table shows the default incidence for insured loans relative to uninsured loans, controlling for the identified risk factors. On average, insured loans are 40% less likely to default than uninsured loans.

**Table 4 - Results of Genworth Study**

| Origination Year | Default Incidence (Insured Relative to Uninsured) |
|---|---|
| 2003 | 0.88 |
| 2004 | 0.60 |
| 2005 | 0.51 |
| 2006 | 0.58 |
| 2007 | 0.80 |
| Average 2003-2007 | 0.60 |

A follow-up study performed by Promontory Financial Group[34] modeled defaults using a proven hazard modeling framework. The study found insured loans had a lower likelihood of default than uninsured loans, and the difference was statistically significant. The following table shows the cumulative default rates at 12 through 72 months for insured and uninsured loans, using the extended specification in the Promontory study. After 5 years (or 60 months, to match results from the Milliman study below), insured loans have a 14.9% cumulative default incidence, compared to 18.0% for uninsured loans, which is a 17% lower incidence of default for insured loans.

[34] Attached as Appendix H.

**Table 5 - Results of Promontory Study**

| | Cumulative Default Rate at Indicated Months | | | | | |
|---|---|---|---|---|---|---|
| | 12 | 24 | 36 | 48 | 60 | 72 |
| Insured Loans | 1.7% | 5.7% | 9.7% | 12.7% | 14.9% | 16.7% |
| Uninsured Loans | 1.7% | 5.8% | 11.0% | 14.9% | 18.0% | 20.2% |
| Pct Difference (Uninsured relative to insured) | -2.15% | 2.09% | 13.47% | 17.40% | 20.79% | 20.98% |

In addition, Mortgage Insurance Companies of America (MICA) commissioned the consulting firm of Milliman, Inc. to examine the impact of insurance on default incidence using an actuarial methodology. The Milliman study[35] controls for:

- Home price appreciation;
- LTV;
- Presence of insurance;
- FICO score;
- Property type;
- Loan purpose;
- Loan type;
- Originator type;
- Loan term; and
- Relative property value.

To determine the impact of Private MI, Milliman modeled the likelihood of default over a fixed time horizon using a logistic regression framework, in which the presence of Private MI is a contributing factor. The following table shows the default rates, relative rates, and relative odds of default controlled for other risk factors ("Odds Relativity") after 5 years for uninsured loans compared to insured loans by CLTV (up to 95%, MGIC's recommended limit) and home price appreciation (HPA). Controlling for the risk factors, uninsured loans have from 31% to 94% greater likelihood of default than insured loans, with all of the differences significant at better than 99.9% confidence. Expressed in terms similar to the previous study results, insured loan default incidence is 24% to 48% lower than that of uninsured loans.

[35] Attached as Appendix I.

**Table 6 - Results of Milliman Study**

| | CLTV 80.01-90.00 | CLTV 90.01-95.00 |
|---|---|---|
| **HPA Range** | **Default Rate — Insured** | |
| HPA<=-20% | 30.4% | 33.5% |
| -20%<HPA<=0% | 10.9% | 10.9% |
| 0%<HPA<=20% | 5.8% | 6.1% |
| 20%<HPA | 2.7% | 3.4% |
| **HPA Range** | **Default Rate — Uninsured** | |
| HPA<=-20% | 53.8% | 59.5% |
| -20%<HPA<=0% | 19.7% | 18.4% |
| 0%<HPA<=20% | 8.6% | 8.0% |
| 20%<HPA | 3.8% | 3.9% |
| **HPA Range** | **Relative Rate (Uninsured Relative to Insured)** | |
| HPA<=-20% | 1.77 | 1.77 |
| -20%<HPA<=0% | 1.80 | 1.69 |
| 0%<HPA<=20% | 1.48 | 1.33 |
| 20%<HPA | 1.41 | 1.13 |
| **HPA Range** | **Odds Relativity (Significance) (Uninsured Relative to Insured)** | |
| HPA<=-20% | 1.94 (< 0.001) | 1.81 (< 0.001) |
| -20%<HPA<=0% | 1.53 (< 0.001) | 1.37 (< 0.001) |
| 0%<HPA<=20% | 1.45 (< 0.001) | 1.40 (< 0.001) |
| 20%<HPA | 1.60 (< 0.001) | 1.31 (< 0.001) |

The Genworth and Promontory studies included loans insured by FHA, VA and Private MI. Given that most FHA and VA business is above 95 LTV, removing FHA and VA loans did not materially change the results. In addition, the NPR requests evidence that "mortgage guarantee insurance or other types of insurance or credit enhancement" would reduce default risk on loans that meet the QRM Definition in all respects other than LTV. As the following table shows, even after removing FHA/VA loans and all loans that fail to meet the QRM Definition, except for LTV, loans insured with Private MI have a reduced default incidence. Insured loans have from 5% to 56% lower likelihood of default, though in some instances the differences are not statistically significant.

**Table 7 – Results of Milliman Study**
**(Non-FHA/VA Loans Meeting QRM Definition, except for LTV)**

| | CLTV 80.01-90.00 | CLTV 90.01-95.00 |
|---|---|---|
| **HPA Range** | **Default Rate — Insured** | |
| HPA<=-20% | 20.1% | 21.1% |
| -20%<HPA<=0% | 4.7% | 4.9% |
| 0%<HPA<=20% | 1.7% | 1.6% |
| 20%<HPA | 0.9% | 1.1% |
| **HPA Range** | **Default Rate — Uninsured** | |
| HPA<=-20% | 33.4% | 40.9% |
| -20%<HPA<=0% | 6.0% | 6.2% |
| 0%<HPA<=20% | 2.8% | 2.8% |
| 20%<HPA | 1.3% | 1.4% |
| **HPA Range** | **Relative Rate (Uninsured Relative to Insured)** | |
| HPA<=-20% | 1.66 | 1.94 |
| -20%<HPA<=0% | 1.27 | 1.27 |
| 0%<HPA<=20% | 1.62 | 1.70 |
| 20%<HPA | 1.47 | 1.28 |
| **HPA Range** | **Odds Relativity (Significance) (Uninsured Relative to Insured)** | |
| HPA<=-20% | 1.84 (<0.001) | 2.28 (<0.001) |
| -20%<HPA<=0% | 1.25 (0.0240) | 1.05 (0.659) |
| 0%<HPA<=20% | 1.46 (<0.001) | 1.33 (0.010) |
| 20%<HPA | 1.26 (0.375) | 1.08 (0.744) |

While all three of these studies use the same data source, they each use substantially different but well-proven methodologies to determine the effect of insurance on default incidence. In each study, insured loans have substantially lower default incidence than uninsured loans after controlling for all other risk factors. The magnitude of the effect is very similar across all three studies. Collectively, these studies provide compelling evidence of the influence of Private MI on reducing the incidence of default.

## F. Private MI Reduces Credit Risk[36]

For the reasons noted above, and from the referenced studies, it should be clear that Private MI reduces incidence of default. For mortgage-backed bond investors, however, credit risk is a function of both the incidence of default and the severity of loss given default (LGD). Private MI offers a tangible benefit to the securitization of mortgage loans because it reduces credit risk. The extent of this benefit is a function of the depth of insurance coverage and the extent to which the home value has declined. Private MI typically insures less than 100% of the potential loss, in order to keep the insurance affordable and to ensure that the insured has an incentive to properly service the loan. The amount of the loss covered is referred to as "depth of coverage." For example, the typical depth of coverage for a 95 LTV loan is 30%. That means that the Private MI

[36] This part of MGIC's response is intended to address **Question 111(a)** of the NPR.

company will pay to the insured losses up to 30% of the principal, accrued interest and reasonable foreclosure expenses. This results in the insured lender having coverage down to 66.5% of the property value at origination (95% * (1-30%)), otherwise referred to as the "investor exposure." Thus, from a loss severity perspective, an insured 95 LTV loan has the same expected LGD as an uninsured 66.5 LTV loan.

The following table illustrates the impact of Private MI on LGD under the following loan scenarios (assuming a 65% foreclosure recovery).

- 80 LTV with no insurance
- 90 LTV with 25% coverage
- 95 LTV with 30% coverage

In each case, we used default incidence levels that correspond to what can be expected for loans meeting MGIC's Proposed Standards through an economic cycle.[37] The expected losses to the investor are the product of the default incidence and the LGD. The insured loans, despite their higher incidence levels, produce substantially lower losses to the investor than the uninsured 80 LTV loans.

**Table 8 - Illustration of the Impact of Private MI on Investor Losses**

| | | Uninsured | Insured with Private MI | |
|---|---|---|---|---|
| (A) | LTV | 80.0% | 90.0% | 95.0% |
| (B) | Private MI Coverage | 0.0% | 25.0% | 30.0% |
| (C) | Investor Exposure ((A) * (1 - (B)) | 80.0% | 67.5% | 66.5% |
| (D) | Foreclosure Recovery | 65.0% | 65.0% | 65.0% |
| (E) | LGD ((C) - (D)) | 15.0% | 2.5% | 1.5% |
| (F) | Default Incidence (see Footnote 37) | 1.4% | 2.3% | 3.4% |
| | **Investor Loss** ((E) * (F)) | **0.21%** | **0.06%** | **0.05%** |

The expected results will be different with a more severe home price decline. However, deeper Private MI coverage could eliminate investor losses entirely, if that were a public policy concern. Even with standard coverage rates and under the severe home price declines we have experienced, though, the reduction in losses to the investors is substantial. Between 2007 and 2010, Private MI companies paid $22 billion of claims and, as of December 31, 2010, have

[37] MGIC ETD Claim/Termination Incidence average for loans meeting MGIC's Proposed Standards, insured 1998-2007, for 90 and 95 LTV; uninsured 80 LTV estimate. *See* Federal Housing Finance Authority, "Mortgage Market Note 11-02" (Apr. 11, 2011), *available at* http://www.fhfa.gov/webfiles/20686/QRM_FINAL_ALL_R41111.pdf. The meaning of "ETD Claim/Termination Incidence" is explained in Appendix F. Ordinarily we would hesitate to compare ever-90 delinquency rates with our claim/termination rates, but the average ever-90 delinquency rate in the FHFA data for loans >80 and ≤90 LTV is 2.4%, which is almost identical to our average claim/termination rate of 2.3%. Even if the 80 LTV default incidence is 1.0, the resulting investor loss would be 0.15%, more than double the losses on insured 90 LTV loans.

reserved approximately $19 billion for future claim payments. These payments, made at a time of substantial distress in the US housing finance market, represent protection against default-related loss not easily available from any other private source.

MGIC tested the impact of Private MI on investor losses using its own portfolio data. MGIC examined losses experienced by a population of loans that included ≤80 LTV loans without primary Private MI coverage, and >80 LTV loans with primary Private MI coverage, originated from 2005 to 2007, and purchased by one of the GSEs. As shown in the table below, the average LGD for ≤80 LTV loans without primary Private MI has been 44.7%. The average total LGD for >80 LTV loans would have been 48.5% without insurance, but after the benefit of primary Private MI, the LGD to the investor was 23.1% — substantially less than the LGD of the ≤80 LTV loans. Even at a default incidence level nearly twice that of the ≤80 LTV loans, the losses to the investor on loans with LTV > 80 would be identical.

**Table 9 - Loss Given Default**

| LTV Group | Total | Private MI | Investor |
|---|---|---|---|
| ≤80 | 44.7% | 0.0% | 44.7% |
| >80 | 48.5% | 25.4% | 23.1% |

Source: MGIC

Thus, in terms of reducing the risk of default, the Agencies can ensure that investor losses on high-LTV loans would be lower than losses on low-LTV loans by requiring the use of Private MI on high-LTV loans.

### G. Summary

In summary, the Private MI attributes discussed above help to advance both the Risk Retention Policy Goals (by preventing defaults and mitigating their effect when they occur without harming a fragile housing market) and the Housing Policy Goals (by allowing the efficient reduction of Public MI programs and improving the performance of the remaining Public MI programs).

## IV. MGIC's Concerns with the NPR[38]

MGIC's Proposed Standards and the use of Private MI are aligned with the Policy Goals. Unfortunately, the NPR threatens the Policy Goals and discourages the use of Private MI in the important ways discussed below.

[38] This part of MGIC's response is intended to address **Question 106** of the NPR.

A. Creates a Permanent Market Advantage for Public MI[39]

MGIC believes the NPR creates a permanent market advantage for Public MI, in part because Dodd-Frank confers an exemption from risk retention for loans insured by Public MI. The NPR's use of an overly narrow QRM Definition (including the Alternative QRM Definition) exacerbates the problem. Put simply, originators and securitizers will have a strong incentive to seek Public MI (with more liberal credit terms and conditions) for any eligible loan unless the QRM Definition is changed or some other accommodation is made.[40] The table below demonstrates the differences across key underwriting criteria of the QRM Definition, the Alternative QRM Definition and the FHA.

**Table 10 - Comparison of Underwriting Criteria**

| | QRM | Alt QRM | FHA |
|---|---|---|---|
| Max LTV-Purchase | 80% | 90% | 96.5% |
| Max LTV-Rate/Term Refi | 75% | 90% | 97.75% |
| Max DTI Ratio | 36% | 38% / 41% ARM/FRM | 43%[41] |
| Credit | 690 equiv | 690 equiv | 580 > 90 LTV<br>500 ≤ 90 LTV |
| Seller Contribution Toward Closing Costs | 0% | 0% | 6% |

As discussed above, the low down payment market is not trivial. By creating a significant advantage for Public MI in this market, both Policy Goals will be frustrated. No empirical evidence that Public MI reduces the risk of default was required before the exemption from risk retention was conferred on Public MI. Because Public MI's credit criteria and policy orientation historically have resulted in higher default rates than those produced by Private MI's credit criteria, the Risk Retention Policy Goals of ensuring high underwriting standards and encouraging appropriate risk management practices will be thwarted. The NPR will shift credit risk from private to public sectors without using the opportunity to reduce the credit risk altogether. The customary re-balancing between private and public capital that occurs during mortgage credit cycles will not happen, thereby also interfering with the Housing Finance Policy Goals of reducing the government's role in housing finance and encouraging the return of private

[39] This part of MGIC's response is intended to address **Question 107** of the NPR.

[40] Securitizers likely will offer detailed cost comparisons between QRM and non-QRM executions in their responses to the NPR, but it is beyond dispute that exempt status for Public MI means no credit risk needs to be retained by law or regulation (hence an incremental cost advantage), and Ginnie Mae securities benefit from a liquid market complete with a "to be announced" capability lacking in private securitization markets (hence an incremental liquidity advantage).

[41] The National Mortgage News reported recently that the FHA is considering a hard cap on its back-end DTI ratio because lenders routinely obtain FHA approval for borrowers with back-end ratios exceeding 50%. Thus, the 43% DTI underwriting guideline provided in the table understates the difference between Public MI DTI ratios and those proposed in the NPR. *See* Kate Berry, "FHA May Clamp Down on Debt-to-Income Ratios," NAT'L MORTG. NEWS, July 7, 2011, http://www.nationalmortgagenews.com/dailybriefing/2010_382/fha-may-clamp-down-on-dti-1025549-1.html.

capital.[42] In short, the Public MI exemption cannot be ignored when considering the dimensions of a QRM definition.

### B. Mortgages Will Be Less Available and More Expensive[43]

MGIC believes that the narrow QRM Definition will make most prudently underwritten private sector mortgages less available and more expensive. They will be less available because the QRM definition is widely expected to establish a "gold standard" for private sector mortgages. Many lenders, especially the community-based lenders, which form an important, long-standing part of MGIC's customer base, have indicated to us that they will gravitate toward this standard and avoid non-QRM loans, regardless of quality.[44] The resulting reduction in consumer choice (and probable increase in market concentration among large lenders) is not insignificant.

Quality, non-QRM loans that are originated will be more expensive due to the costs of implementing the proposed rules. These costs have been estimated to result in a 75- to 100-basis-point interest rate increase to borrowers.[45] The table below contains the monthly payment impact of 75- and 100-basis-point interest rate increases on higher-LTV, non-QRM loans and compares that payment to the monthly payment on FHA loans with similar characteristics. As the table demonstrates, FHA loans are expected to have a considerable pricing advantage over higher-LTV, non-QRM loans with Private MI, effectively pricing those loans out of the market.

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[42] "In addition to winding down Fannie Mae and Freddie Mac, FHA should return to its pre-crisis role as a targeted provider of mortgage credit access for low- and moderate-income Americans and first-time homebuyers." *See* "Reforming America's Housing Finance Market: A Report to Congress," *supra* note 8, at 14. Brent Smith discusses the countercyclical role of FHA in a recent paper on mortgage reform, but curiously does not discuss either Private MI or the issue posed by Dodd-Frank's credit risk retention provision. *See* Brent C Smith, "Mortgage Reform and the Countercyclical Role of the Federal Housing Administration's Mutual Mortgage Insurance Fund," 97 Q.J. Econ. 95 (No. 1, First Quarter 2011), *available at* http://www.richmondfed.org/publications/research/economic_quarterly/2011/q1/pdf/smith.pdf.

[43] This part of MGIC's response is intended to address **Questions 12(a), 12(b), 107, 108, 120 and 143** of the NPR.

[44] Consistent with customer feedback received by MGIC, the mortgage trade press suggests that smaller lenders might not even pursue opportunities to originate loans under the Public MI exemption. *See* Brian Collins, "Costs Hamper Table Funding for Small FHA Lenders," NAT'L MORTG. NEWS, June 23, 2011, http://www.nationalmortgagenews.com/nmn_features/community-banks-higher-fha-costs-1025400-1.html.

[45] *See* Zandi & deRitis, Moody's Analytics, "Reworking Risk Retention" (June 20, 2011), *available at* http://www.economy.com/mark-zandi/documents/Reworking-Risk-Retention-062011.pdf. *See* Appendix C for a discussion of additional estimates of the impact of the NPR on pricing for non-QRM loans.

**Table 11 - FHA Loans vs. Conventional Loans with Private MI – Monthly Payments**

| | | | | | | 75 bp Interest Rate Increase | | 100 bp Interest Rate Increase | |
|---|---|---|---|---|---|---|---|---|---|
| LTV | FICO Score | Today's FHA Note Rate | P&I + FHA MIP | Today's GSE Note Rate | P&I + MGIC MI | Conventional Rate + 0.75% | P&I + MGIC MI | Conventional Rate + 1.00% | P&I + MGIC MI |
| 95% | 720+ | 4.375% | $1,244 | 4.625% | $1,191 | 5.375% | $1,287 | 5.625% | $1,320 |
| | 680-719 | | | 4.750% | $1,254 | 5.500% | $1,350 | 5.750% | $1,383 |
| | 660-679 | | | 5.000% | $1,331 | 5.750% | $1,429 | 6.000% | $1,462 |
| 90% | 720+ | 4.375% | $1,179 | 4.625% | $1,099 | 5.375% | $1,190 | 5.625% | $1,221 |
| | 680-719 | | | 4.750% | $1,135 | 5.500% | $1,227 | 5.750% | $1,258 |
| | 660-679 | | | 5.000% | $1,188 | 5.750% | $1,281 | 6.000% | $1,313 |

Sources and assumptions: $220,000 purchase price; 30-year, fixed-rate mortgage; conventional rates based on recent lender surveys conducted by MGIC; current FHA pricing.

In addition to increasing the cost to borrowers, it is estimated that a 100 basis-point increase in the 30-year, fixed mortgage rate would decrease the number of home sales by 423,000 and decrease the median existing house price by 8.5%.[46]

The NPR may be attempting to solve a problem that, for the most part, no longer exists.[47] Many of the high-risk loan characteristics (no down payment, reduced doc, no doc, sub-prime) that contributed to the housing finance crisis were largely eliminated by the private sector in late 2007 and 2008. Some simply disappeared, and some high-LTV, sub-prime borrowers migrated to Public MI programs. This left private sector loans originated in 2009 relatively free of these high-risk characteristics, with risky loans unlikely to appear on a mass scale for a variety of reasons (*e.g.*, tighter mandated controls over originators; better supervision of non-banks by the newly established Consumer Financial Protection Bureau; new disclosures and representations and warranties regarding the underlying loan pools; and regulatory/investor awareness of linkages between credit default swap/collateralized debt obligations and underlying loan quality). Yet, of the loans originated in 2009 that would have met the proposed QM standard, only 40% would have met the QRM Definition (see Table 16 - QM Loans Qualifying Under Various Underwriting Standards). Meeting the housing needs of the nearly 60% of borrowers who would not have qualified for a QRM will result in one or both of two undesired outcomes – greatly expanding the government's already outsized role in housing finance or making housing more expensive and/or potentially unattainable for a majority of borrowers. The NPR risks excessive deterrence of responsible origination, with costs exceeding benefits.

[46] *Id*.

[47] *See* "Mortgage Reform: Potential Impacts of Provisions in the Dodd-Frank Act on Homebuyers and the Mortgage Market," *supra* note 32. This recent GAO study on mortgage reform confirms this regarding those QM criteria for which data are available.

C. Provides Insufficient Incentives for the Use of Private MI[48]

As described above, Private MI has numerous attributes that make it an important component of housing finance. Yet, the NPR offers only a tentative requirement for Private MI in the Alternative QRM Definition. Given the treatment of Public MI in the NPR,[49] MGIC finds it troubling that the Agencies either would question the effectiveness of Private MI or allow its effectiveness to be measured only by whether Private MI reduces default incidence. It seems incongruous that Congress intended a rigorous (and, in MGIC's view, incomplete) standard for Private MI and none at all for Public MI, especially when the QRM Definition includes provisions related to post-origination loan surveillance and loss mitigation duties — each a core activity of Private MI.[50] Simply relying on Public MI's status as a governmental counterparty does not address the incentives created by Public MI programs and practices. Public MI, Private MI and other forms of credit enhancement should be held to the same standards regarding ability to reduce default risk. Otherwise, use of Public MI runs counter to Dodd-Frank's emphasis on creating incentives to encourage responsible lending and securitization activity.

The NPR's formulation of the use of Private MI is too narrow. Indeed, the FDIC relied on Dodd-Frank's reference to Private MI in its legal justification for including loss mitigation within the ambit of a QRM.[51] Given the strong interrelation between Private MI, loan servicing and loss mitigation, MGIC finds the FDIC's defense of including servicing standards within the QRM Definition equally applicable to Private MI. The FDIC Office of General Counsel argues:

> [t]he only limitations on the scope of the definition of QRM under subsection (e)(4) are (i) that the definition not be broader than the definition of "qualified mortgage" under the Truth in Lending Act; and (ii) (although not explicit), that the definition promote the purposes of Section 941. Subsection (e)(4) leaves the exact contours of the definition to the applicable regulators, and requires only that in formulating the definition, the agencies take into consideration underwriting and product features that historical loan performance data indicate result in a lower risk of default. This provision neither requires that the definition of QRM be limited to factors that data indicate result in a lower risk of default nor requires that all such factors be included in the definition of QRM.[52]

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[48] This part of MGIC's response is intended to address **Questions 166(a)-(b)** of the NPR.

[49] In addition to the exemption afforded loans insured by the Federal insurance/guarantee programs, the NPR proposes extending the exemption from risk retention to state (and sub-state) entities. *See* 76 Fed. Reg. at 24137. These entities should be limited to mission-focused lending or be required to comply with the same loan performance and financial responsibility standards applied to Private MI and other private securitization participants. A "level playing field" reduces risk arbitrage opportunities (*i.e.,* undesirable incentives) and prevents the silent accumulation of credit and operational risk within the US housing finance system.

[50] *See* 76 Fed. Reg. at 24127-28. It also seems incongruous that international entities like the Joint Forum and the Financial Stability Board, in which the Agencies participate, should express a consistent opinion regarding the constructive potential role of Private MI without causing any discussion of that in the NPR. *See supra* note 19.

[51] *See* FDIC Office of General Counsel, "Legal Arguments Supporting Inclusion of Servicing Standards in Risk Retention" 2 (Dec. 13, 2010), *available at* http://www.scribd.com/doc/45822085/FDIC-Legal-Arguments-for-Residential-Servicing-Standards.

[52] *Id*. at 3.

Including a requirement for Private MI in the QRM Definition clearly satisfies the standard articulated by the FDIC, independent of the ability of Private MI to reduce the incidence of default.

As with any insurance business, the ability of Private MI companies to provide broad coverage at reasonable prices requires protection against adverse selection.[53] This is particularly important in the mortgage industry, where the contagion effects of foreclosures create a significant amount of risk correlation between individual borrowers. Non-performing loans have external effects beyond the parties to the transaction; they affect every homeowner who lives near a foreclosed home and, as we have experienced, may affect the entire financial system.[54] Experiences in non-US housing finance systems strongly suggest MI could play a constructive role as part of the prudential guardrails that keep the US housing finance system from crashing.[55] However, in order for Private MI to contribute materially to the maintenance of a vigorous private securitization market for residential mortgages, there must be sufficient incentives to use Private MI. The NPR does not provide any support in that regard.

## V. MGIC's Proposed Standards[56]

### A. MGIC's Proposed Standards Overview[57]

We believe that the above concerns can be mitigated and the Policy Goals achieved by allowing an exemption from risk retention for a broad category of prudently underwritten mortgage loans meeting specific underwriting standards. These underwriting standards require Private MI with independent underwriting standards[58] for low down payment (*i.e.*, >80 LTV) loans. MGIC recommends that the underwriting standards applied to this category of loans include the features shown in the following table under the heading "MGIC's Proposed Standards." For comparison purposes, the table below also contains the features of loans meeting the QRM Definition and the Alternative QRM Definition.

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[53] David Min at the Center for American Progress makes the case for MI's important role in maintaining an orderly and efficient mortgage market in Canada, which he contrasts with the disorderly private securitization market in the US market during inflation of the housing bubble. In Canada, MI is mandatory for all >80 LTV loans extended by federally regulated entities. A mandatory use requirement is one way of protecting against adverse selection. *See* David Min, Center for American Progress, "True North: The Facts about the Canadian Mortgage Banking System" (Aug. 2010), *available at* http://www.americanprogress.org/issues/2010/08/pdf/canadian_banking.pdf.

[54] Econometric theory might not have caught up with the "facts on the ground," but foreclosure contagion constitutes a significant enterprise risk management issue for Private MI companies — as well as to ordinary home owners, it seems. *See* Gerardi, Foote & Willen, "Can We Identify Foreclosure Contagion Effects?", Federal Reserve Bank of Atlanta (May 5, 2010), http://realestateresearch.frbatlanta.org/rer/2010/05/can-we-identify-foreclosure-contagion-effects.html.

[55] *See* Min, *supra* note 53 regarding the positive case for MI. Roger Blood describes the consequences of not protecting Private MI against adverse selection in "Regulation of Mortgage Default Insurance: Principles and Issues," Housing Finance International (March 2009), *available at* http://www.hofinet.org/_docs/A-Blood%20-20Regulation%20of%20Mortgage%20Default%20Insurance.pdf.

[56] This part of MGIC's response is intended to address **Questions 12(b), 106, 110, 114(a), 143, 144(a) and 150(a)-(c)** of the NPR.

[57] This part of MGIC's response is intended to address **Question 119(a)** of the NPR.

[58] *See* Appendix B for a discussion of the impact of the duopoly power of the GSEs on loosening underwriting standards.

**Table 12 - Comparison of Underwriting Standards**

| | QRM | Alt QRM | MGIC's Proposed Standards |
|---|---|---|---|
| Max LTV-Purchase | 80% | 90% | 95% |
| Max LTV-Rate/Term Refi | 75% | 90% | 95% |
| Max LTV-Cash-Out Refi | 70% | 75% | 75% |
| MI Required | n/a | No[59] | LTV>80 |
| Second Lien | Refi Only | All Purp | CLTV≤75 |
| Max DTI Ratio | 36% | 38% / 41% ARM/FRM | 45% |
| Credit | 690 equiv | 690 equiv | 660 equiv |
| Seller Contribution Toward Closing Costs | 0% | 0% | 3% |
| Prepay Penalty | No | No | No |
| Negative Amortization | No | No | No |
| Interest Only | No | No | No |
| Balloon | No | No | No |
| ARM Margins | 2/2/6 | 2/2/6 | 2/2/6 |
| ARM Products | ALL | ALL | ALL |
| Max Term | 30yr | 30yr | 30yr |
| Occupancy | Primary | Primary | Primary |
| Documentation | Full | Full | Full |
| Appraisal | Full | Full | Full |

Before examining the key elements of our Proposed Standards individually, we note that Dodd-Frank and the NPR fail to specify a target default rate for purposes of developing a definition of QRM. Consequently, there is no standard by which we can determine that any set of underwriting guidelines produces an acceptable level of defaults. We believe this is a significant shortcoming of Dodd-Frank, which the NPR compounds by not making the Agencies' assumptions regarding a target rate of default more explicit.

[59] *See* 76 Fed. Reg. at 24129 ("Mortgage guarantee insurance or other types of insurance or credit enhancements provided by third parties could be taken into account in determining whether the borrower met the applicable combined LTV requirement, but such insurance or enhancements would not alter the 90 percent maximum combined LTV for purchase transactions and rate and term refinancings and 75 percent maximum combined LTV for cash-out refinancing.").

For example, in justifying the 80% limit on LTV, the Agencies write, "there is substantial data indicating that loans with LTV ratios of 80 percent or less perform noticeably better than those with LTV ratios above 80 percent." One could substitute any value for "80%" in that sentence and it would still be true, as default incidence generally increases monotonically with respect to LTV. Similarly, the statement, "there is substantial data indicating that loans with LTV ratios of 95 percent or less perform noticeably better than those with LTV ratios above 95 percent" is equally true, and it is equally useful to the determination of the appropriate LTV limit for QRM loans. The Agencies go on to measure the increase in default rates at higher LTV ratios, but they fail to provide a benchmark for an acceptable level of performance. The analysis provided by FHFA also fails to provide such a benchmark.[60]

Given the lack of a benchmark, we offer the following observations regarding the appropriate limits for individual underwriting elements:

- While the marginal impact of individual elements is useful for comparing the relative impact of one element versus another, the effect of all the elements together is the measure most relevant to investors (and, in reality, is the approach taken by originators, securitizers and Private MI companies).

- Congress and the Agencies implicitly set a benchmark with the exemption from risk retention for Public MI that cannot be ignored in setting QRM boundaries.

- An appropriate test of a set of underwriting guidelines is whether the resulting default rates in a severe housing stress scenario would cause undue stress in the financial system, and the Great Recession provides an appropriate test in that regard.

## B. Description of Certain Attributes of MGIC's Proposed Standards

### *1. Loan-To-Value (LTV)*[61]

LTV is both an important risk factor associated with default and a measure of the borrower's own risk exposure in the transaction. Based on more than 50 years of experience, we agree that requiring borrowers to have some "skin in the game" is an important part of housing finance reform. However, we also believe that a 20% down payment requirement is far too restrictive and unfairly disadvantages first-time homebuyers and low- to moderate-income families. As noted above, it would take 14 years for a family earning the median income to save enough for a 20% down payment on a home with the median price. The NPR, in supporting the prohibition of financing of closing costs, notes that, "historical data indicate that borrowers with a meaningful equity interest in their properties exhibit a lower risk of default."[62] In the study referenced,

[60] *See* Appendix E for a critique of FHFA Market Note 11-02 and its application to the question of suitable QRM criteria.
[61] This part of MGIC's response is intended to address **Questions 111(b)-(c) and 120** of the NPR.
[62] *See* 76 Fed. Reg. at 24124.

however, a "meaningful equity interest" amounts to 3%.[63] In our experience, a down payment of 5% combined with other prudent underwriting limits will ensure that qualified borrowers have sufficient incentive to continue making their loan payments as long as they are able. Thus, we recommend an LTV limit of 95%, with LTV defined as the loan amount divided by the lesser of the sales price or appraised value.

Our claim experience illustrates the important relationship between LTV and risk, but it also demonstrates that low down payment lending need not produce default rates that stress the financial system. The following table shows claim rates for loans insured by MGIC from 1998 through 2007 that meet MGIC's Proposed Standards in all respects except LTV.[64]

**Table 13 - Claim Rates of MGIC Insured Loans by LTV (10-year average, 1998-2007)**

| LTV | 80.01-85.00 | 85.01-90.00 | 90.01-95.00 | 95.01-97.00 | 97.01+ |
|---|---|---|---|---|---|
| Claim/Term. Incidence | 1.4% | 2.6% | 3.4% | 4.3% | 5.8% |
| Relative to 90 | 0.5 | 1.0 | 1.3 | 1.7 | 2.2 |
| Diff From 90 | -1.2% | 0.0% | 0.8% | 1.7% | 3.2% |

Reducing LTV does have a modest impact on reducing claim rates. As demonstrated above, reducing the LTV from 95 to 90 reduces the marginal claim rate by 0.8 percentage points. However, this modest increase in quality comes with a consequence to consumers. Lowering LTV from 95 to 90 would eliminate 4% to 7% of borrowers from qualifying for a lower-rate private sector loan without risk retention.[65]

It is important to realize that claim rates in the above table represent the average over 10 years of originations, the last 3 years of which represent the worst performance of our 50-year history. It is also important to bear in mind that our results are significantly affected by the loan purchase decisions of the GSEs. As we demonstrate in Appendix B, those purchase decisions increased the

[63] The population studied consists entirely of loans insured by FHA with LTV > 95%, for which FHA required a 3% minimum cash investment but allowed gifts, grants, and seller contributions to be used to satisfy that requirement. The author's conclusion is that, "[t]he results indicate that borrowers who provide even modest downpayments from their own resources have substantially lower default propensities than do borrowers whose downpayments come from relatives, government agencies, or nonprofits." Austin Kelly, "Skin in the Game: Zero Down Payment Mortgage Default," 19 J. HOUS. RES. 75, (No. 2, 2008), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1330132.

[64] The tables in this section, showing comparative performance by LTV, DTI and FICO score, use the population of loans insured by MGIC from 1998-2007, a period selected because it includes 10 years of history, across widely varying economic conditions, with all loans having sufficient aging to enable accurate comparisons of performance. The population has been re-weighted to ensure a consistent mix of geography, FICO scores and LTVs, and to evenly weight each origination year, to accurately represent the marginal impact of each underwriting attribute. This analysis uses the ever-to-date claim/termination incidence to allow the comparison of performance across origination years. A description of various performance metrics is attached as Appendix F.

[65] Coalition for Sensible Housing Policy White Paper, "Proposed Qualified Residential Mortgage Definition Harms Creditworthy Borrowers While Frustrating Housing Recovery" (July 11, 2011), *available at* http://www.responsiblelending.org/mortgage-lending/policy-legislation/regulators/Coalition-QRM-White-Paper-1.pdf. We believe this impact is understated. During the housing boom, many borrowers who could have made a 5% down payment opted, instead, for 100% financing.

default rates on GSE loans we insured, even as early as 2001. Still, subject to all our other Proposed Standards, even the cumulative claim rates on 97.01+ LTV loans would not have been catastrophic.

### 2. *Down Payment*[66]

MGIC recommends the Agencies change the NPR as it relates to down payment, closing costs and seller contributions to more closely match industry practice and the HUD Handbook. The Agencies relied heavily on the HUD Handbook for determining requirements for down payment, closing costs and seller contributions. Unfortunately, the requirements contain several inconsistencies, both within the NPR and with standard lending practices.

For example, the NPR defines "down payment" for QRMs as an amount that includes both closing costs and the borrower's equity investment in the property.[67] In traditional lending practice, the term "down payment" means the borrower's equity investment in the property, calculated as the difference between the property value (typically the lesser of the sales price or appraised value) and the loan amount. In traditional lending practice, closing costs are a separate item, not regarded as part of the down payment. In the terminology of the HUD Handbook, the "required investment" by the borrower is the combination of the down payment and the closing costs.[68] MGIC recommends that the Agencies use the term "required investment" to eliminate the confusion created by the NPR as written.

The Agencies, in recommending the inclusion of closing costs in the required down payment, express the intent to prevent the dilution of equity through the financing of closing costs. In direct conflict with that intent, however, the NPR allows 100% of the down payment to be sourced from allowed gifts. In his study, Kelly identified gifts and grants as a significant source of dilution of borrower equity,[69] a finding that matches our own experience. MGIC typically requires that some portion of the minimum down payment come from the borrower's own funds. In our experience, as Kelly documented in his study, it is important that borrowers truly have some of their own "skin in the game." We recommend that 3% of the property value come from the borrower's own funds.

Also, the NPR notes that a gift from any person or entity with an interest in the sale of the property, such as the seller, is considered an inducement to purchase and must be subtracted from the sales price.[70] This section clearly comes from the HUD Handbook,[71] but nowhere else in the NPR is there a reference to "sales price." The NPR definition of down payment refers to purchase price and makes no reference to adjustments.

Within standard lending practices, allocation of closing costs is subject to negotiation between the buyer and seller. The NPR requires the calculation of down payment to include these costs,

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[66] This part of MGIC's response is intended to address **Questions 109(a) and 121** of the NPR.
[67] *See* 76 Fed. Reg. at 24167.
[68] *See* HUD 4155.1, Mortgage Credit Analysis for Mortgage Insurance, ch. 2, § A.2.
[69] *See* Kelly, *supra* note 63.
[70] *See* 76 Fed. Reg. at 24174.
[71] *See* HUD, *supra* note 68, at ch. 2 § A.4.a.

with payment to be made exclusively by the buyer. The HUD Handbook allows for the sharing of closing costs between buyer and seller as follows.

> The seller and/or third party may contribute up to six percent of the lesser of the property's sales price or the appraised value toward the buyer's closing costs, prepaid expenses, discount points and other financing concessions.
>
> The six percent limit also includes
>
> - third party payment for permanent and temporary interest rate buydowns, and other payment supplements
> - payments of mortgage interest for fixed rate mortgages
> - mortgage payment protection insurance, and
> - payment of the upfront mortgage insurance premium (UFMIP).
>
> Note: Contributions exceeding six percent are considered inducements to purchase.[72]

Closing costs representing separate and distinct transaction costs incurred for the purchase or financing of the property should not be considered as part of the down payment definition and should be payable by either buyer or seller, subject to a 3% maximum contribution by the seller. While we agree with the HUD Handbook's treatment of seller contributions to closing costs in general, in our experience 3% is a more reasonable limit for prudent lending up to 95 LTV.

Reaction to the expected effects of an 80 LTV limit in the QRM Definition has overshadowed the expected effects of the NPR's treatment of down payment, closing costs and seller contributions. Based on recent experience, we believe the prohibition against seller contributions toward closing costs would have a significant impact on the number of borrowers eligible for QRM loans. 37% of all loans insured by MGIC in the first half of 2011 involved some amount of seller contribution toward closing costs. Regardless of whether the final definition of QRM has an LTV limit greater than 80%, those borrowers would have been ineligible for QRM loans. Further, the prohibition against seller contributions toward closing costs in the QRM Definition would frustrate the Housing Finance Policy Goals because the FHA's more liberal treatment of seller contributions (shown in Table 10 - Comparison of Underwriting Criteria) would drive additional business to the FHA.

Thus, as part of MGIC's Proposed Standards, with regard to down payment, minimum cash investment, closing costs and seller contributions, we recommend that the Agencies more closely adopt the language of the HUD Handbook, with the following exceptions:

- A minimum of 3% of the property value should come from the borrower's own funds (*e.g.*, savings and/or proceeds of sale) to apply to the minimum required investment, with the remainder from allowable gifts or grants.

[72] *See* HUD, *supra* note 68, at ch. 2 § A.3.b.

- Seller contributions should be limited to 3% of the sales price.

We also recommend HUD consider making these changes to the HUD Handbook to ensure consistency between government and private lending and to ensure adequate borrower equity for government-insured loans.[73]

*3. Mortgage Insurance Requirement*

There is a clear rationale for requiring Private MI on loans with LTVs greater than 80% versus simply giving Private MI consideration as suggested in the NPR. As discussed in Section IV, the ability of Private MI companies to provide broad coverage at reasonable prices requires protection against adverse selection. In order for Private MI to contribute materially to the maintenance of a vigorous private securitization market for residential mortgages, there must be sufficient incentives to use Private MI.

Requiring Private MI allows insurers to set and enforce their own underwriting standards without losing business to unsound alternatives. If other forms of credit enhancement are considered by the Agencies, they should be held to the same standard as Private MI regarding their ability to reduce default risk and exhibit other significant attributes that advance the Policy Goals.

*4. Credit*[74]

We agree with the Agencies that rules requiring the use of a particular company's predictive credit score would not be appropriate. We also agree that the use of general guidelines around credit report tradeline history has its own problems. We believe that the QRM credit standards (estimated to be equivalent to a 690 FICO delinquency score)[75] are too restrictive. In combination with the other guidelines in MGIC's Proposed Standards, we believe that credit standards equivalent to a 660 FICO delinquency score[76] would be sustainable through housing cycles and allow for an appropriate level of credit risk. The following table shows claim rates for loans insured by MGIC from 1998 through 2007 that meet MGIC's Proposed Standards in all respects except FICO score.

**Table 14 - Claim Rates of MGIC-Insured Loans by FICO (10-year average, 1998-2007)**

| FICO | 760+ | 720-759 | 700-719 | 690-699 | 660-689 | 350-659 |
|---|---|---|---|---|---|---|
| Claim/Term. Incidence | 1.6% | 2.9% | 4.0% | 4.9% | 5.9% | 8.4% |
| Relative to 690-699 | 0.3 | 0.6 | 0.8 | 1.0 | 1.2 | 1.7 |
| Diff From 690-699 | -3.3% | -2.0% | -0.9% | 0.0% | 1.0% | 3.5% |

[73] Any exceptions to these requirements should be limited to underserved borrowers.
[74] This part of MGIC's response is intended to address **Question 115** of the NPR.
[75] *See* 76 Fed. Reg. 24140.
[76] We do not have access to sufficient tradeline data to enable us to provide the specific set of so-called "derogatory factors" to be contained in § __.15(d)(5) of the proposed rules relating to a borrower who would have an equivalent FICO score of 660.

As with very high-LTV loans, even very low-FICO loans subject to MGIC's Proposed Standards (including the LTV limit) would not have produced catastrophic losses. Loans with FICO scores less than 660 may be approaching that level, however.

### 5. *Debt-to-Income (DTI) Ratio*[77]

DTI (or "back ratio") is an important measure of the borrower's capacity to repay a loan. It is MGIC's experience that this measure captures all the information of the housing-to-income ratio (HTI, or "front ratio"), plus the additional information regarding other indebtedness. Thus, the establishment of both HTI and DTI limits by the Agencies is not necessary to ensure sound underwriting. A DTI alone is sufficient. It is also our experience that there is no single DTI limit that should be applied to all transactions. Ideally, DTI limits should change to reflect trade-offs with other compensating factors and unique borrower circumstances. We recognize, however, that the establishment of prudent underwriting guidelines requires simplification. We believe that the QRM limit of 36% is overly restrictive. MGIC recommends that a limit of 45% be used, which, in combination with the other underwriting limits, marks a prudent maximum level of indebtedness that will enable broad homeownership opportunities without creating undue credit risk. The following table shows the relative claim rates for loans insured by MGIC from 1998 through 2007 that meet MGIC's Proposed Standards in all respects except DTI.

**Table 15 - Claim Rates of MGIC-Insured Loans by DTI (10-year average, 1998-2007)**

| DTI | 1%-33% | 34%-36% | 37%-39% | 40%-42% | 43%-45% | 46%+ |
|---|---|---|---|---|---|---|
| Claim/Term Incidence | 2.3% | 3.0% | 3.0% | 3.4% | 3.6% | 4.0% |
| Relative to 34%-36% | 0.8 | 1.0 | 1.0 | 1.1 | 1.2 | 1.3 |
| Diff From 34%-36% | -0.7% | 0.0% | 0.0% | 0.4% | 0.6% | 1.0% |

Increasing the DTI limit would not result in catastrophic levels of losses.

### 6. *Loan Purpose*[78]

A substantial contributing factor to the housing crisis and subsequent financial crash was the withdrawal of home equity by large numbers of households.[79] It is apparent that some unscrupulous lenders took advantage of the ease of cash-out refinance transactions to prey on struggling or uninformed homeowners. MGIC's Proposed Standards are intended to enable creditworthy purchasers to achieve homeownership, not enable homeowners to strip equity from their homes. Consequently, we agree with the conclusion of the Agencies that cash-out refinance transactions should be subject to lower LTV limits than other transactions. We do not agree, however, that rate/term refinance transactions should be subject to lower LTV limits than

[77] This part of MGIC's response is intended to address **Question 123** of the NPR.
[78] This part of MGIC's response is intended to address **Question 120** of the NPR.
[79] Alan Greenspan and James Kennedy estimated that equity extraction peaked in 2004 at a seasonally adjusted annualized rate of $800 billion. Greenspan & Kennedy, Federal Reserve Board of Governors, "Estimates of Home Mortgage Originations, Repayments, and Debt On One- to Four-Family Residences" (Sept. 2005) *available at* http://www.federalreserve.gov/pubs/feds/2005/200541/200541pap.pdf.

purchase transactions. The ability to refinance a home to lower monthly payments or to reduce the term of the loan is an important component of household financial flexibility and does not reduce the borrower's incentives to continue making payments. Indeed, this assumption is central to the Home Affordable Refinance Program and much of the recent borrower activity regarding "cash-in" refinances (in which borrowers seek to reduce the amount owed and/or the amortization term on a non-distressed basis).[80] Based on an analysis of CoreLogic data reported by the Community Mortgage Banking Project, almost 25 million homeowners (52% of homeowners with mortgages) would be denied a QRM upon refinancing because they have less than 25% equity in their homes.[81] Therefore, we recommend the same 95 LTV limit for non-cash-out refinance transactions.

*7. Second Liens*

The abuse of second lien loans also made a substantial contribution to the housing crisis by enabling borrowers to convert their home equity into cash.[82] The extraction of equity increases the probability of default and interferes with the servicing of the first lien loan without compensating the investor in the first lien loan for this additional risk.[83] While prudent use of home equity lending is an important component of our economic health, the use of second lien loans to evade prudent lending and capital requirements, and the effect this activity has on senior lien holders and insurers, warrants stricter controls.[84] To ensure appropriate accountability, we recommend the Agencies limit the risk retention exemption to structured or piggyback loans with a combined LTV of 75% or less.

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[80] As the FHFA explained HARP, "[i]n fact, credit risk would be reduced because, after the refinance, the borrower would have a lower monthly mortgage payment and/or a more stable mortgage payment." Letter from James B. Lockhart, Director, Fed. Hous. Fin. Agency to Suzanne Hutchison, EVP, Mortg. Ins. Co. of Am. (Feb. 20, 2009), *available at* http://www.fhfa.gov/webfiles/1256/HutchinsonGSERefi22009.pdf. "Cash-in" versus "cash-out" refinance activity is followed closely by market commentators. *See*, *e.g.,* "Freddie Mac: Very Low Cash-Out Refinance Activity," CalculatedRiskBlog, (June 12, 2011, 1:20 PM), http://www.calculatedriskblog.com/2011/06/freddie-mac-very-low-cash-out-refinance.html.

[81] Center for Responsible Lending, Community Mortgage Banking Project, Mortgage Bankers Association, Mortgage Insurance Companies of America, National Association of Home Builders, and the National Association of Realtors, White Paper Prepared in Advance of April 14, 2011 House Subcommittee on Capital Markets and Government Sponsored Enterprise Hearing, "Proposed QRM Harms Creditworthy Borrowers and Housing Recovery" (Apr. 13, 2011), *available at* http://www.mbaa.org/files/ResourceCenter/MIRA/QRMWhitePaper.pdf.

[82] Home equity loan balances increased by $538 billion from 2003 to 2007. *See* Federal Reserve Release, FFA Coded Tables, L.1 Credit Market Debt Outstanding, T. 218 (Mar. 8, 2007), *available at* http://www.federalreserve.gov/releases/z1/20070308/Coded/coded-4.pdf.

[83] *See, e.g.*, "5/12/11 Testimony of Laurie Goodman, Amherst Securities Group, to the Subcommittee on Housing, Transportation and Community Development: Topic-National Mortgage Servicing Standards and Conflicts of Interest," *available at* http://banking.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=484c5b2b-6924-459f-898e-3ae075feeb15: Robbie Whelan, "Second-Mortgage Misery," Wall St. J. June 7, 2011.

[84] The distinction is not always easy to make on a prospective basis, but we would submit there is a clear policy difference between borrowing to support a small business (good) and borrowing simply to avoid a mortgage insurance credit enhancement requirement (not good). *See* James A. Wilcox, "Securitization and Small Business," FRBSF Economic Letter (July 18, 2011), http://www.frbsf.org/publications/economics/letter/2011/el2011-22.html. SMR Research Corporation estimated that, in the first half of 2004, 32.8% of all home purchase transactions in California used a piggyback structure, with over 95% of them having CLTV>80%. MGIC contract underwriting data, covering $15.6 billion of loans originated on a national basis during that period, corroborates the SMR Research results. Of all purchase transactions we underwrote for others in that period, 34.6% were piggyback structures with CLTV>80%.

## C. Impact of Implementing MGIC's Proposed Standards[85]

Each of MGIC's Proposed Standards, on its own, reflects a common-sense, prudent underwriting standard, developed over decades of experience through multiple regional and national economic cycles. As so many industry participants have commented over the last year, however, underwriting standards must be considered as a whole, rather than individually, to make a meaningful statement about default risk. Collectively, MGIC's Proposed Standards produce a loan population that is expected to be significantly larger than the QRM Definition and somewhat larger than even the Alternative QRM Definition, but MGIC's Proposed Standards are likely to produce the "very high credit quality" desired by the Agencies (since MGIC's Proposed Standards have been tested with data from a more severe housing downturn than that experienced during the Great Depression). In addition, adoption of MGIC's Proposed Standards, combined with sufficient disincentives for lending outside these standards, would substantially reduce the possibility of a similar downturn while reducing the government's role in housing finance. Following is a more detailed discussion of each of these and other benefits of MGIC's Proposed Standards.

### *1. Increases Access to Credit on Reasonable Terms*[86]

MGIC's Proposed Standards provide more customers with access to credit on reasonable terms and address liquidity concerns surrounding the possible effect of the QRM Definition on private market securitizations. Put in historical terms, MGIC's Proposed Standards would have allowed 30% to 60% of the market to be securitized without risk retention mandated by Dodd-Frank.[87] At the same time, there is still an adequate population of non-QRM loans for securitization liquidity purposes.

Table 16 below illustrates the potential impact of MGIC's Proposed Standards on availability of mortgage credit. This table shows that for all loans in the CoreLogic servicing database originated from 2001 through 2010 and meeting the QM definition,[88] on average only 25% would have met the QRM Definition and only 33% would have met the Alternative QRM

[85] This part of MGIC's response is intended to address **Questions 146(b) and 148** of the NPR.
[86] This part of MGIC's response is intended to address **Questions 12(a), 107, 108 and 146(a)** of the NPR.
[87] Investors remain free to specify suitable levels of credit enhancement and risk retention. Advocates and detractors of particular QRM definitions sometimes disregard the importance of market preferences, which are likely to ensure that the risk retained under both "zero risk retention" and "minimum risk retention" scenarios are greater than that provided for by Dodd-Frank and the NPR.
[88] *See supra* note 5 for additional information concerning our decision to consider only loans meeting the QM definition.

Definition.[89] On average, 39% of the same loans would have met MGIC's Proposed Standards. The proposed rules are likely to have a negative impact on the availability and pricing of non-QRM mortgages. Consequently, we expect that the percentage of non-QRM loans will shrink and the percentage of QRM loans will rise, but it is not possible to project what percentage of the market will qualify for any given definition of QRM. Instead, we can only project how much bigger the QRM population could be if limits are eased. For example, in 2009 and 2010, despite the fact that some prudently underwritten loans would not have qualified under MGIC's Proposed Standards, those standards would have resulted in a 43-45% larger loan population exempt from risk retention compared to the QRM Definition and a 3%-7% larger loan population compared to the Alternative QRM Definition. However, because underwriting standards in effect over the last two years have been more restrictive than in the remainder of the decade, the more relevant comparison would be to the earlier years of the decade or the average across all years. For the average across all years, the Proposed Standard would have resulted in a 54% larger loan population exempt from risk retention compared to the QRM Definition, and a 16% larger loan population compared to the Alternative QRM Definition.

**Table 16 - QM Loans Qualifying Under Various Underwriting Standards**

| | QRM | Alt QRM | MGIC Prop Std |
|---|---|---|---|
| 2001 | 21.2% | 29.1% | 36.3% |
| 2002 | 27.7% | 36.3% | 43.1% |
| 2003 | 28.8% | 37.6% | 43.1% |
| 2004 | 18.6% | 23.9% | 29.6% |
| 2005 | 17.2% | 22.0% | 27.1% |
| 2006 | 17.7% | 22.7% | 28.1% |
| 2007 | 18.8% | 25.3% | 31.6% |
| 2008 | 25.4% | 37.5% | 44.6% |
| 2009 | 39.8% | 55.2% | 56.7% |
| 2010 | 39.4% | 53.5% | 57.2% |
| Average | 25.1% | 33.3% | 38.8% |

Source: Genworth Mortgage Insurance Corp. analysis using data from CoreLogic, Inc. servicing database

[89] Another Private MI company, Genworth Mortgage Insurance Corp., generously shared its analytic work on QRM market sizing and performance for the entire (low and high-LTV) market, using the CoreLogic Inc. (NYSE: CLGX) servicing database. *See supra* notes 31-32. The CoreLogic database was chosen for this analysis because Genworth is a subscriber to CoreLogic and not to LPS. MGIC does not currently subscribe to either data provider. Genworth applied a Qualified Mortgage (QM) filter, using data elements available within the CoreLogic data that represent what they believe to be the loan characteristics that would be excluded from either version of the proposed QM definition, specifically negative amortization, interest-only, low documentation, and >30-year amortization. It is important to note that details related to seller contributions to closing costs are not available in the CoreLogic data and, therefore, no loans have been excluded on that basis. Any impact of limits to seller contributions would further reduce the percentage of loans qualifying under the various underwriting standards. We believe that the QM-qualifying population best represents the universe of loans likely to be securitized after the QM rules are finalized.

Thus, the Proposed Standards increase access to credit on reasonable terms without eliminating liquidity in the non-QRM market on a risk-justified basis.

### 2. *Ensures Low Default Rates Through Prudent Underwriting Standards*[90]

The following table compares ever-to-date default/claim rates[91] for loans meeting the QRM Definition, Alternative QRM Definition and MGIC's Proposed Standards, and for all Fannie Mae and FHA loans originated 2001 through 2007. While MGIC's Proposed Standards result in somewhat higher default rates than the QRM Definition and the Alternative QRM Definition, the default rates are still well within reasonable expectations for low-credit-risk loans under a severe stress scenario, and they are substantially less than those experienced by Fannie Mae and FHA.[92] It is also worth noting the close match in performance between our Proposed Standards and Fannie Mae in 2001, and the subsequent widening performance gap as the GSEs substantially expanded their guidelines.

**Table 17 - Ever-to-Date Default/Claim Rates**

| | QRM | Alt QRM | Prop Std | Fannie Mae | FHA |
|---|---|---|---|---|---|
| 2001 | 0.48% | 0.66% | 1.10% | 1.20% | 6.50% |
| 2002 | 0.36% | 0.48% | 0.74% | 1.10% | 5.42% |
| 2003 | 0.39% | 0.50% | 0.71% | 1.15% | 4.86% |
| 2004 | 0.72% | 0.88% | 1.22% | 2.20% | 5.55% |
| 2005 | 1.49% | 1.73% | 2.31% | 4.11% | 6.32% |
| 2006 | 2.11% | 2.47% | 3.20% | 6.85% | 5.66% |
| 2007 | 1.94% | 2.52% | 3.41% | 6.85% | 3.73% |

Sources: Genworth Mortgage Insurance Corp. analysis using data from CoreLogic, Inc. servicing database; Fannie Mae 2011 First Quarter Supplement; and Actuarial Review of the Federal Housing Administration Mutual Mortgage Insurance Fund (Excluding HECMs) for Fiscal Year 2010. Loans originated after 2007 have not been included because they have not had sufficient loss development for their default rates to be meaningful.

In addition to the Genworth analysis reflected in the table above, we also would refer to the results of a study from Moody's Analytics using MGIC data.[93] MGIC worked with Moody's to generate a loan performance profile for loans originated in the bubble years 2006 through 2007.

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[90] This part of MGIC's response is intended to address **Question 145** of the NPR.

[91] For the CoreLogic and Fannie Mae data in this section of the response, "default rate" is defined as the percentage of loans originated in a particular year that are terminated with a status of 90 days past due or worse. For FHA data, "claim rate" is defined as the percentage of loans insured in a particular year for which a claim has been received. Consequently, the FHA percentages shown likely underestimate default rates comparable to the other columns in the table. *See* Appendix F for a discussion of mortgage performance metrics and a comparison of default rates and claim rates.

[92] The apparent improvement in performance of FHA loans in 2006 and 2007 should be interpreted with care. Foreclosure delays have caused ever-to-date claim rates for those years to be substantially below the expected lifetime rates. The FHA 2010 Actuarial Review projects lifetime claim rates for 2006 and 2007 to be 18.1% and 20.2%, respectively.

[93] *See* Zandi & deRitis, Moody's Analytics Special Report "The Skinny on Skin in the Game" (Mar. 11, 2011), *available at* http://www.economy.com/mark-zandi/documents/QRM_030911.pdf.

The resulting profile of high-LTV loans meeting MGIC's Proposed Standards performed better than the FHA and Fannie Mae profiles presented above. The performance results are presented in the table below.

**Table 18 - Foreclosure Rate by Down Payment**

| Orig Year | 15% | 10% | 5% |
|---|---|---|---|
| 2006-2007 | 2.4% | 3.3% | 4.0% |

Thus, from a public policy perspective, MGIC's Proposed Standards preserve credit opportunities for ordinary borrowers without exposing the US housing finance system to an imprudent level of default risk.

### *3. Reduces Government's Role in Housing Finance*

Congress required the Department of the Treasury to prepare a report on housing finance reform with a view toward encouraging the return of private capital to the US housing finance system. In that report, Treasury declared a goal of reducing FHA's market share from nearly 30% (at the time of its report) to 10% to 15%.[94] Although FHA reform has been discussed periodically by regulators and politicians, little progress has been made to reduce Public MI's market presence.[95] Giving Public MI a permanent competitive advantage over Private MI is not consistent with Treasury's goal of reducing FHA's market share. In fact, it is reasonable to expect FHA's market share to increase if loans with Public MI are exempt from risk retention and loans with Private MI are not and if loans with Public MI have looser underwriting standards than QRM loans. The October 2010 report by the Federal Reserve on the impact of risk retention requirements concluded that the rules would not have a substantial impact on FHA lending.[96] The analysis cited in that report, however, considered only the historical universe of nonconforming, privately securitized mortgages. The risk retention rules must be considered in the context of the entire

[94] *See* "Reforming America's Housing Finance Market: A Report to Congress," *supra* note 8, at 14.

[95] *See supra* notes 40-41 above. FHA's recent premium rate increases have increased the competitiveness of Private MI from a borrower perspective, but this advantage has been partially offset by the recent delivery fee increases by the GSEs. *See, e.g.*, Testimony of Peter Skillern, US Senate Committee on Banking, Housing & Urban Affairs Hearing on Housing Finance Reform: Access to the Secondary Market for Small Financial Institutions 3-5 (June 28, 2011), *available at* http://banking.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=46124bbf-6c42-4ec4-b21b-256af568d234&Witness_ID=f3e79b96-c18e-4756-957c-1fa68d2cee21. The FHA has not changed its credit criteria or processes, which are considered more liberal than its Private MI counterparts. Other Public MI programs also have not enacted material changes to their programs intended to reduce their respective market presence. Robert Van Order and Anthony Yezer note that reductions in FHA loan limits scheduled to occur later this year will not result in a material shrinkage of FHA market share, and thus recommend more concerted action to reduce FHA (and Public MI) to comport with its traditional mission of serving low- and moderate-income borrowers. *See* Van Order & Yezer, George Washington University Center for Real Estate and Urban Analysis, "FHA Assessment Report: The Role of the Federal Housing Administration in a Recovering US Housing Market" 10 (June 2011), *available at* http://business.gwu.edu/creua/research-papers/files/FHA2011Q2.pdf. In short, Public MI is not shrinking significantly as a result of market competition, legislative reform or self-initiated action.

[96] Board of Governors of the Federal Reserve System, "Report to the Congress on Risk Retention" 78 (Oct. 2010), *available at* http://federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf.

market (including the GSEs and Public MI) and the stated goals of the Administration to replace Freddie Mac and Fannie Mae with alternatives that rely on greater levels of private capital.

As discussed in Section IV, implementing the proposed rules is expected to give FHA loans a considerable pricing advantage over higher-LTV, non-QRM loans with Private MI, effectively pricing private alternatives out of the market. Exempting from risk retention loans meeting MGIC's Proposed Standards would allow the private sector to compete more fairly against Public MI. This is vital to reducing the FHA's market share. MGIC's Proposed Standards also increase borrower choice and create desired market alternatives to Public MI, which will help encourage more innovation and competitive service from Public MI.

### *4. Sets a Reasonable Standard for Prudent Underwriting*[97]

Existing rules and laws that involve prudent underwriting do not include limits on factors such as DTI or LTV, except to require Private MI for loans above certain LTV thresholds.[98] All low down payment loans, even if they would be considered prudently underwritten, would fall outside the QRM Definition, and the majority would fall outside of the Alternative QRM Definition. Historically, regulators and Congress have treated all prudently underwritten residential mortgage loans as safe, low-risk assets, subject to reduced capital requirements relative to other assets. This treatment has always been regarded as the rule for residential mortgage lending, with loans not meeting the standard treated as the exception. The post-bubble, post-GSE housing finance system will need a new standard, and public comments have made it very clear that the final QRM definition is expected to serve that role. The final QRM definition should represent a standard for prudent underwriting that is more consistent with the historical treatment of prudently underwritten mortgage loans and better aligned with the regulation of mortgage loans that are held in portfolio or guaranteed by the GSEs.[99] MGIC's Proposed Standards reinforce regulatory/supervisory consistency and establish a new, reasonable market standard at the same time, both important concerns of financial reform. Congress, commentators and the Agencies themselves have expressed concerns regarding the volume of new financial regulatory initiatives required by Dodd-Frank, so an approach that emphasizes continuity should be welcomed.[100] Encouraging consistency in quality of loans between those held in portfolio and

[97] This part of MGIC's response is intended to address **Question 145** of the NPR.

[98] *See, e.g.*, 12 C.F.R. 365 app. A to Subpart A, *available at* http://www.fdic.gov/regulations/laws/rules/2000-8700.html.

[99] Absolute consistency might be difficult to obtain, but an approach that includes prudently underwritten loans (subject to any "qualified mortgage" definitional adjustments) and excludes "nontraditional" ones is a better starting point than the QRM Definition. *See, e.g.*, Joint Press Release, "Federal Financial Regulatory Agencies Issue Final Guidance on Nontraditional Mortgage Product Risks" (Sept. 29, 2006), available with summary and embedded links at http://www.federalreserve.gov/newsevents/press/bcreg/20060929a.htm.

[100] *See, e.g.*, "Remarks by John Walsh, Acting Comptroller of the Currency, to the Housing Policy Council of the Financial Services Roundtable" (May 19, 2011), *available at* http://www.occ.gov/news-issuances/speeches/2011/pub-speech-2011-60.pdf.

those securitized would be an important step toward re-establishing the confidence of investors in the integrity of private securitizations.[101]

## VI. Alternatives for Implementing MGIC's Proposed Standards[102]

The Agencies can implement MGIC's Proposed Standards in any of the following ways (each of which is allowed under Section 15G and discussed in more detail below):

- Conform the definition of "Qualified Residential Mortgage" to MGIC's Proposed Standards, as allowed by Section 15G(e)(4)(B)(iv) (our recommended approach);
- Allow an exemption from risk retention requirements for loans complying with MGIC's Proposed Standards, as allowed by Section 15G(e)(1); or
- Allow zero risk retention for a low-credit-risk category of loans (those complying with MGIC's Proposed Standards), as allowed by Section 15G(c)(1)(B)(ii).

### A. Qualified Residential Mortgage Definition[103]

Our recommended approach is to conform the final QRM definition to MGIC's Proposed Standards. This approach is recommended because:

- It is the least complex way to meet the Policy Goals;
- It is consistent with the intent for QRM as expressed in the legislative history and the letters recently sent to the Agencies by members of Congress (discussed below); and
- It creates a single standard that can be used across all mortgage lending.

MGIC acknowledges this approach advocates using the QRM exemption from risk retention to foster a market rule rather than a narrow exception.[104] However, MGIC suggests that use of a narrow exception approach fails to resolve the negative consequences arising from the combination of the narrow QRM Definition with the broad Public MI exemption from risk retention. The divergence in loan performance standards between the QRM Definition (and the Alternative QRM Definition) and Public MI creates an unsustainable, imbalanced set of incentives to use Public MI. Divergence in qualifying loan standards undermines the Risk

[101] Indeed, the GSEs could help facilitate market acceptance of, and transition to, the new market standard by incorporating the Proposed Standards into their pending Uniform Mortgage Data Program developed in conjunction with FHFA. See Uniform Mortgage Data Program, EFANNIEMAE.COM, https://www.efanniemae.com/sf/lqi/umdp/. (Fannie Mae) (last visited July 27, 2011); Uniform Mortgage Data Program, FREDDIEMAC.COM, http://www.freddiemac.com/sell/secmktg/uniform_mortgage.html (Freddie Mac) (last visited July 27, 2011).

[102] This part of MGIC's response is intended to address **Questions 12(b) and 144(c)** of the NPR.

[103] This part of MGIC's response is intended to address **Questions 106 and 143** of the NPR.

[104] See Joe Adler, "Should QRM Loans Be the New Normal?" AM. BANKER (June 6, 2011), http://www.americanbanker.com/news/qrm-loans-new-normal-1038454-1.html.

Retention Goals, and incentives to use Public MI undermine the Housing Finance Policy Goals. In contrast, the MGIC Proposed Standards support both Risk Retention and Housing Finance Policy Goals.

Conforming the final QRM definition to MGIC's Proposed Standards is consistent with Section 15G and its legislative intent.[105] Section 15G(e)(4) states in relevant part:

> (B) The [regulators] shall jointly define the term 'qualified residential mortgage' for purposes of this subsection, taking into consideration underwriting and product features that historical loan performance data indicate result in a lower risk of default, such as —
>
> > … (iv) mortgage guarantee insurance or other types of insurance or credit enhancement obtained at the time of origination, to the extent such insurance or credit enhancement reduces the risk of default …

As shown in Section III.E. of this response, Private MI reduces the risk of default and, therefore, satisfies Section 15G(e)(4)(B)(iv). Further, MGIC's Proposed Standards, taken as a whole, represent underwriting and product features that historical loan performance data indicate result in a lower risk of default, thereby satisfying the broader requirements of Section 15G(e)(4)(B).

Section 15G(e)(4)(C) requires the definition of QRM to be no broader than the definition of QM. MGIC's Proposed Standards meet that requirement.

As noted above, the legislative history behind Section 15G indicates that it was intended to create incentives that will prevent a recurrence of the excesses and abuses that preceded the housing crisis, restore investor confidence in asset-backed finance, permit securitization markets to resume their important role as sources of credit for households and businesses, ensure high underwriting standards, encourage appropriate risk management practices and improve access to credit on reasonable terms. By reducing default and credit risk as discussed in Sections III.E. and F., while at the same time expanding the population of loans eligible for exemption from risk retention, MGIC's Proposed Standards meet each of these stated goals. MGIC's Proposed Standards also satisfy the Housing Finance Reform Goals by reducing the incentive for borrowers and lenders to choose Public MI over private capital.

Additional information regarding the legislative intent of Section 15G was provided by members of Congress in a May 31, 2011, letter to the Agencies,[106] which stated in relevant part:

> We strongly urge you in this process to consider lower down payment loans that have mortgage insurance (MI) as constituting a QRM.

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[105] Ray Natter recently published an instructive overview of Section 941's legislative history related to residential mortgages. See Natter, Barnet, Sivon & Natter Perspectives, "What Was the Legislative Intent Behind the QRM?" (June 2011), *available at* http://www.bsnlawfirm.com/newsletter/OP0611_3.pdf. Natter's summary of the legislative history provides no support for the NPR's treatment of low down payment mortgages, especially those insured with Private MI.

[106] *See* "Letter from the United States Congress," *supra* note 25.

> Section 941 of the Dodd-Frank Act specifically names "mortgage guarantee insurance" as one of the factors to be included in the QRM definition. The law recognizes that private capital does not exclusively come from a lender or an investor; it can be provided by a private mortgage insurer. The QRM regulations should reflect this important reality, which was Congress' intent in clarifying this point in the Act. As we seek to ensure sustainable homeownership supported by the private sector, it should not go unnoticed that loans with private mortgage insurance default less often than uninsured loans. Mortgage insurers provide additional scrutiny on a loan application, supplementing the lender's review. In addition, mortgage insurers have well-established procedures that have been shown to mitigate and cure loan deficiencies. These safeguards protect lenders and investors while keeping families in their homes. This is important to consider as we seek ways to create sustainable homeownership opportunities for Americans through the private sector with less reliance on government-supported mortgage finance products.

It is clear that a significant number of members of Congress view the legislative intent of Section 15G as allowing low down payment loans to be a part of QRM, so long as Private MI is included. Also important is that the members of Congress apparently did not view the Alternative QRM Definition, with its possibility of allowing 10% down payment loans with Private MI, as adequate. We agree.

In addition to the legislative intent of Section 15G described above, senators involved in the drafting of the QRM provisions of Dodd-Frank and their colleagues provided additional information regarding the intent of Section 15G in a May 26, 2011, letter to the Agencies,[107] which stated in relevant part:

> We the undersigned intended to create a broad exemption from risk retention for historically safe mortgage products when we included the Qualified Residential Mortgage (QRM) exemption in the Dodd-Frank Wall Street Reform and Consumer Protection Act.
>
> The statute requires the QRM definition to be based on "underwriting and product features that historical loan performance data indicate result in a lower risk of default," and provides clear guidance on the types of factors that can be used, including:
>
> - Documentation of income and assets;
> - Debt-to-income ratios and residual income standards;
> - Product features that mitigate payment shock;

[107] Letter from the United States Congress (May 26, 2011), *available at* http://www.sec.gov/comments/s7-14-11/s71411-40.pdf.

- Restrictions or prohibitions on non-traditional features like negative amortization, balloon payments and prepayment penalties; and

- Mortgage insurance on low down payment loans.

MGIC's Proposed Standards satisfy the intent articulated by the Senators because the Proposed Standards expand the population of loans eligible for exemption from risk retention with underwriting and product features that historical loan performance data indicate result in a lower risk of default.

The FDIC stated in its "Legal Arguments Supporting Inclusion of Servicing Standards in Risk Retention"[108] that Section 15(e)(4) requires only that, in formulating the definition of QRM, the Agencies take into consideration underwriting and product features that historical loan performance data indicate result in a lower risk of default and that Section 15(e)(4) neither requires the definition of QRM be limited to factors that data indicate result in a lower risk of default nor requires that all such factors be included in the definition of QRM. Adopting MGIC's Proposed Standards, including a requirement for Private MI, satisfies the standard articulated by the FDIC, independent of the ability of Private MI to reduce the risk of default.

Thus, historical loan performance, legislative intent and Agency interpretation support conforming the final QRM definition to MGIC's Proposed Standards.

### B. Exemption from Risk Retention for Loans Insured by Private MI[109]

Dodd-Frank permits the Agencies to allow exemptions, exceptions or adjustments to the rules issued under Section 15G. The Agencies' authority is conditioned by the need to show that any exemption, exception or adjustment (1) helps ensure high-quality underwriting standards for the securitizers and originators whose assets are securitized or available for securitization; and (2) encourages appropriate risk management practices by the securitizers and originators of assets, improves the access of consumers and businesses to credit on reasonable terms or otherwise is in the public interest and for the protection of investors.[110]

MGIC suggests creating an exemption from risk retention for loans that comply with MGIC's Proposed Standards for the following three reasons.[111]

- Implementing MGIC's Proposed Standards (with the requirement for Private MI on high-LTV loans) meets the statutory test of helping to ensure high-quality underwriting

[108] *See* "Legal Arguments Supporting Inclusion of Servicing Standards in Risk Retention," *supra* note 51.
[109] This part of MGIC's response is intended to address **Question 163** of the NPR.
[110] 15 U.S.C.A. § 78o-11(e)(1)-(2).
[111] Even a partial acceptance of MGIC's proposals underlines the need for this exemption. For example, the alternative definition of a QRM presented in the NPR (at 24129, Questions 143-49) would exclude more than 50% of MGIC's recently underwritten business. More than 79% of the FHA's 2010 business was written at LTVs greater than 90%. Ignoring this reality is inconsistent with advancing the Housing Policy Goals and increasing the role of private capital in low down payment lending.

standards and encouraging appropriate risk management practices by securitizers and originators of assets. As explained above, the Private MI oversight process — beginning with a comprehensive risk management review of lenders wanting to become master policyholders, and continuing through loan surveillance and loss mitigation in conjunction with servicers — is not duplicated by any other non-governmental entity in the housing finance system.[112] Private MI's unique role is important for advancing the Policy Goals.

- Implementing MGIC's Proposed Standards meets the statutory test of improving the access of consumers to credit on reasonable terms and is otherwise in the public interest. There are substantial policy arguments for supporting a "level playing field" between Private MI and Public MI. Consumer choice, particularly when the choice offers a less expensive Private MI alternative to the borrower, is in the public interest. Consumer choice is frustrated when rules favor Public MI without any compelling reason for doing so.

- The functional and structural differences between Private MI and Public MI do not justify the beneficial treatment afforded Public MI in the NPR. Dodd-Frank simply exempts "any residential mortgage loan asset… which is insured or guaranteed by the United States or an agency of the United States."[113] Neither the legislative history of Dodd-Frank nor any independent objective data have established the superiority of Public MI from a credit risk management perspective. Indeed, recent interest shown in FHA reform (and actions already taken to create a formal risk management role, for example) are founded in material part on the long-standing need to equip the FHA and Rural Housing Service guarantee programs with the underwriting and risk management tools already used by Private MI companies.[114] The variety of Public MI program requirements makes it difficult to explain why there should be a blanket risk retention exemption (and the consequent NPR preference) for Public MI. Public MI coverage requirements vary from the 100% credit risk assumption by the FHA and Native American loan guarantee

[112] In contrast, three other entities commonly cited as facilitators of the private securitization process — rating agencies, due diligence companies, and securitization trustees — do not put any capital at risk when performing their services, unlike Private MI companies. Rating agencies, due diligence companies and securitization trustees also condition performance of their services on substantial legal protections, so the rescission rights maintained by Private MI companies are no more substantial. As noted in Footnote 19 above, the Joint Forum's recent recommendations for improving incentive alignment in securitization included the use of mortgage insurance. *See* "Report on asset securitisation incentives," *supra* note 19, at 29-30.

[113] 15 U.S.C.A. § 78o-11(e)(3)(B).

[114] Recent legislative proposals to reform FHA and consolidate the Rural Housing Service guarantee program arguably would reduce the scope of Public MI, but would not address borrower cost, affordability or choice issues associated with non-QRM status. See, e.g., Discussion Draft on FHA-Rural Regulatory Reform Improvement Act of 2011, 112 Cong., 1st Sess., *available at* http://financialservices.house.gov/UploadedFiles/fha_rural.pdf. The Discussion Draft proposes to grant the FHA indemnification authority which the FHA has requested for some time. *See, e.g.*, "FHA Reforms, Legislative Proposals, and Contributions to the HUD FY 2011 Budget," testimony of (then) FHA Commissioner David Stevens before the House Financial Services Subcommittee on Housing and Community Opportunity 10 (Mar. 11, 2010), *available at* http://archives.financialservices.house.gov/media/file/hearings/111/stevens_testimony-hud.pdf. The results revealed by the HUD Inspector General's "Operation Watchdog" suggest material risk management issues remain regarding FHA, the largest part of Public MI. *See* http://www.hudoig.gov/pdf/Internal/2011/cf1801.pdf. Similar issues affect the Rural Housing Services' guarantee fund. *See* http://www.usda.gov/oig/webdocs/04703-2-CH%281%29.pdf.

programs to the 25% to 50% assumption by the Veteran's Administration and even lesser amounts by the MI programs of state housing finance programs.[115] Because the Public MI exemption is a statutory one provided by Dodd-Frank, "leveling the playing field" requires regulatory action by the Agencies.

MGIC's suggestion to create an exemption from risk retention for loans that comply with MGIC's Proposed Standards is consistent with the Housing Finance Policy Goal favoring an increasing role for private capital. Lenders simply do not offer low down payment loans without additional security such as Private MI or Public MI. Proof of this statement is demonstrated by the FHA's dramatic increase in new business when Private MI companies revised credit guidelines and reduced underwriting capacity in 2008 amidst turbulent mortgage credit conditions (shown above in Table 1). There is no other scalable alternative to MI for management of the credit risk associated with low down payment lending. If federal housing policy wishes to emphasize private capital, the issue of Public MI must be addressed.

### C. Zero Risk Retention for Low-Risk Category of Mortgage Loans[116]

Dodd-Frank permits securitizers to retain less than 5% of the credit risk of a securitization transaction if the loans included in the securitization were originated pursuant to "underwriting standards established by the Federal banking agencies that specify the terms, conditions, and characteristics of a loan within the asset class that indicate a low credit risk with respect to the loan."[117] This Dodd-Frank provision has been referred to as the "low credit risk" (LCR) alternative to the general 5% risk retention requirement.

The NPR proposed 0% risk retention in a variety of asset classes for loans which met specified underwriting standards.[118] The NPR, however, did not propose an LCR alternative for residential mortgages. The Agencies reasoned that QRM could be substituted for a LCR residential mortgage.[119] MGIC respectfully disagrees. The Agencies' conclusion ignores a statutory command to establish LCR underwriting standards for residential mortgages.

Indeed, Dodd-Frank expressly refers to QRM and LCR categories as distinct within the same paragraph. Section 15G(c)(1) states in relevant part:

> The regulations prescribed… shall-

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[115] *See* 76 Fed. Reg. at 24136. The Agencies suggest that loans insured by Public MI and securitized by a private entity would be treated as exempt. *See id.* at 24137. MGIC supports this reasoning even if it is extremely unlikely that a private securitizer would be willing to match Ginnie Mae's guarantee fee of 6 basis points. See Frequently Asked Questions, GINNIEMAE.GOV, *available at* http://www.ginniemae.gov/media/ginnieFAQ.asp?Section=Media (last visited July 28, 2011). However, MGIC also urges the Agencies to clarify that a securitization guaranteed by Ginnie Mae (i.e., "the United States or any agency of the United States") that includes loans insured by Private MI also would qualify for exemption from risk retention. Such an alternative might offer attractive possibilities to reduce the role of Public MI in the US housing finance system.

[116] This portion of MGIC's response addresses **Questions 150(a)-(d)** of the NPR.

[117] *See* 15 U.S.C.A. § 78o-11(c)(1)(B)(ii), (c)(2)(B).

[118] *See* 76 Fed. Reg. at 24129-136.

[119] *See Id*. at 24130.

(B) require a securitizer to retain-

(ii) less than 5 percent of the credit risk **for an asset that is not a qualified residential mortgage**… if the originator of the asset meets the underwriting standards prescribed under paragraph (2)(B)[120] (emphasis added).

The failure to propose an LCR alternative for residential mortgages in the NPR is important in two respects:

- First, as the Agencies note in the NPR, the narrow QRM Definition will result in many prudently underwritten loans being treated as non-QRM loans.[121] Even adoption of the Alternative QRM Definition would leave many prudently underwritten loans — primarily loans not meeting either the LTV or DTI limits — as non-QRM. Genworth Mortgage Insurance estimates about 66% of QM loans would be considered non-QRM under the Alternative QRM Definition.[122] Creating an LCR alternative allows for risk-based differentiation among non-QRM loans and encourages originators to produce, and securitizers to package, pools of excellent credit quality loans pursuant to defined standards. Such an approach would advance the Risk Retention Policy Goals. The NPR's proposed creation of an undifferentiated category of non-QRM loans does not create a similar incentive.

- Second, and equally important, the Agencies proposed a 0% risk retention requirement for other asset classes in the NPR. MGIC believes a similar 0% risk retention requirement is warranted for securitizations of LCR loans meeting MGIC's Proposed Standards. Dodd-Frank did not specify any maximum number or percentage of loans or securitization transactions which might be designated as requiring 0% risk retention. Rather, the 0% risk retention designation was intended to create a strong incentive to produce high-credit-quality loans and securitization transactions — in the case of LCR loans by requiring adherence to strict underwriting standards. Additionally, a 0% risk retention requirement would reduce the Public MI advantage arising under the NPR. A higher risk retention requirement would reduce the effectiveness of the LCR alternative as a response to the Public MI policy issue. In effect, originators and securitizers would be offered a choice between (1) complying with strict underwriting standards and still retaining risk, or (2) selecting less rigorous Public MI standards and retaining no risk. The outcome is predictable. Thus, MGIC's proposed LCR alternative results in a better risk management outcome than the NPR "no-LCR" alternative. Such an approach would advance the Housing Finance Policy Goals. The NPR's proposed 5% risk retention requirement for all non-QRM loans does not create a similar result.

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[120] *See* 15 U.S.C.A. § 78o-11(c)(1)(B)(ii). MGIC's response is not intended to be a sustained legal response, but MGIC would note that general principles of statutory construction require the Agencies to give effect to distinct categories referred to in a statute. *See generally*, Yule Kim, CRS Report to Congress, "Statutory Interpretation: General Principles and Recent Trends" 23 (Aug. 31, 2008), *available at* http://www.fas.org/sgp/crs/misc/97-589.pdf.

[121] *See* 76 Fed. Reg. at 24118.

[122] *See*, Table 16 - QM Loans Qualifying Under Various Underwriting Standards, *supra*.

The LCR alternative makes it easier for the Agencies to consider the full value of Private MI as well. Unlike the QRM Definition (and the Alternative QRM Definition), in which the NPR appears to consider Private MI primarily in terms of reducing default incidence,[123] the LCR alternative clearly allows for any factors which result in low credit risk to investors, measured by both the incidence of default and the severity of loss given default.

Credit risk is distinct from default incidence and is defined in the NPR[124] to mean:

> (1) The risk of loss that could result from the failure of the borrower in the case of a securitized asset …to make required payments of principal or interest on the asset … on a timely basis;
>
> (2) The risk of loss that could result from bankruptcy, insolvency, or a similar proceeding with respect to the borrower …; or
>
> (3) The effect that significant changes in the underlying credit quality of the asset … may have on the market value of the asset ...

As shown above, independent of its ability to reduce incidence of default, the use of Private MI at the specified coverage levels shown in Section III.F. reduced credit risk to investors to minimal levels.

Although there is no statutory requirement that LCR loans produce the same credit risk profile as QRM loans to obtain 0% risk retention treatment, MGIC's Proposed Standards are intended to produce similar or better credit loss results than loans meeting the QRM Definition — and therefore equally deserve a 0% risk retention designation. The important difference between the NPR and MGIC's approach is that MGIC's approach creates the possibility of 0% risk retention for loans not meeting the final QRM definition, and does so on a robust credit risk management footing.

The LCR alternative is consistent with both the Dodd-Frank and NPR intent to reward responsible behavior and address overarching housing policy concerns. Underwriting standards must be followed, or the desired risk retention treatment could be lost (for purposes of simplicity, MGIC suggests the LCR alternative use the NPR's proposed approach for maintaining QRM status).[125] Liquidity should be abundant, since MGIC estimates the LCR alternative with MGIC's Proposed Standards would cover many prudently underwritten loans outside the QRM Definition.

To the extent liquidity concerns persist, the Agencies should allow commingling of LCR loans with QRM loans in hybrid pools.[126] The combination of excellent estimated performance from

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[123] *See* 76 Fed. Reg. at 24119.
[124] *See id*. at 24156.
[125] *See id*. at 24128-24129.
[126] In that regard, MGIC differentiates its recommendation to allow commingling of loans from two categories of loans exempt from risk retention from other recommendations that have been made to allow commingling of loans from exempt and non-exempt categories of loans. Adopting MGIC's Proposed Guidelines would produce a sufficiently large population of exempt loans that liquidity should not be a concern.

loans complying with MGIC's Proposed Standards and the additional credit protection provided by Private MI will result in very low-credit-risk loan pools for investors. Finally, MGIC would note the LCR alternative helps address competitive and consumer choice concerns posed by the Public MI exemption by offering borrowers a Private MI alternative. If the Agencies do not accept MGIC's suggestion to conform the final QRM definition to MGIC's Proposed Standards, we urge the Agencies to fulfill the Dodd-Frank obligation to create an LCR alternative and assess a 0% risk retention requirement.[127]

## VII. Additional Recommendations

### A. Treatment of Private MI as an Allowed Form of Risk Retention[128]

Dodd-Frank requires the Agencies to specify permissible forms of risk retention.[129] The Agencies proposed a number of risk retention forms in the NPR, either related to general forms of retention for use in any securitization or forms customary to specific asset classes. MGIC urges recognition of Private MI as a permissible form of risk retention so that residential mortgage loans insured by Private MI would be considered to have met any applicable risk retention requirement. Recognition is justified on statutory, industry custom and public policy-based grounds.

The statutory rationale for recognition of Private MI as a form of risk retention under Dodd-Frank is straightforward. Dodd-Frank generally requires "securitizers" or "originators" to retain risk, but also provides for entities other than securitizers or originators to retain risk. For example, Dodd-Frank refers to "retention of the first-loss position by a third-party purchaser." within the context of the commercial mortgage asset class.[130] Strictly speaking, a "purchaser" cannot be said to have retained risk, but to have acquired it as part of a purchase transaction.[131] Private MI companies, while not originators, securitizers or "purchasers," are third-parties which historically have performed an important credit risk management role assuming first-loss positions for a fee. The distinction between being a "purchaser" (not defined in Dodd-Frank) or an insurer is not a meaningful one for purposes of defining risk retention. Both parties have an economic interest in ensuring good credit outcomes. Put simply, both have "skin in the game."

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[127] The GAO also linked the narrowness or broadness of the final QRM definition to the value of creating an LCR alternative. *See* "Mortgage Reform: Potential Impacts of Provisions in the Dodd-Frank Act on Homebuyers and the Mortgage Market," *supra* note 32, at 44-46. However, the GAO did not consider the issue of Public MI in relation to the LCR alternative, and in MGIC's view greatly overestimates the effect of recent premium rate increases and underwriting changes. *See id*. at 48-49. If the Agencies accept MGIC's approach to revising the QRM Definition, MGIC believes the Agencies still should create an LCR alternative on the grounds of statutory integrity and as a "QRM ante-room" in which the Agencies might experiment with new residential mortgage products and Private MI coverage combinations. Under this approach, MGIC recommends a risk retention percentage greater than 0%.

[128] This portion of MGIC's response addresses **Questions 12(b), 14(a)-(b), 19(a)-(b), 90 and 144(b)** of the NPR.

[129] 15 U.S.C.A. § 78o-11(c)(1)(C)(i).

[130] *Id*. at (c)(2)(E)(ii). Senator Crapo proposed recognition of B-piece buyers as a risk retention method as a secondary amendment to the original QRM amendment offered by Senators Landrieu, Isakson and Hagan. See 156 CONG. REC. 3569, 3590-92 (2010).

[131] In terms of actions taken, Merriam-Webster's dictionary defines "purchase" as "to obtain by paying money or its equivalent," *available at* http://www.merriam-webster.com/dictionary/purchaser, compared with the definition of "retain" as "to keep in possession," *available at* http://www.merriam-webster.com/dictionary/retain.

Thus, there is a statutory basis for recognizing Private MI as a form of risk retention for residential mortgages.

The industry custom rationale for recognition of Private MI as a form of risk retention is equally straightforward. Dodd-Frank rightly considered long-standing industry practices in the commercial mortgage asset class when it recognized the role of B-piece purchasers as a unique and important source of risk retention. The industry custom case for Private MI rests on an even longer use of Private MI as a credit risk management tool whose use pre-dates modern private securitization structures for residential mortgages.[132] Private MI has been successful through multiple economic cycles because it significantly aligns interests, promotes the use of sound underwriting practices and ensures wide availability of reasonably priced credit for homebuyers.

The public policy rationale for recognizing MI as a permissible form of risk retention has three facets:

- First, as noted above, Private MI provides 2 to 7 times more credit risk retention than Dodd-Frank's 5% risk retention requirement. Thus, the credit risk retained by Private MI companies and not transferred to investors is substantial by Dodd-Frank's (or the NPR's) measure. Credit risk held by Private MI companies generally isn't disappearing or even being diffused through a series of offsetting transactions by multiple investors (as is usually the case with credit derivatives, for example). Private MI companies retain the credit risk as "long" investors (subject to use of reinsurance for portfolio management purposes, which is reviewed by state insurance regulators).

- Second, the credit risk held by a Private MI company is typically for the practical life of a loan.[133] Securitizers are likely to argue for lesser risk retention periods than are provided for in the NPR.[134] Recognition of Private MI as a permissible form of risk retention will not weaken loan-level surveillance for the entire life of the loan while a lesser risk retention period for securitizers might.

- Third, Private MI would be a useful counterweight to other permissible forms of risk retention. The other forms confer an information advantage on the securitizer relative to determining costs, efficiencies and other return-maximizing considerations that is not necessarily consistent with the incentive alignment goal of Section 15G.[135] Risk retention

[132] Indeed, Peter Elmer argues that Bill Lacy of MGIC was a member of the three-person group responsible for helping to create the private securitization market for residential mortgages, which is the subject of this rulemaking. See Peter J Elmer, "Conduits: Their Structure and Risk, FDIC Banking Review" (Dec. 1999), *available at* http://www.fdic.gov/bank/analytical/banking/1999dec/2_v12n3.pdf.

[133] Under the Homeowners Protection Act of 1998, Pub. L. No. 105-216, 112 Stat. 897, lenders normally are required to cancel borrower-paid mortgage insurance once the loan amortizes down to 78 LTV (based on original property value), typically 8-10 years after origination. This holding period for the credit risk assumed is substantially longer than those proposed for securitizers by some responses to the NPR.

[134] *See* Question 102(a) of the NPR, 76 Fed. Reg. at 24117.

[135] Susan Wachter and Adam Levitin have made similar points regarding the danger of information asymmetries in residential mortgage securitization and suggest Private MI might supply part of the policy response to reducing or managing such asymmetries. See Adam J. Levitin & Susan M. Wachter, "Explaining the Housing Bubble," Georgetown Business, Economics and Regulatory Law Research Paper No. 10-16 at 69, n. 217 (Aug. 31, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1669401.

threatens to become a structuring game for entities with an information advantage and a strong incentive to use it. A Private MI company's incentive is to insure those loans with the best opportunity of not defaulting or causing loss when a foreclosure is completed, an incentive consistent with the underlying aims of Section 15G.

It is not surprising the Treasury and the Federal Reserve each raised third-party credit enhancement providers like Private MI as a risk retention possibility in their reports on risk retention.[136] There are substantial, time-tested reasons to support recognition of Private MI as a permissible form of risk retention.

B. Appropriate Levels of Risk Retention[137]

MGIC strongly urges the Agencies to increase the level of risk retention required for loans that do not meet MGIC's Proposed Standards. Loans that fall outside MGIC's Proposed Standards will be potentially unsafe, and their origination should be discouraged more strongly than is currently provided in the NPR.

The NPR requires 0% risk retention on a small portion of the market and 5% risk retention on the remainder. We believe this fails to provide the correct incentives for prudent lending and against imprudent lending. Under the NPR, imprudent loans will require 5% risk retention as will many prudent loans (because many prudent loans will fall outside the QRM Definition). By implementing MGIC's Proposed Standards and increasing the level of risk retention on loans outside those standards, the Agencies will create strong incentives in favor of prudent lending and against imprudent lending.

In addition to increasing the level of required risk retention, MGIC also urges the Agencies to give consideration to the different marginal incentives created by horizontal, vertical and L-shaped slices. A horizontal, first-loss piece of the credit risk creates substantial incentives for the issuer to ensure high-quality loans only so long as losses are less than the level of risk retained. For example, if the issuer retains 5% of the credit risk in a horizontal, first-loss layer, they incur 100% of the losses up to 5%. Beyond that point, they incur none of the losses and, thus, have no incentive for further control of quality. If the issuer expects the losses on the pool to be 5% or more, there is effectively no incentive for them to ensure high-quality loans, and there is also likely to be no impact on the pricing of those loans. On the other hand, if the issuer expects the losses to be substantially less than 5%, they will have strong incentive to ensure quality, and there is also likely to be an impact on the pricing of the loans. This suggests the ironic result that the rules, as proposed, could have more of an impact on the pricing of prudently underwritten loans than they do for high-risk loans. In order to avoid this problem, the level of risk retention must be more sensitive to the level of risk inherent in the pool being securitized. This is accomplished more effectively if the population of exempt loans is widened sufficiently such that the loans for which retention is required are more homogenous in their risk profile.

[136] *See* Geithner, *supra* note 7, at 23-24; Report to the Congress on Risk Retention, *supra* note 7, at 84.
[137] This part of MGIC's response is intended to address **Questions 10, 11, 14(a)-(b), 143 and 144(a)-(c)** of the NPR.

The vertical slice option, while presenting less marginal incentive to the issuer, has the advantage of providing a constant incentive, regardless of the losses. For this reason, we recommend that the Agencies require securitizers of loans outside MGIC's Proposed Standards retain L-shaped slices of risk, in which the horizontal, first-loss piece covers substantially all of the expected losses on the pool, and the vertical piece of the remainder creates sufficient incentive for the issuer to ensure high quality when losses exceed expectations.

### C. Financial Requirements Applicable to Private MI[138]

The Agencies asked what financial eligibility standards should be used for Private MI companies if Private MI were included within the final QRM definition or another exemption, exception or adjustment to the general risk retention provision. MGIC suggests using the framework of state insurance regulation and the substance of the National Association of Insurance Commissioners (NAIC) Model Act on Mortgage Guaranty Insurance (the Model Act) by including a requirement that a Private MI company be in regulatory good standing in its state of domicile.

Insurance remains primarily a matter of state regulation under the terms of the McCarran-Ferguson Act.[139] Although Congress may choose to override state insurance regulation, and has under certain compelling circumstances, Congress did not intend to do so under Dodd-Frank. Instead, Congress encouraged a system of higher-level oversight in the form of insurance representation on the Financial Stability Oversight Council and the Federal Insurance Office.[140] Additionally, the Treasury recently announced plans to form a Federal Advisory Committee on Insurance.[141] Establishing separate federal financial requirements for Private MI for purposes of implementing the risk retention rules is inconsistent with the current regulatory approach being taken.

Thus, the Agencies should look to the state insurance regulatory and supervisory framework for substantive standards and enforcement of those standards regarding Private MI. The NAIC will

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[138] This part of MGIC's response is intended to address **Questions 112(a)-(b) and 151** of the NPR. Although Questions 112(a) and 151 solicit responses regarding Private MI or "other types of insurance or credit enhancements." MGIC offers its response only regarding Private MI for two reasons. First, insurance regulation generally discourages different regulatory approaches to the same fundamental risk, so it is unlikely any comparison to another insurance product would be an "apples to apples" one. Second, regarding non-insurance credit enhancement, the possibilities are many, but the same issue of a true comparison remains. To the extent the Agencies receive other responses to these questions, MGIC would be willing to submit supplemental materials comparing Private MI with the alternative offered.

[139] 15 U.S.C. 1011 *et seq*.

[140] Title I, Section 111(b)(1)(J) and (b)(2)(C) of Dodd-Frank establish insurance representation on the Financial Stability Oversight Council. Title V, Section 502 of Dodd-Frank establishes the Federal Insurance Office. Title X also excludes "the business of insurance" as "a financial product or service," suggesting a legislative intent to defer to the state insurance regulatory system on both solvency and consumer protection issues. *See* Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat 1376, §§ 1002(3), 1002(15)(C)(i).

[141] *See* Notice of establishment of the Federal Advisory Committee on Insurance (FACI) and solicitation of applications for committee membership, 76 Fed. Reg. 28129, (May 13, 2011), *available at* http://www.gpo.gov/fdsys/pkg/FR-2011-05-13/pdf/2011-11857.pdf.

continue to act as a coordinating body for formulating and updating insurance regulation, including an ongoing comprehensive review of solvency regulation.[142]

In preparing its Model Act, the NAIC collected best practices suggested by the "Alger Report"[143] and the regulatory experiences of the various states with Private MI. The Model Act includes financial and operational risk management requirements to address the challenges posed by an insurance contract providing long-term default loss protection on residential mortgage credit. Most notably, the Model Act mandates:

- A mono-line form, to isolate the risk from other lines of insurance and improve transparency for policyholders;

- Additional protections against conflicts of interest, including limitations on insuring affiliates and paying commissions;

- Enterprise risk management protections, including measures to discourage geographic concentrations of risk and investment restrictions to discourage "doubling down" on mortgage credit risk; and

- An integrated capital and reserving approach, beginning with risk-to-capital/minimum policyholder provisions, contingency reserves (in which 50% of earned premium is held for 10 years against a catastrophic risk event), limited dividending authority and a progressive reserving policy intended to promote periodic disclosure and discussion of reserve adequacy.

The Model Act (or at least material portions of it) has been adopted for use by insurance regulators in all jurisdictions in which Private MI companies currently active in the US are domiciled.[144] The Model Act has been used by other financial regulators in recent years for guidance regarding prudential standards for start-up mortgage insurance industries. For example,

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[142] The NAIC has established multiple regulatory initiatives in connection with Dodd-Frank financial regulatory reform. *See* State Regulatory Initiatives, NAIC.ORG, http://www.naic.org/index_financial_reform_section.htm (last visited July 27, 2011). More particularly regarding financial requirements, the NAIC is in the midst of reviewing its risk-based approach to insurance company solvency in response to similar efforts from the Basel Committee on Banking Supervision and the European Union's "Solvency II" initiative for insurance companies. *See* Solvency Modernization Initiative, NAIC.ORG, http://www.naic.org/index_smi.htm (last visited July 27, 2011).

[143] See Report to his Excellency Herbert H. Lehman, Governor of the State of New York, by George W. Alger, Appointed under the Executive Law to Examine and Investigate the Management and Affairs of the Insurance Department with Respect to the Operation, Conduct, and Management of Title and Mortgage Guarantee Corporations under its Supervision (New York, 1934). For a good recent summary of the Alger Report and subsequent Private MI regulation, *see* Promontory Financial Group, LLC, "The Role of Private Mortgage Insurance in the US Housing Finance System" (Jan. 2011), *available at* http://www.promontory.com/assets/0/78/110/286/974d1fb8-ac46-413e-a62a-4b5472f4df14.pdf.

[144] These jurisdictions include Arizona, North Carolina, Pennsylvania and Wisconsin, as well as important states based on Private MI premiums generated such as California, Illinois and New York. See NAIC Model Laws, Regulations and Guidelines (April 2011), table of contents *available at* http://www.naic.org/documents/committees_models_table_of_contents.pdf. By "material portions" we mean use of a mono-line form to transact business, specified risk-to-capital or minimum policyholder position provisions, and maintenance of catastrophic contingency reserves.

Mexico used the Model Act and US experience to establish a mortgage insurance industry.[145] Fannie Mae and Freddie Mac each have used the Model Act to create eligibility requirements for their Private MI credit risk counterparties.[146] Thus, the state insurance regulatory system continues to benefit from the Model Act's conceptual guidance, and the Model Act continues to remain the global standard for MI regulation.

For this reason, MGIC suggests that an appropriate requirement for Private MI companies should be maintenance of "good standing" with their domiciliary regulator. Within the context of a multi-state regulatory system, the domiciliary regulator asserts the most supervisory authority, receives the most financial and operating information, undertakes periodic financial/operational assessments and makes judgments on qualitative aspects not easily reduced to a "requirement." The domiciliary regulator is the linchpin of the state insurance regulatory system. Regulators in other jurisdictions also exert authority by setting licensing requirements to which Private MI companies must comply in order to do business within that jurisdiction and by participating in periodic financial and market conduct examinations of Private MI companies transacting business on a multi-state basis.

In summary, MGIC recommends using the time-tested state insurance regulatory framework as the means to monitor Private MI companies for compliance with the risk retention provision. The framework has evolved a robust substantive understanding of the unique risks presented, and the multi-state system has produced a pool of knowledgeable regulators. No other alternative is as attractive or even promising.

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MGIC appreciates the opportunity to comment on the NPR. The Agencies' task to complete a final rule on credit risk retention is not easy, especially regarding residential mortgages, where the ongoing market downturn, the question of GSE reform and the appropriate balance between private capital and government intervention remain unresolved. To that end, MGIC has proposed a broader QRM definition, which we believe is consistent with restoring a robust housing market fueled by responsible lending and investors who can be confident that painful lessons learned are not soon forgotten. A robust housing market needs low down payment borrowers and a revitalized private securitization market, to fund those low down payment borrowers, needs Private MI. Otherwise, borrowers will face fewer and more expensive choices;

[145] See Carlos Serrano, "Public and Private Partnerships in Mortgage Insurance: Lessons from Mexico's SHF Experience," Housing Finance in Emerging Markets Conference (World Bank: Mar. 2006), *available at* http://info.worldbank.org/etools/library/latestversion.asp?218132.

[146] Fannie Mae's "MI Approval Requirements" are available at https://www.efanniemae.com/is/mis/miapprovalreqs.jsp. Freddie Mac's "Private Mortgage Insurer Eligibility Requirements" are available at http://www.freddiemac.com/singlefamily/pdf/mireqs.pdf. Both Fannie Mae and Freddie Mac have used these requirements in an advisory rather than a binding capacity recently, and each is in the process of updating their requirements. However, each has relied heavily on the Model Act for development of their requirements, and it is likely any update will retain that reliance.

the incentives of originators, securitizers and investors will not be aligned as envisioned by Congress and the Agencies; and efforts to reduce the scope of government intervention in housing finance will become harder. We hope that our response has presented the role of Private MI and our recommendations clearly. Questions and requests for further information or clarification should be directed to me or Eric Klopfer (Eric_Klopfer@mgic.com, 919-455-1497), Ted Durant (Ted_Durant@mgic.com, 414-347-2625) or Martha Tsuchihashi (Martha_Tsuchihashi@mgic.com, 414-347-6865).

Sincerely,

Curt S. Culver
Chief Executive Officer

## Appendix A

## Index of Defined Terms

## Appendix B

## Evolution of Automated Underwriting Systems and Mortgage Origination Practices

### Development of GSE Automated Underwriting Systems

1999 to 2008 represents a decade of significant changes in mortgage origination practices. The results of these changes have been far reaching, contributing to the housing bubble, the collapse of residential real estate and the associated financial market distress. At the heart of these changes lies the use of automated underwriting systems (AUS). AUS were initially established to assist loan underwriters to make credit decisions (*i.e.*, assuming the data entered into the system is valid, should the loan be made?), but eventually dictated the underwriting process and the gathering and validation of supporting information (*i.e.*, what needs to be done to check the accuracy of the information submitted to the system?). The use of AUS made the mortgage-lending process significantly more efficient, enabling the industry to grow from just over $1 trillion of originations in 1999 to nearly $4 trillion in 2003. That efficiency came with a significant, deferred cost, however, in the form of significant increases in loan defaults.

Freddie Mac introduced Loan Prospector (LP) in 1995 and stated that its new technology would produce a simpler, fairer and more affordable approach to mortgage-lending decisions.[147] Freddie Mac estimated that LP was saving originators $400 per application and it was reducing the approval time "from weeks to days."[148] Fannie Mae introduced Desktop Underwriter (DU) in 1998.

### Delegation of Insurance Approval to GSE Automated Underwriting Systems

By 1999, Freddie Mac and Fannie Mae had taken such a large share of the conventional, conforming market, that the Private MI companies were increasingly pressured by customers and the GSEs to delegate insurance approval to DU and LP. Beginning in 2000, loans approved by DU or LP were automatically approved for MGIC mortgage insurance (subject to the validity of the data) even if the loans were outside of MGIC's published guidelines. Beginning in 2007, certain loans outside MGIC's underwriting guidelines were not automatically approved for MGIC insurance even if they were approved by DU and LP.

### Performance Differences - GSE Automated Underwriting Systems vs. MGIC Underwriting Guidelines

As the chart in Figure 1 shows, from 2000 to 2007, the percentage of MGIC-insured loans approved by DU and LP rose from 14% to 65%. Loans approved by DU and LP from 2004 through 2007 that were outside our published guidelines have experienced approximately twice the default incidence as loans within our guidelines. This performance illustrates the impact our guidelines could have made if they had been enforced and the importance of requiring mortgage insurers to apply independent underwriting judgment.

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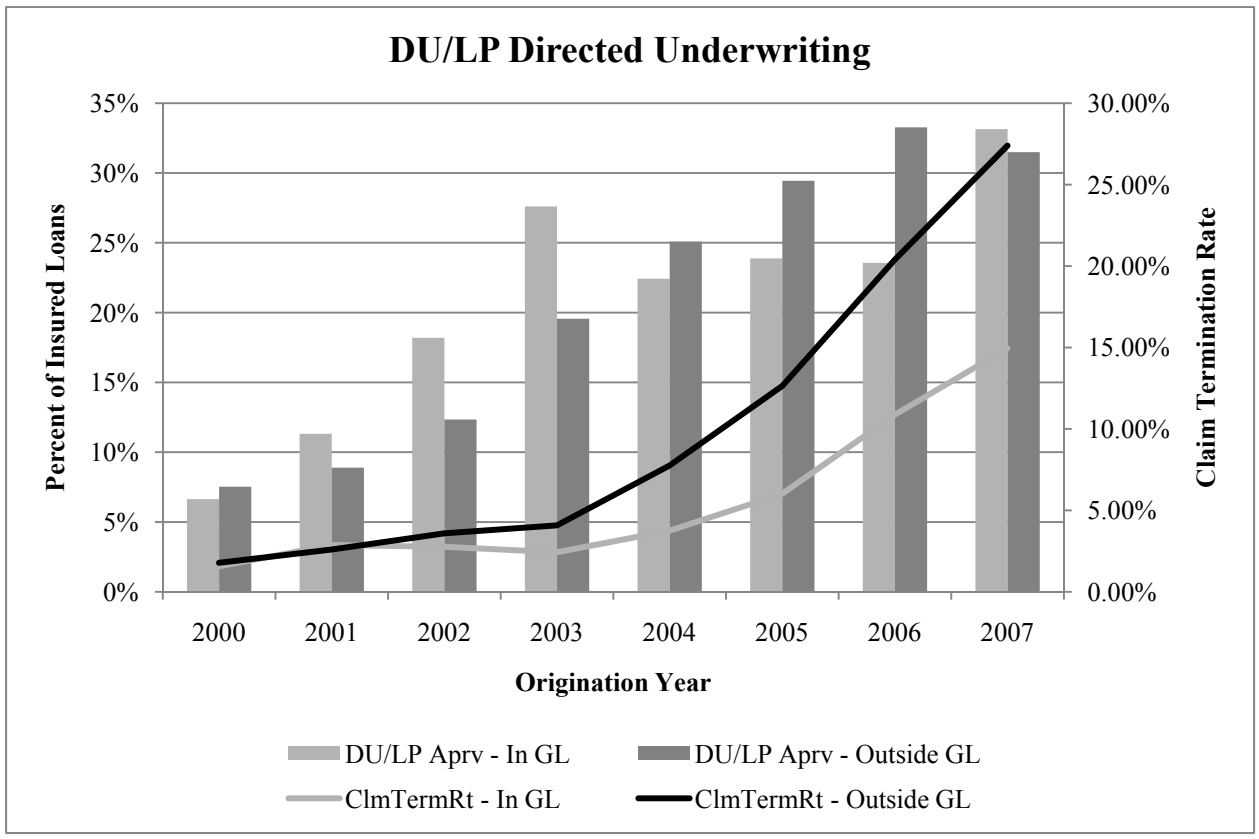
[147] Peter E. Mahoney & Peter M. Zorn, 1996 Mortgage Market Trends, "The Promise of Automated Underwriting," (1996), *available at* www.freddiemac.com/finance/smm/nov96/pdfs/mhnyzorn.pdf.
[148] Id.

**Figure 1**




Evolution of the Documentation and Validation of Inputs into the GSE Automated Underwriting Systems

The large volume of refinancing in 2003 proved the value of AUS in enabling a dramatic increase in loan origination activity. Quarterly originations of new mortgages in the third quarter of 2003 reached $1.2 trillion, compared to $238 billion in the first quarter of 2000,[149] a five-fold increase in the course of three years. That simply could not have happened without the use of AUS and without radically lowering the expectations around documentation and validation of the three Cs (collateral, character and capacity) of mortgage underwriting. The GSEs began waiving documentation requirements for highly qualified borrowers in the late 1990s. By 2006, with the blessing of AUS, they were purchasing loans with virtually no documentation from a significant number of borrowers, including those with high LTVs and low FICO scores. The processes used to originate the large volume of loans and the habits they engendered exposed the weakness of automated approval: misrepresentation and fraud. Mortgage borrowers and lenders seeking the quickest path to funding apparently found it all too tempting to adjust a few inputs to the AUS to obtain the desired "Approve" outcome. The lack of resources devoted to quality control reviews

[149] See Rajdeep Sengupta & Yu Man Tam, Economic Synopses, Federal Reserve Bank of St. Louis "Mortgage Originations — 2000-2006" (2008), *available at* http://research.stlouisfed.org/publications/es/08/ES0818.pdf.

by many participants in the mortgage-lending industry meant that the probability of misrepresentation or fraud being discovered prior to default was very low. As awareness of this weakness grew, exploitation of it grew as well.

Consequences of Misrepresentation and Fraud in Loan Origination

The consequences of misrepresentation and fraud relevant to mortgage securitization and risk retention include the following. First, a finding of fraud or misrepresentation may trigger a request for the seller to repurchase the loan at par value, causing no loss to the investors. Details vary by securitization deal, but for GSE pools, the GSE, as guarantor, must pursue the seller for remedies. Second, misrepresentation or fraud related to a loan with Private MI may allow the insurer to rescind coverage. The mortgage servicer must then pursue a claim against the originator. Further, the rescission of mortgage insurance may trigger a repurchase request by the GSE to the seller. It is important to note that insurance rescissions are not an indication of the failure of the insurance companies to honor their obligations. On the contrary, mortgage insurance policies specifically allow rescission in order to protect the rights of policyholders with valid claims. Misrepresentation and fraud represent operational risk associated with the mortgage origination,[150] which under many circumstances is not covered by mortgage insurance.

Thus, the existence of representations and warranties, along with Private MI, should establish a strong incentive to originators to prevent the occurrence of misrepresentation and fraud, but only if the repurchase and rescission events have financial consequences and the originators are required to be adequately capitalized for those consequences. The lack of capital required to be held against contingent repurchase liabilities in the past may have resulted in unintended parties, such as the GSEs, "holding the bag" for poor origination practices.

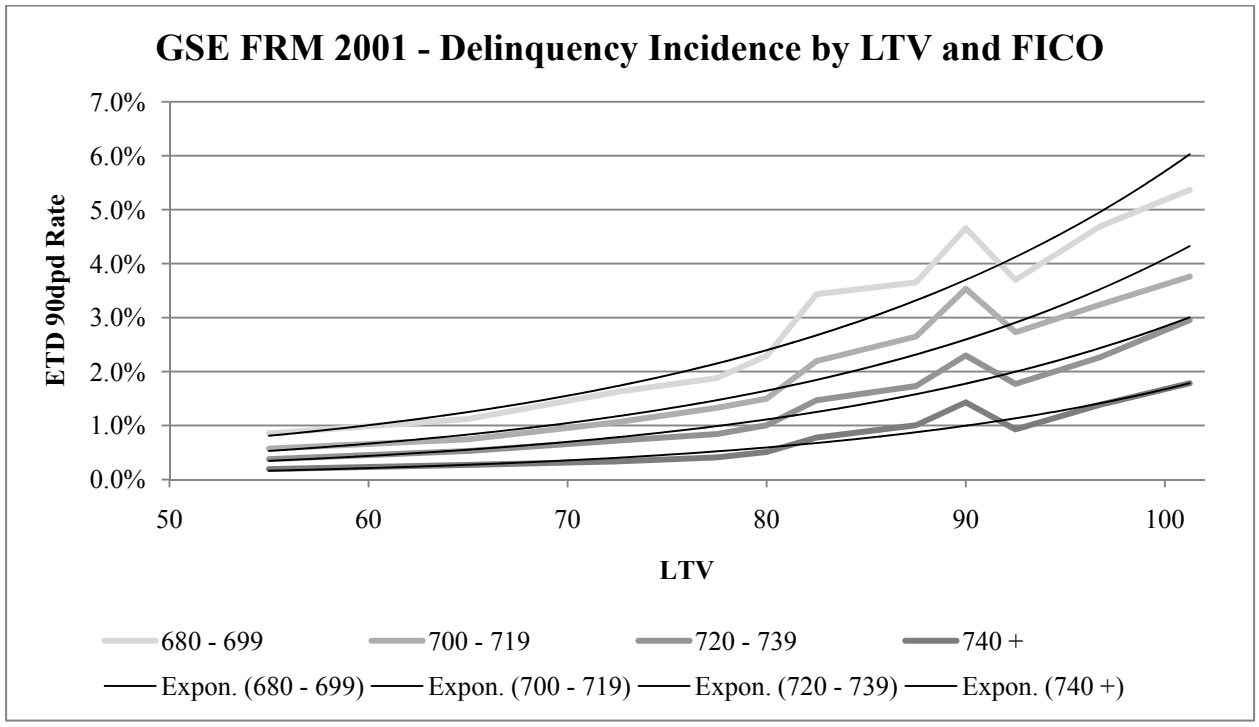
The history of Private MI rescissions and repurchase requests vividly illustrates the consequences of the changing mortgage origination practices after the 2003 boom. Of the loans MGIC originated in 2007 in its flow insurance channel (representing primarily GSE business), 25.6% of the claims received and settled resulted in coverage rescission, up from 3% for loans originated in 2003. It is also important to note that rescission rates vary substantially by mortgage originator. For loans originated between 2005 and 2007, MGIC rescission rates among its top 50 lender-servicers ranged from 0.9% to 49.8%, with a median value of 13.8% and an average of 20.2%. The wide spread between median and average rescission rates indicates that rescissions have been concentrated to specific lenders, illustrating the role played by lenders in this aspect of default risk. Mortgage repurchase requests have followed a similar pattern, rising from $7.3 billion in 2008 to $34.0 billion in 2010.[151] These increases in findings of material misrepresentation and fraud reflect the dramatic increase by unscrupulous lenders in exploiting the AUS systems' dispensing with the need to validate the correctness of information.

[150] For a detailed examination of "origination risk", see the response by Andrew Davidson to the request for comments made in the NPR, *available at* http://www.sec.gov/comments/s7-14-11/s71411-74.pdf.
[151] Source: Inside Mortgage Finance.

Adverse Selection of Loans With Private Mortgage Insurance by AUS Systems

It is our understanding that DU and LP quickly moved from making loan-level underwriting decisions regarding the projected incidence of default to making loan-purchase decisions, considering both the expected incidence of default and the severity of the loss given a default. The severity-reducing effect of private mortgage insurance meant that, all else equal, the GSEs could afford to have looser underwriting guidelines for insured loans than uninsured loans. Data compiled by FHFA on the performance of GSE and non-GSE loans, by LTV and FICO, provide strong evidence of adverse selection on high-LTV loans by the GSEs.[152] Even in 2001, there is a pronounced shift in default rates for high-LTV loans purchased by the GSEs. The chart in Figure 2 shows the relationship between LTV and ever-to-date 90-days-past-due incidence for fixed-rate mortgage (FRM) loans purchased by the GSEs in 2001. Except for a striking discontinuity for loans greater than 80 LTV and less than or equal to 90% LTV,[153] there is a very smooth, exponential relationship between LTV and delinquency incidence. Estimated fits of that relationship are also shown in the graph.

**Figure 2**

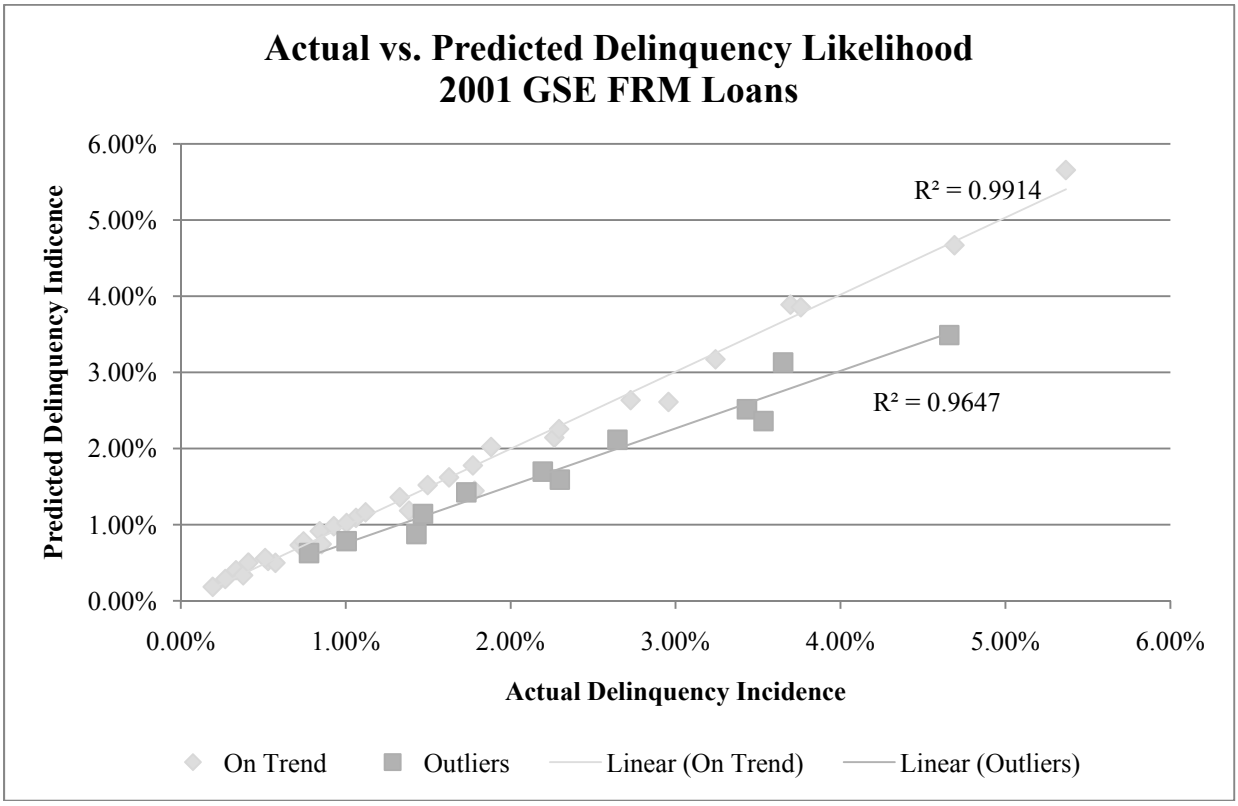



[152] Federal Housing Finance Agency, "Data on the Risk Characteristics and Performance of Single-Family Mortgages Originated from 2001 through 2008 and Financed in the Secondary Market" (Sept. 13, 2010), *available at* http://www.fhfa.gov/Default.aspx?Page=313.

[153] The FHFA data groups LTV into the following ranges, which have been translated to the following midpoints (in parentheses): 0-59.9 (55.0); 60-69.9 (65.0); 70-74.9 (72.5); 75-79.9 (77.5); 80.0 (80.0); 80.1-84.9 (82.5); 85-89.9 (87.5); 90.0 (90.0); 90.1-94.9 (92.5); 95-97.4 (96.75); and 97.5-104.5 (101.25). In addition, the LTV range of 105+ has been omitted, due to the small amount of loans in that category.

To further illustrate the extent of the anomaly, we built a simple model that estimates delinquency likelihood as a function of FICO and LTV. The chart in Figure 3 plots actual against predicted delinquency rates, with the loans over 80 and up to 90 LTV (the outliers) segregated from the other loans.[154] Loans over 80 and up to 90 LTV have, on average, default rates that are 32% higher than what would be predicted from the normal relationship between FICO, LTV and delinquency. Clearly there is something about the loans over 80 and up to 90 LTV that has caused a break in the usual relationship between LTV and serious delinquency risk, and the impact of that factor is to increase the likelihood of serious delinquency.

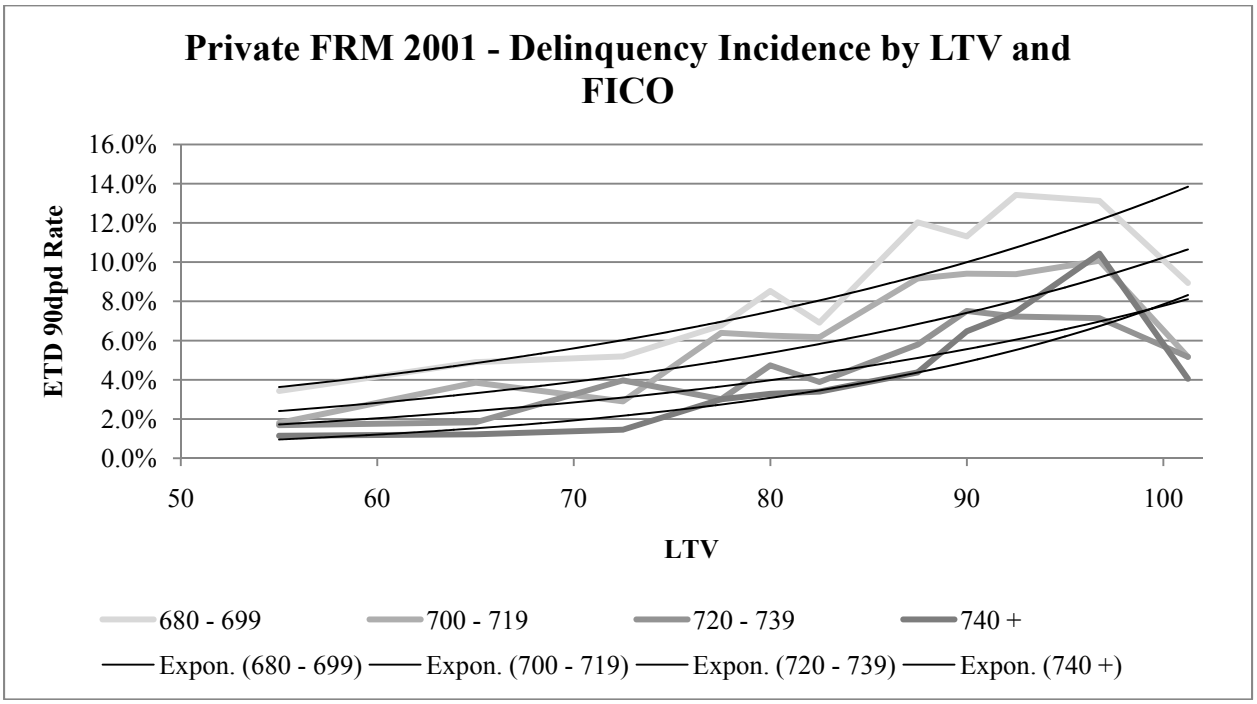
**Figure 3**




One could argue that this discontinuity is simply part of the natural relationship between LTV and default risk. However, in our experience, that relationship is only discontinuous in the presence of certain threshold effects (such as tighter underwriting guidelines at key LTV limits) or in the presence of adverse selection. Fortunately, FHFA provided comparison data for private-label, RMBS-financed (non-GSE) loans from the same period. As can be seen in Figure 4, the relationship between LTV and delinquency for non-GSE loans is noisier, but the only apparent discontinuity is a steep drop in delinquency when LTV $\geq$ 97.5.

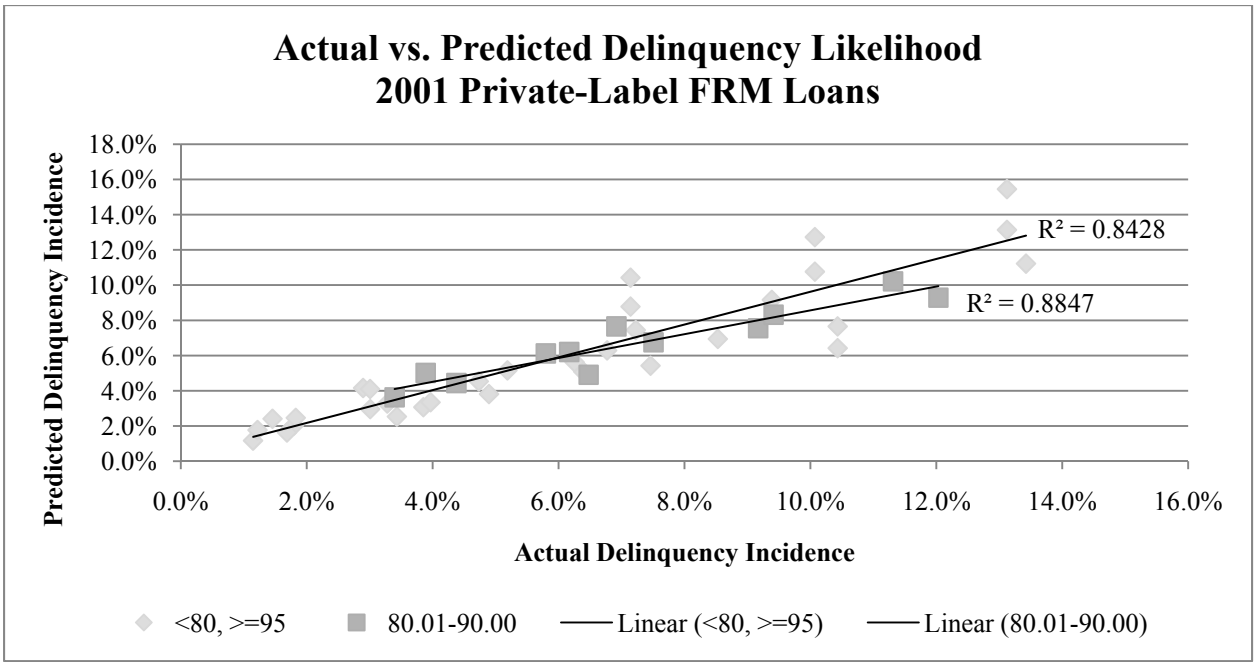
[154] The R-squared statistic for the loans on trend is 0.99. Using the estimated model to predict delinquencies for the outliers results in a very close linear relationship between predicted and actual rates (R-squared = 0.96), with a bias toward underestimation.

**Figure 4**




The chart in Figure 5 plots actual against predicted delinquency rates for the non-GSE loans, splitting the data by LTV as before.

**Figure 5**



This data is consistent with the hypothesis that GSE purchase decisions for loans with LTVs over 80 and up to 90 caused increased default rates over what should have been expected, all else equal. This has important public policy implications, as the QRM Definition has relied on FHFA studies showing, among other things, a pronounced increase in default rates for loans with LTVs greater than 80. The evidence from this analysis is that the difference shown by FHFA is likely to be overstated. For FRM loans originated in 2001, the amount of overestimation appears to be around 32%.

Conclusion

The lessons of the past make a strong case for a prudent and reasonable set of underwriting standards that serve a majority of borrowers. Within those standards, there is also a strong case for changing the role that Private MI companies have played during the bubble years by enabling the Private MI companies to establish and meaningfully enforce their own independent underwriting standards, in order to provide another set of eyes on the mortgage origination process. Given the dynamics of the marketplace, during the bubble years, this "second set of eyes" was read out of the process, with the Private MI companies relying on the lenders. Enabling the Private MI companies to provide this critical function will help avoid adverse selection, which often leads to originating loans that should not be made. For all of their shortcomings, AUS have brought needed streamlining and consistency to the mortgage origination process. While AUS should be part of the future of mortgage finance, their decisions cannot substitute for prudent underwriting, from both a credit and process (validation) perspective. Establishing a prudent and reasonable set of underwriting standards will bring better transparency to the mortgage process and help ensure that loans are originated in the best interest of all stakeholders.

## Appendix C

## Estimates of Incremental Costs for a Loan not Meeting the QRM Requirements[155]

The Agencies request information on the impact of the proposed rules, specifically with regard to the cost of mortgage loans not meeting the QRM requirements. The estimates that have been made public, so far, span a considerable range, from as low as 10 basis points to as much as 200 basis points. The Agencies should be warned by that wide range that the impact of the proposed rules is very uncertain.

There are several components to the cost difference for non-QRM loans, namely:

- The lack of a government guarantee, compared to Public MI and GSE loans with the current, explicit backing of the federal government;
- The incremental default risk;
- The additional capital required by risk retention rules, including the premium capture rule; and
- The effects of reduced liquidity for the resulting securities.

Estimates of the value of the government guarantee have been widely available for many years, stemming from the large amount of research on the question of the value of the implied guarantee to the GSEs. The range of those estimates is now relatively narrow. Estimates of the incremental default risk are straightforward, but they depend crucially on the mix of business in the securitized pool. The narrow QRM Definition leaves an extremely wide range of possibilities for the risk levels of the loans that lie outside QRM. The level of capital required as a result of risk retention is straightforward, though it depends on the type of institution retaining the risk and how it is regulated. The resulting capital levels and return on capital that the entities will require, and therefore the impact on loan pricing, could vary substantially. The most unknown factor, however, is the effect of liquidity. There is simply no way to estimate the liquidity premium that the market will place on non-QRM securities. We can only speculate that initially the liquidity premium will be substantial, reflecting all of the unknown risk that is attached to those securities. Over time, as investors become comfortable with them, and as the market grows in size, we might expect to see that liquidity premium decline.

Mark Zandi, Chief Economist of Moody's Analytics, estimates that for "homeowners who cannot make large down payments, do not have substantial income to back their monthly payments, or do not have pristine credit scores, the interest rate on a 30-year fixed rate mortgage will rise between 75 and 100 basis points" as a result of the following three factors:

- QRM eligibility, which will add 30 to 50 basis points to non-QRM loans;
- The premium capture rule, which will add 10 to 15 basis points; and

[155] This part of MGIC's response is intended to address **Questions 12(a)-(b), 107 and 108** of the NPR.

- The lack of direct government backing and reduced liquidity in the non-QRM mortgage market, which will add approximately 35 basis points.[156]

Economists for the National Association of Home Builders estimate that "borrowers who can't afford to put 20 percent down on a home and who are unable to obtain FHA financing will be expected to pay a premium of two percentage points for a loan in the private market."[157]

Ken Fears, Manager of Regional Economics at the National Association of Realtors, suggests the spread between QRM and non-QRM loans will be 80 to 185 basis points as a result of:

- Enhanced capital costs of 5% risk retention for non-QRM loans;
- Fewer securitizations with portfolios large enough to retain 5% — limits on securitizers volume and monopoly pricing; and
- Reduced liquidity for non-QRM vs. QRM: perceived risk and increased variation of products outside of QRM.[158]

The FDIC has stated that it believes the incremental costs to non-QRM borrowers will be 10 to 15 basis points.[159]

The report by Moody's Analytics appears to be the most complete, detailed analysis of the important components of loan pricing, and its estimates lie in the center of the estimates from similar, credible work. For this reason, we have used the Moody's estimates in further analysis of the likely impact of the proposed rules.

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[156] *See* Zandi & deRitis, *supra* note 45.

[157] *See* Testimony of Barry Rutenberg, On Behalf of the National Association of Home Builders, Before the Senate Banking, Housing, and Urban Affairs Committee Hearing on Public Proposals for the Future of the Housing Finance System Part II (May 26, 2011), *available at* http://banking.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=92d9d2fb-7648-4389-a362-856adf298b22&Witness_ID=c780def3-ed92-4236-9f0b-762fa477bd59.

[158] Ken Fears, National Association of Realtors, "QRM: Higher Mortgage Rates on the Horizon" (June 17, 2011), *available at* http://economistsoutlook.blogs.realtor.org/2011/06/17/qrm-higher-mortgage-rates-on-the-horizon/.

[159] Transcript of conversation with Sheila C. Bair, Council on Foreign Relations (June 9, 2011), *available at* http://www.cfr.org/financial-crises/conversation-sheila-c-bair/p25253.

## Appendix D

## Location of Answers to NPR Questions Within MGIC Response

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| Minimum 5% Risk Retention | | | | |
| 10 | Whether the minimum 5% risk retention requirement for non-exempt ABS transactions is appropriate, or whether a higher risk retention requirement should be established for all non-exempt ABS transactions or for any particular classes or types of non-exempt ABS | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 11 | If a higher minimum requirement should be established, what minimum should be established and what factors should the Agencies take into account in determining that higher minimum? For example, should the amount of credit risk be based on expected losses, or a market-based test based on the interest rate spread relative to a benchmark index? | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 12(a) | Would the minimum five percent risk retention requirement, as proposed to be implemented, have a significant adverse effect on liquidity or pricing in the securitization markets for certain types of assets (such as, for example, prudently underwritten residential mortgage loans that do not satisfy all of the requirements to be a QRM)? | IV.B. | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V.C.1. | MGIC's Proposed Standards — Impact of Implementing MGIC's Proposed Standards — Increases Access to Credit on Reasonable Terms | 33 |
| | | App. C | Estimates of Incremental Costs for a Loan not Meeting the QRM Requirements | C-1 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| 12(b) | If so, what markets would be adversely affected and how? What adjustments to the proposed rules (*e.g.*, the minimum risk retention amount, the manner in which credit exposure is measured for purposes of applying the risk retention requirement, or the form of risk retention) could be made to the proposed rules to address these concerns in a manner consistent with the purposes of section 15G? Please provide details and supporting data. | IV.B | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V. | MGIC's Proposed Standards | 24 |
| | | VI. | Alternatives for Implementing MGIC's Proposed Standards | 38 |
| | | VII.A. | Additional Recommendations — Treatment of Private MI as an Allowed Form of Risk Retention | 46 |
| | | App. C | Estimates of Incremental Costs for a Loan not Meeting the QRM Requirements | C-1 |
| Risk Retention - Permissible Forms | | | | |
| 14(a) | Should the Agencies mandate that sponsors use a particular form of risk retention (*e.g.*, a vertical slice or a horizontal slice) for all or specific types of asset classes or specific types of transactions? | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |
| | | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 14(b) | If so, which forms should be required for which asset classes and why? | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |
| | | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 19(a) | Are there other forms of risk retention that the Agencies should permit? | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |
| 19(b) | If so, please provide a detailed description of the form(s), how such form(s) could be implemented, and whether such form(s) would be appropriate for all, or just certain, classes of assets. | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| Risk Retention – Allocation to the Originator | | | | |
| 90 | Should the rules permit sponsors to allocate risk to a third party, and if so, how to ensure that incentives between the sponsor and investors are aligned in a manner that promotes quality underwriting standards? | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |
| | | III.A. | Attributes of Private Mortgage Insurance that Advance Policy Goals — Private MI Aligns Incentives | 8 |
| Qualified Residential Mortgages | | | | |
| 106 | Is the overall approach taken by the Agencies in defining a QRM appropriate? | IV. | MGIC's Concerns with the NPR | 19 |
| | | V. | MGIC's Proposed Standards | 24 |
| | | VI.A. | Alternatives for Implementing MGIC's Proposed Standards — QRM Definition | 38 |
| 107 | What impact might the proposed rules have on the market for securitizations backed by QRM and non-QRM residential mortgage loans? | IV.A. | MGIC's Concerns with the NPR — Creates a Permanent Market Advantage for Public MI | 20 |
| | | IV.B. | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V.C.1 | MGIC's Proposed Standards — Impact of Implementing MGIC's Proposed Standards — Increases Access to Credit on Reasonable Terms | 33 |
| | | App. C | Estimates of Incremental Costs for a Loan not Meeting the QRM Requirements | C-1 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| 108 | What impact, if any, might the proposed QRM standards have on pricing, terms, and availability of non-QRM residential mortgages, including to low and moderate income borrowers? | IV.B. | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V.C.1 | MGIC's Proposed Standards — Impact of Implementing MGIC's Proposed Standards — Increases Access to Credit on Reasonable Terms | 33 |
| | | App. C | Estimates of Incremental Costs for a Loan not Meeting the QRM Requirements | C-1 |
| 109(a) | The Agencies seek general comment on the overall approach of using certain longstanding HUD standards for certain definitions and standards within the QRM exemption and whether the Agencies should adopt a different approach. | V.B.2 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Down Payment | 28 |
| 110 | The Agencies seek comment on all aspects of the proposed definition of a QRM, including the specific terms and conditions discussed in the following section. | V. | MGIC's Proposed Standards | 24 |
| 111(a) | 111(a). The Agencies seek comment on whether mortgage guarantee insurance or other types of insurance or credit enhancements obtained at the time of origination would or would not reduce the risk of default of a residential mortgage that meets the proposed QRM criteria but for a higher adjusted LTV ratio. Commenters are requested to provide historical loan performance data or studies and other factual support for their views if possible, particularly if they control for loan underwriting or other factors known to influence credit performance. | III.E. | Attributes of Private Mortgage Insurance that Advance Policy Goals — Private MI Reduces Risk of Default | 10 |
| | | III.F. | Attributes of Private Mortgage Insurance that Advance Policy Goals — Private MI Reduces Credit Risk | 17 |
| | | App. G | Genworth Study | G-1 |
| | | App. H | Promontory Study | H-1 |
| | | App. I | Milliman Study | I-1 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| # | Question | Sec | Topic | Pg |
| 111(b) | If the information indicates that such products would reduce the risk of default, should the LTV ratio limits be increased to account for the insurance or credit enhancement? | V.B.1 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Loan-to-Value (LTV) | 26 |
| 111(c) | If so, by how much? | V.B.1 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Loan-to-Value (LTV) | 26 |
| 112(a) | If the proposed QRM criteria were adjusted for the inclusion of mortgage guarantee insurance or other types of insurance or credit enhancements, what financial eligibility standards should be incorporated for mortgage insurance or financial product providers and how might those standards be monitored and enforced? | VII.C. | Additional Recommendations — Financial Requirements Applicable to Private MI | 49 |
| 112(b) | What disclosure regarding the entity would be appropriate? | VII.C. | Additional Recommendations — Financial Requirements Applicable to Private MI | 49 |
| QRM - Exemption | | | | |
| 114(a) | Comment on each condition for QRM eligibility. | V. | MGIC's Proposed Standards | 24 |
| QRM – Eligibility Criteria | | | | |
| 115 | Are the proposed credit history standards useful and appropriate indicators of the likelihood that a borrower might default on a new residential mortgage loan? | V.B.4 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards – Credit | 30 |
| 119(a) | Comment on all aspects of the proposed rules' limits on the payment terms of a QRM. | V.A. | MGIC's Proposed Standards — MGIC's Proposed Standards Overview | 24 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| 120 | Comment on the appropriateness of the proposed LTV and combined LTV ratios for the different types of mortgage transactions. | IV.B. | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V.B.1. | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Loan-to-Value (LTV) | 26 |
| | | V.B.6. | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Loan Purpose | 31 |
| 121 | Comment on the proposed amount and acceptable sources of funds for the borrower's down payment. | V.B.2 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Down Payment | 28 |
| 123 | Comment on the appropriateness of the proposed front-end ratio limit of 28 percent and the proposed back-end ratio limit of 36 percent. | V.B.5 | MGIC's Proposed Standards — Description of Certain Attributes of MGIC's Proposed Standards — Debt-to-Income Ratio (DTI) | 31 |
| Possible Alternative Approach | | | | |
| 143 | Comment on the potential benefits and costs of the alternative approach, with a broader QRM exemption combined with a stricter set of risk retention requirements for non-QRM mortgages. | IV.B. | MGIC's Concerns with the NPR — Mortgages Will be Less Available and More Expensive | 21 |
| | | V. | MGIC's Proposed Standards | 24 |
| | | VI.A. | Alternatives for Implementing MGIC's Proposed Standards — QRM Definition | 38 |
| | | VII.B. | Additional Recommendations - Appropriate Levels of Risk Retention | 48 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| # | Question | Sec | Topic | Pg |
| 144(a) | If such an alternative approach were to be adopted, what stricter risk retention requirements would be appropriate in order to provide additional incentives to underwrite a greater share of origination volume within the QRM definition? | V. | MGIC's Proposed Standards | 24 |
| | | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 144(b) | Should such stricter requirements involve the form of risk retention or a higher amount of risk retention? | VII.A. | Additional Recommendations — Treatment of Private MI as Allowed Form of Risk Retention | 46 |
| | | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 144(c) | Are there other changes that would achieve the same objective? | VI. | Alternatives for Implementing MGIC's Proposed Standards | 38 |
| | | VII.B. | Additional Recommendations — Appropriate Levels of Risk Retention | 48 |
| 145 | How would this approach help to ensure high quality loan underwriting standards and align the interests of investors? | III. | Attributes of Private Mortgage Insurance that Advance Policy Goals | 5 |
| | | V.C.2. | MGIC's Proposed Standards — Impact of the Proposed Standards – Ensures Low Default Rates Through Prudent Underwriting Standards | 35 |
| | | V.C.4. | MGIC's Proposed Standards — Impact of the Proposed Standards — Sets a Reasonable Standard for Prudent Underwriting | 37 |
| 146(a) | Would this approach have the practical effect of exempting the securitization of most residential loans from the risk retention requirement? | V.C.1. | MGIC's Proposed Standards — Impact of the Proposed Standards — Increases Access to Credit on Reasonable Terms | 33 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| # | Question | Sec | Topic | Pg |
| 146(b) | If so, how would this positively and/or negatively affect investors in such securitizations? | III. | Attributes of Private Mortgage Insurance that Advance Policy Goals | 5 |
| | | V.C. | MGIC's Proposed Standards — Impact of the Proposed Standards | 33 |
| 146(c) | Would an offering of an ABS backed by loans complying with the lower standards in the alternative approach adequately promote the necessary alignment of incentives among originators, sponsors, and investors? | III.A. | Attributes of Private Mortgage Insurance that Advance Policy Goals — Private MI Aligns Incentives | 8 |
| 148 | Would the lower QRM standards under the alternative approach be consistent with the requirement that QRMs be fully exempted from section 15G's risk retention requirements? | V.C. | MGIC's Proposed Standards — Impact of the Proposed Standards | 33 |
| Reduced Risk Retention Requirements | | | | |
| 150(a) | Should underwriting standards be developed for residential mortgage loans that are different from those proposed for the QRM definition and under which a sponsor would be required to retain more than zero but less than five percent of the credit risk? | V. | MGIC's Proposed Standards | 24 |
| | | VI.C. | Zero Risk Retention for Low-Risk Category of Mortgage Loans | 43 |
| 150(b) | If so, what should those underwriting standards be and how should they differ from those established under the QRM provisions? | V. | MGIC's Proposed Standards | 24 |
| | | VI.C. | Zero Risk Retention for Low-Risk Category of Mortgage Loans | 43 |
| 150(c) | For example, should such underwriting standards allow for a loan-to-value ratio of up to 90 percent for purchase mortgage loans if there is mortgage insurance that would provide investors similar amounts of loss protection upon default as would be provided by a mortgage with a loan-to-value ratio of 80 percent? | V. | MGIC's Proposed Standards | 24 |
| | | VI.C. | Zero Risk Retention for Low-Risk Category of Mortgage Loans | 43 |

| NPR Questions | | Response | | |
|---|---|---|---|---|
| **#** | **Question** | **Sec** | **Topic** | **Pg** |
| 150(d) | If additional underwriting standards were established for residential mortgages, what amount of risk retention less than five percent should be required for loans meeting such standards, and should it be required to be held in a particular form? | VI.C. | Zero Risk Retention for Low-Risk Category of Mortgage Loans | 43 |
| 151 | If any new underwriting standards for residential mortgages were to be established and permit the inclusion of mortgage guarantee insurance or other types of insurance or credit enhancements, what financial eligibility standards should be incorporated for mortgage insurance or financial product providers? | VII.C. | Additional Recommendations — Financial Requirements Applicable to Private MI | 49 |
| General Exemptions | | | | |
| 163 | Are we correct in believing the federal department or agency issuing, insuring, or guaranteeing the ABS or collateral will monitor the quality of the assets securitized? | VI.B. | Alternatives for Implementing MGIC's Proposed Standards — Exemption from Risk Retention for Loans Insured by Private MI | 41 |
| Other Exemptions | | | | |
| 166(a) | Is the proposed exemption for ABS issued or guaranteed by a State or municipal entity appropriate? | IV.C. | MGIC's Concerns with the NPR — Provides Insufficient Incentives for the Use of Private MI | 23 |
| 166(b) | Is it under or over-inclusive? | IV.C. | MGIC's Concerns with the NPR — Provides Insufficient Incentives for the Use of Private MI | 23 |

## Appendix E

## Critique of FHFA Market Note 11-02 and its Application to the Question of Suitable QRM Criteria

The analysis prepared by FHFA in support of the QRM Definition (FHFA Mortgage Market Note 11-02[160]) fails to provide analytic justification for the regulations proposed in the NPR. Certainly, the data quantifies several undisputed facts about mortgage lending, namely that:

- Default risk increases as DTI increases;
- Default risk increases as LTV increases; and
- Default risk increases as FICO score decreases.

However, the study does not suggest what constitutes an unacceptable level of risk for RMBS investors or appropriate QRM limits. The analysis used by FHFA to justify the QRM limits deserves closer inspection. Following is an examination of certain key findings of the FHFA.

FHFA Key Finding: "Risk-Factors Contributing to Poor Performance of Non-QRM Loans Varied from Typical Years to Boom Years"[161]

> "For the 2005-2007 origination years, the requirement for product-type (no non-traditional and low documentation loans, or loans for houses not occupied by the owner) was the QRM risk factor that most reduced delinquency rates. For most origination years, requirements for borrower credit score and loan-to-value ratio are the factors that most reduce the ever-90-day delinquency rate of mortgages acquired by the Enterprises that would have met the proposed QRM standards."

[160] *See* "Mortgage Market Note 11-02," *supra* note 37.
[161] *Id*. at 3.

Following is the data that appears to support that conclusion:

**All Loans**

| | QRM Delq Rate | Delinquency Rate Removing Factor | | | |
|---|---|---|---|---|---|
| | | Product Type | DTI | LTV | FICO |
| 1997 | 0.42% | 0.05% | 0.39% | 0.61% | 3.08% |
| 1998 | 0.39% | 0.10% | 0.31% | 0.52% | 2.34% |
| 1999 | 0.44% | 0.13% | 0.34% | 0.78% | 3.12% |
| 2000 | 0.32% | 0.43% | 0.20% | 0.83% | 2.94% |
| 2001 | 0.31% | 0.35% | 0.27% | 0.59% | 2.52% |
| 2002 | 0.33% | 0.41% | 0.32% | 0.73% | 2.34% |
| 2003 | 0.55% | 0.64% | 0.66% | 1.06% | 2.95% |
| 2004 | 0.95% | 1.72% | 1.16% | 1.58% | 4.27% |
| 2005 | 1.86% | 5.30% | 2.36% | 2.31% | 6.46% |
| 2006 | 2.72% | 7.49% | 3.35% | 3.73% | 7.90% |
| 2007 | 2.37% | 6.34% | 3.59% | 4.39% | 8.66% |
| 2008 | 0.68% | 1.48% | 1.64% | 1.68% | 5.15% |
| 2009 | 0.04% | 0.06% | 0.11% | 0.09% | 0.50% |

Source: Appendix A, Section 3: The Effect of Removing Individual Requirements, All Loans

While it is technically true that, "[f]or most origination years, requirements for borrower credit score and loan-to-value ratio are the factors that most reduce the ever-90-day delinquency rate," the impact of FICO substantially exceeds that of LTV, while LTV and DTI are generally quite close to each other. Grouping LTV and FICO together as leading risk factors is misleading. In addition, the extent to which GSE underwriting guidelines and the resulting mix of business changed over this time period should be considered. The impact of those changes contributed substantially to these results, but there appears to be no attempt to separate out those effects. Finally, it should be noted that in 2009 the GSEs continued to purchase a substantial amount of loans up to 95 LTV, yet the impact of LTV is lower than the impact of both DTI and FICO.

FHFA Key Finding: "Expanding QRM Definitions Would Add Loans with Much Poorer Performance"[162]

> "Loans that would have met QRM standards except for having loan-to-value ratios above 80 percent but less than 90 percent had ever-90-day delinquency rates that ranged from 2.0 to 3.9 times as great as QRM loans originated in the same year. Relaxing the PTI/DTI requirement from 28/36 to 30/38 would have resulted in delinquency rates up to 2.1 times as great as for QRM loans."

[162] *Id*.

Following is the data which appears to support that conclusion:

**Marginal Delinquency Rate Compared to Base QRM**

| Year | DTI | LTV | FICO |
|---|---|---|---|
| 1997 | 1.6 | 2.0 | 4.1 |
| 1998 | 1.4 | 2.1 | 4.1 |
| 1999 | 1.2 | 2.4 | 4.8 |
| 2000 | 1.0 | 2.4 | 4.4 |
| 2001 | 1.4 | 2.5 | 4.2 |
| 2002 | 1.3 | 2.5 | 3.6 |
| 2003 | 1.6 | 2.2 | 3.6 |
| 2004 | 1.7 | 2.3 | 3.3 |
| 2005 | 1.6 | 2.1 | 2.8 |
| 2006 | 1.7 | 2.0 | 2.8 |
| 2007 | 1.7 | 2.1 | 3.0 |
| 2008 | 1.8 | 3.9 | 5.3 |
| 2009 | 2.1 | 1.9 | 7.7 |

Source: Derived from data in Appendix A, Section 4a: The Effect of Relaxing Individual Requirements, Purchases

The data in Appendix A, Section 4a of Market Note 11-02 does not directly show relative default rates, but they can be calculated from the data that is shown. The default rates for all originations considered upon removing the LTV constraint, range from 1.9 to 2.9 times the proposed QRM level, not 2.0 to 3.9 as described in the Key Finding. For Purchase loans, the default rate multiples range from 1.9 to 3.9. Of significant interest is the extent to which the 2008 multiple of 3.9 is an outlier. Loans originated in 2008 have very unusual characteristics, with many of the loans originated in the first half of the year being very high risk, and loans originated in the second half of the year being much better underwritten. Also, it is true that the impact of relaxing DTI results in default rates that are as much as 2.1 times the proposed QRM level, but again, the 2.1 value is an outlier. Also, the Key Finding fails to include, as was done with LTV, the lower end of the range for DTI (1.0). The Key Finding, while technically true, is misleading.

No one disputes that expanding the definition of QRM will add loans with poorer performance than those meeting the QRM Definition. However, no standard has been set by Congress or the Agencies to determine what level of performance is bad enough to be excluded from the final QRM definition. FHFA relies instead on broad, relative measurements that appear to show that those additional loans are so much worse that the chosen limits must be valid. Market Note 11-02 compares a pool of loans with LTVs as high as 90 to a pool of loans that, theoretically, have LTVs as low as 00.01. It would be more appropriate to compare a pool of loans with LTVs in the range of 80.01 – 90.00 to a pool of loans with LTVs in the range of 70.01-80.00.

In comparing the relative effects of DTI, LTV and FICO, Market Note 11-02 uses metrics that make it appear that relaxing the LTV constraint has a bigger effect than relaxing the DTI

constraint. First, it uses a 10-point range for LTV (from 80 to 90), but only a 2-point range for DTI (36 to 38 for back ratio). Then, it measures the percentage-point increase in delinquency and the percentage-point increase in volume, dividing the former by the latter to arrive at an increase in delinquency rates per percentage-point increase in volume. What it fails to reflect with this analysis is that a 10-point increase in LTV increases volume 1.5 to 5.1 times more than a 2-point DTI increase. It is well known that, except for clustering effects at critical threshold levels, default incidence is monotonically increasing at an increasing rate with respect to LTV (see Appendix B for a visual demonstration of this from FHFA data). Mathematically, this means that the metric used by FHFA will always get larger as you specify a larger increase in LTV. The use of a large marginal increment for LTV and a small marginal increment for DTI makes comparisons between the two invalid.

Finally, we would note that the use of multiples and percentage increases greatly distorts the magnitude of the marginal increases. The delinquency rates for the proposed QRM population are generally measured in basis points, *i.e.*, fractions of a percent. An increase from, say 80 basis points to 120 sounds much bigger when you describe it as a 50% increase than when you describe it as a 40-basis-point increase. The relevant question should be, "what level of risk is acceptable?" Absent an answer to that question, it is impossible to set limits for QRM.

## Appendix F

## Measuring Mortgage Loan Performance - Description of Various Performance Metrics

### Definitions

*Delinquency* — A loan for which one or more payments are past due. Mortgage loans nearly always have monthly payments. Loans that are more than 30 days (one month) past due have two payments due (the current month and the previous month), and are often referred to as "30dpd" (30 days past due).

*Serious Delinquency* — A delinquency is typically deemed serious when it is 90 days (3 months) or more past due, *i.e.* there are 4 or more payments due.

*Foreclosure* — The act of taking title to the property in accordance with the terms of the mortgage. This can be a lengthy process, so for a long period of time a loan may be "in foreclosure." At the end of the process, if the lender has completed foreclosure and taken clear title, the loan may be referred to as being "a foreclosure." Not all loans that enter the foreclosure process result in the lender taking title. The borrower may still pay the loan in full and "cure" the delinquency.

*Default* — Often used interchangeably with "Delinquency," it is more appropriately used for loans that have terminated with the borrower failing to pay the loan in full. Typically this ends in foreclosure, but it can include non-foreclosure outcomes, such as a borrower-titled short sale or a deed-in-lieu of foreclosure.

*Claim* — For mortgage insurers, a claim is the event of loss. Typically this occurs after the mortgage servicer has acquired title to the property securing the loan. The servicer then files a claim with the insurer. These may be further broken down into *claims received* and *claims paid*, the difference being claims in process, claims denied and claims resulting in rescinded coverage.

Mortgage performance metrics generally take the form of a ratio, typically expressed as a percentage, of the number of bad loans to the number of total loans. Some variations on the metrics include:

- The definition of a bad loan, which typically would be 90dpd, foreclosure, default or claim. As noted above, "default" often can be a generic term indicating any of the other outcomes. "Foreclosure" may indicate that the loan entered foreclosure, or it may be stricter, requiring that the loan be terminated through foreclosure. The strict use of default would indicate a loan that terminated either through foreclosure or a foreclosure alternative, such as short sale or deed-in-lieu.

- The definition of the population of loans studied. Typically the measurement is for a group of loans grouped by some characteristic, typically origination year or by securitization pool. Often the population will be all originated loans, but it may also just include loans that have terminated or it may just include loans still active.

- The metric may be a periodic rate, such as the percent of loans becoming seriously delinquent over a year, or it may be cumulative over the lives of the loans, or it may be a point-in-time measurement of delinquency in active loans. The proper terms for those would be *rate*, *incidence* and *prevalence*, respectively. However, in practice the terms "rate" and "incidence" are used interchangeably for any of these.

- Another key point of differentiation is that the measurement might be made using dollar amounts, rather than loan counts, resulting in dollar-weighted performance metrics.

**MGIC Performance Metrics**

**Ever-To-Date Claim Incidence** (**ETD Clm Inc**) = ETD Claims Received / Loans Insured

**Ever-To-Date Claim/Termination Incidence** (**ETD Clm/Term Inc**) = ETD Claims Received / Loans Insured and Terminated

The difference between these two metrics is in the denominator. Claim Incidence measures total claims as a percent of total loans originated, while Claim/Termination incidence measures total claims as a percent of terminated loans. The ultimate claim incidence for a group of loans is not known until all of the loans have terminated. Typically, the cumulative claim incidence after four years is only half of what it will be when all the loans have completed their terms. Thus, the ETD Claim Incidence from one origination year cannot be compared reliably with other years, particularly when the loans are relatively young (less than eight years of aging). The ETD Claim/Termination Incidence, on the other hand, approaches a stable estimate of the ultimate incidence after only a few years. For this reason, it is possible to compare the ETD Claim/Termination Incidence across policy years that have three or more years of aging.

**Insurance Claim Rates Compared To Delinquency Rates**

The comparison of mortgage insurance claim rates (whether from FHA or from Private MI) to mortgage industry delinquency rates is problematic for two reasons. First, not all serious delinquencies result in losses to the lender. In fact, even at 90dpd, the majority of mortgage loans under ordinary circumstances will cure. Second, due to the length of the foreclosure process, there is a substantial delay between the point at which a borrower stops making payments and the point at which the insurer receives a claim. In some states, it may take the servicer two to three years to obtain title to the property securing the loan. Thus, the ETD Claim Incidence for an insurer, even after four years, will be substantially lower than the incidence of serious delinquency on those same loans.

## Appendix G

## Genworth Study[163]

See attached.

[163] This part of MGIC's response is intended to address **Question 111(a)** of the NPR.

# Performance of Insured vs Piggyback Mortgage Loans

Genworth Financial

August 2010

## Study Concept Summary

Genworth is pleased to report a more thorough examination of the differences in insured loan versus piggy back loan performance.
The Original study focused on 30+ delinquencies over four origination years with cuts by origination year, CLTV, and FICO, and two geographic cuts.
The sub group combination differences were then weighted by the overall volume of both insured and piggy-back loans in each segment,
and then rolled up to display the relative differences in performance given the specific segmentation. Overall that study suggested
that piggy-back loans performed 55% worse than insured loans with similar characteristics.

This revised study now focuses on ever 90+ delinquency rates and the cure rates on loans ever 90 days delinquent. The new study adds
an additional origination year, 2003, and more importantly, adds additional characteristic cuts such as document type, loan purpose, and expands
the geographic breaks to the nine US Census regions. The overall number of possible combination sets therefore increases nearly 20 fold
going from 256 combination segments to 5,040 in this expanded study.
This greater degree of detail should have the effect of removing the effects of differences in the distributions of insured loans relative to piggy-back loans.
Theoretically, increasing the degree of segmentation should move the overall weighted ratio of performance directionally from the 1.55 in the former study closer to 1.0.

The new study also differs from the former in that the older study used the total volume of both the insured and piggy-back loans to weight
the ratios of each identified segment. However, with a 20 fold increase in segmentation, and because piggy-back loans were smaller in volume than insured loans
some segments had extremely low piggyback volumes where it it would be entirely possible for all or none of the loans to be delinquent.
Consequently, the use of total volume weights (piggyback plus insured) would distort the effects of differences in the distribution of piggy-back loans.
For instance, for the 2003 originations 100 CLTV loans accounted for 48.9% of both the insured and piggy back volume for 2003. However, Piggy-back loans with
100% CLTV were only 17.8% of the 2003 piggy volume. Using the total volume would over-weight CLTV 100 ratios, whereas using the piggy-back volume would
put the relative difference in 100 LTV performance in a more appropriate perspective.

The other major component of this updated study is the inclusion of an analysis of the cure rates on loans ever 90 days delinquent.
The study will show that even for segments where there is little difference in ever 90+ delinquency rates, MI insured loans
exhibit significantly higher cure rates, thereby affecting the ultimate foreclosure rates on such segments. The expertise and willingness
of MIs to work with delinquent insured borrowers plays a major role in reducing the real risk of default on high LTV loans.

**Study Composition**

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Volumes Of Originations | Piggy-Back Volume | $260.6 billion | Insured Volume | $588.9 billion | **Total Volume** | **$849.5 billion** |
| Numbers of Loans | | 1,045,328 | | 3,872,318 | | 4,917,646 |

| Expanded Study On Ever 90 Days Delinquent And Subsequent Cure Rates | Original Study On 30+ Delinquency Rates |
|---|---|
| 5 Origination Years 2003 - 2007 | 4 Origination Years 2004 - 2007 |
| 2 Documentation Types : Full Docs, Low or No Docs | |
| 2 Loan Purpose Categories: Purchase, Refinancing ( Other was excluded) | |
| 4 CLTV Ranges : 80.1 to 85, 85.1 to 90, 90.1 to 95, GT 95 | 4 CLTV Ranges : 80.1 to 85, 85.1 to 90, 90.1 to 95, GT 95 |
| 7 FICO Ranges : <620, 620-659, 660-699, 700-719, 720-739, 740-759, 760+ ( No FICOs were excluded) | 8 FICO Score Ranges |
| 9 US Census Regions | 2 Market Segments : Distressed States FL,NV,CA,AZ,MI), All Others |
| Number of Combination Segments = 5x2x2x4x7x9 = **5,040** | Number of Combination Segments = 4x4x8x2 = **256** |

**19.7 Fold Increase In Segmentation**

## Data And Methodology

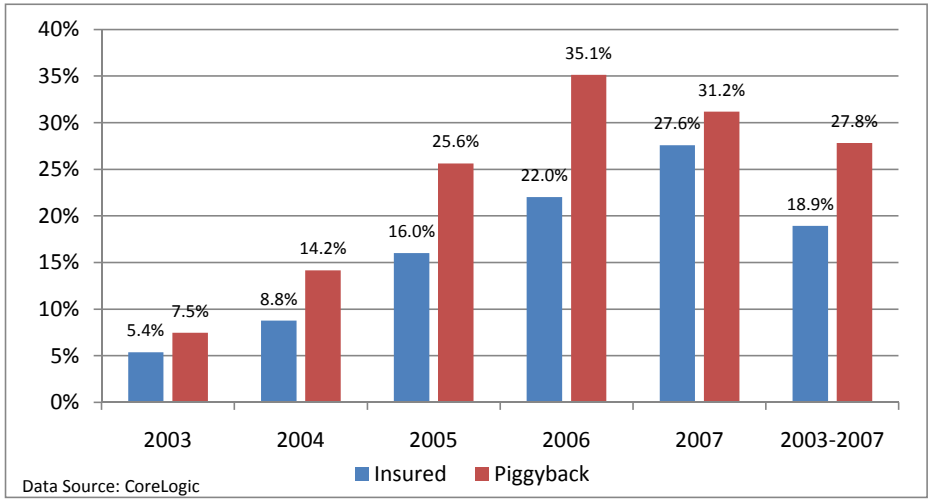
Genworth utilized the servicing data set of Corelogic which has collected highly detailed loan level loan perfromance information from several large major servicing companies. Piggyback loans are identified as first lien loans with an LTV of 80% and a CLTV greater than 80%. Insured loans are identified by the coding of an insurance provider, whether it be a private mortgage insurer or FHA or VA. Our study focused on loans with CLTV greater than 80%, originated from 2003 through 2007. The sample selected totals 4,917,646 loans of which 3,872,318 are insured high LTV loans, and 1,045,328 are first lien structured or piggyback loans. The overall volume totaled $0.85 trillion.

The previous study focused on loans that were currently deliquent 30+ days and loans that had terminated in default. This study takes the analysis much farther. This study reviewed the monthly status of all 4.9 million loans in the sample to see which loans were ever 90 days delinquent, and then follows the monthly status reports until the loan either cures or goes to foreclosure. Consequently, this study evaluates both the performance of the loans and also permits a review of actual cures of previous delinquencies that ultimately resulted in current status for loans still outstanding or successful payoff .

The delinquency rate for the piggyback loans is somewhat understated in that the data set only captures the delinquency rates on first liens. There are likely loans where the 1st lien is still current, but the 2nd lien is delinquent. If these delinquencies were added to the piggyback data, their delincency rate would be even higher than shown and the differential to Insured loans would be even larger.

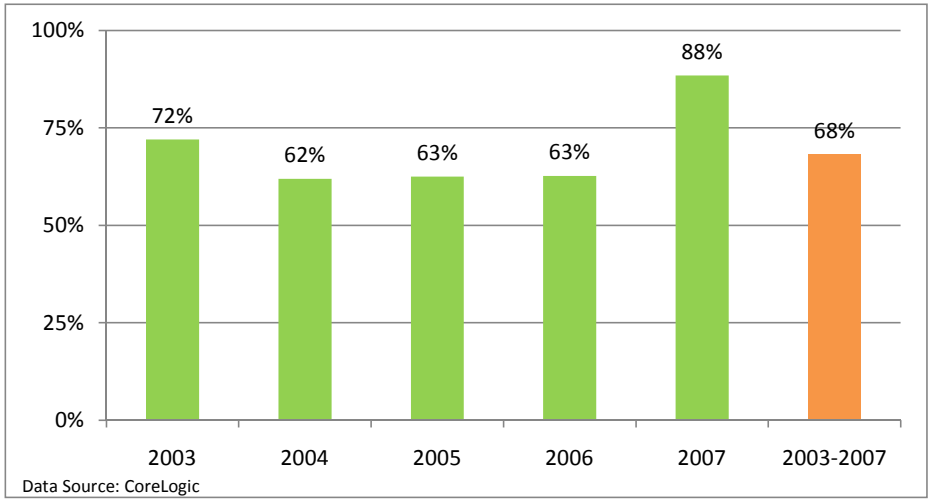
## Ever 90 Day Delinquency Rates By Origination Year

Weighting Segments By Piggyback Profile



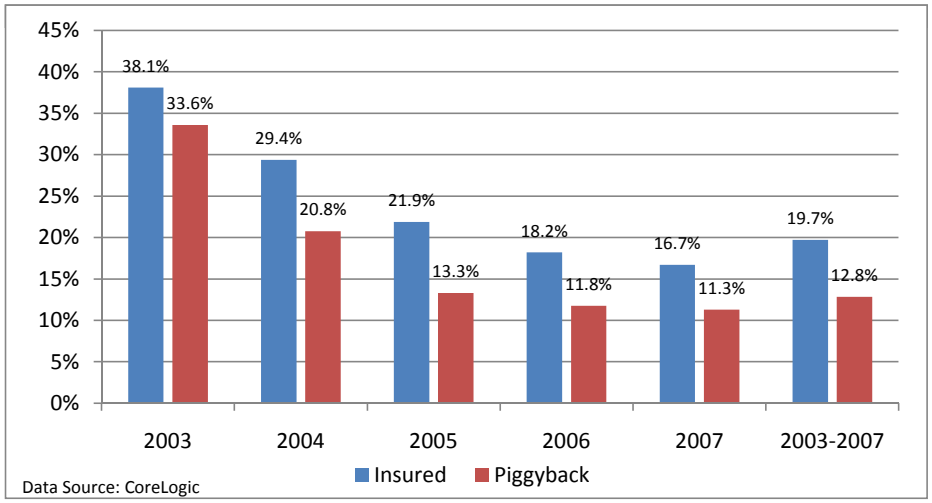

## Weighted Ratios Of Piggyback Delq Rates To Insured Delq Rates

Insured Ever 90 Rate / Piggyback Ever 90 Rate



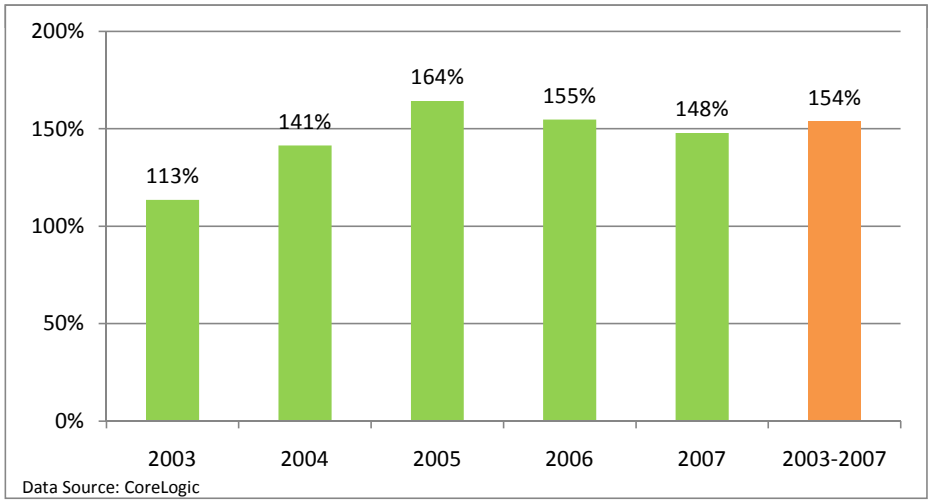

## Cure Rates On Ever 90 Day Delinquencies By Origination Year

Weighting Segments By Piggyback Profile




## Weighted Ratios Of Insured Cure Rates To Piggybacks

Insured Cure Rate % / Piggyback Cure Rate %

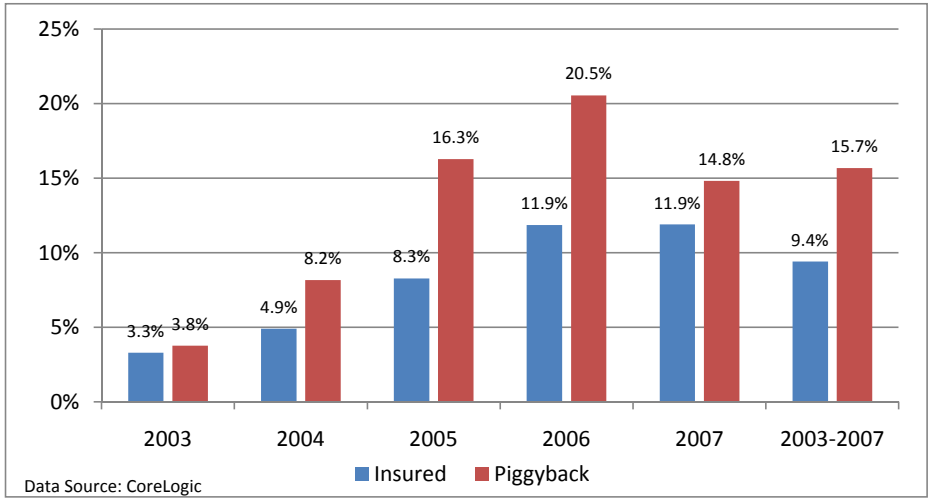



## Insured Loans Performed 32% Better than Piggyback Loans

## Once Delinquent 90 Days Or More, Insured Loans Exhibited Cure Rates 54% Higher Than Piggybacks

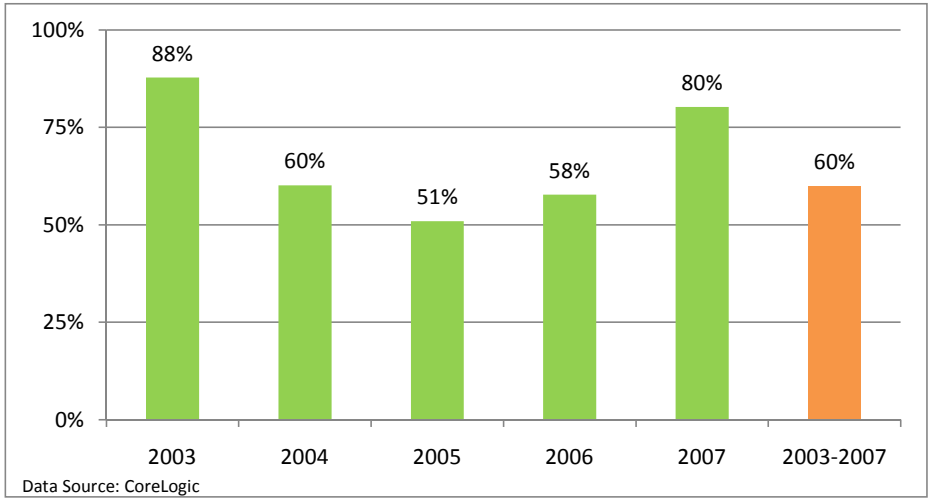
## Non-Performing Rates By Origination Year

(Currently 90+ Days Delinquent & Defaults)




## Ratios Of Piggyback Non-Performing Rates To Insured

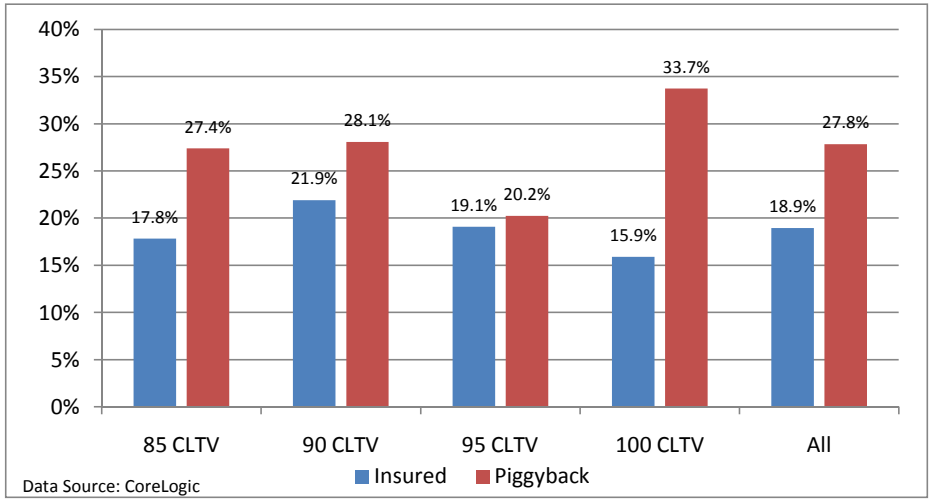
Piggyback Non-Performing Rate / Insured Non-Performing Rate




## Lower Ever 90 Delqs Combined with More Cures Result in Insured Loans Having 40% Less Defaults (90+ & F/C)

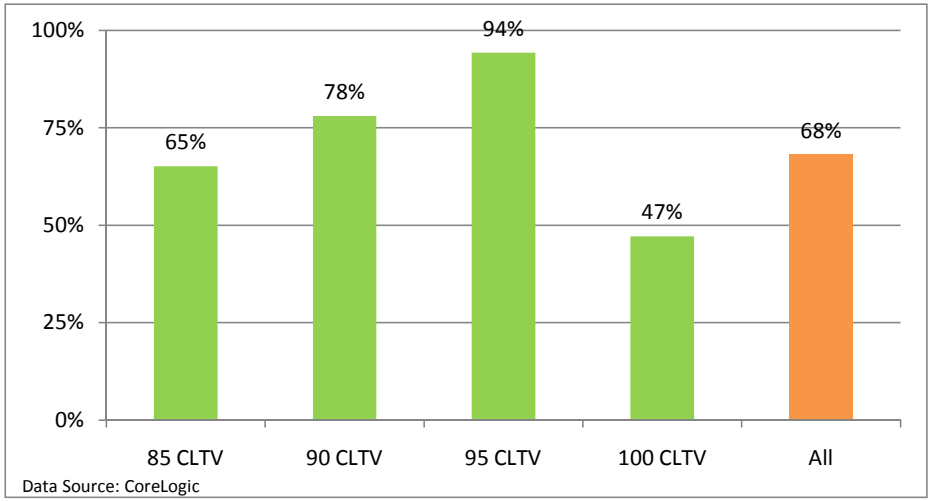
## Ever 90 Day+ Delinquency Rates By CLTV

Weighting Segments By Piggyback Profile



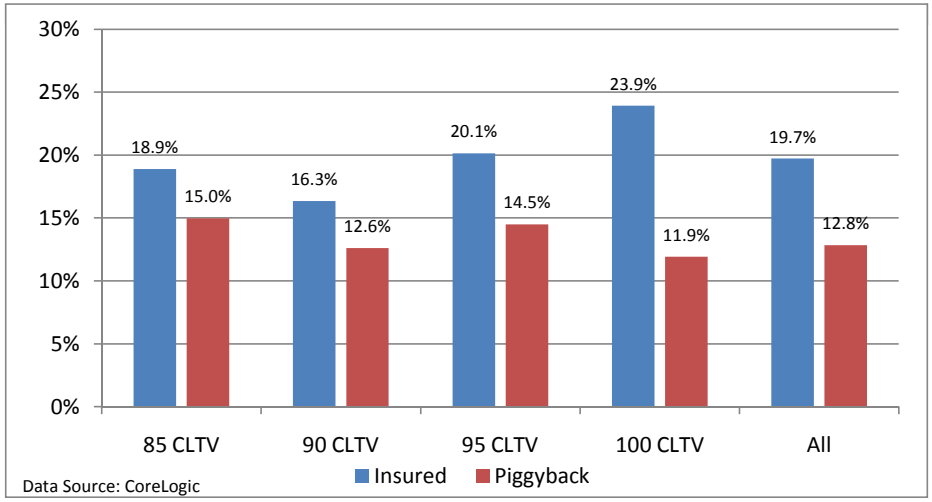

## Weighted Ratios Of Piggyback Delq Rates To Insured Delq Rates

Piggyback ETD 90 Rate / Insured ETD 90 Rate



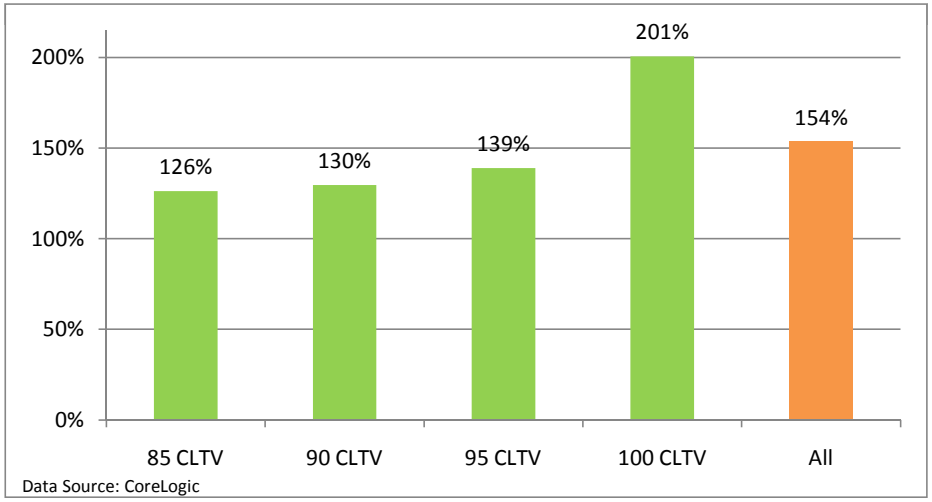

## Cure Rates On Ever 90 Day Delinquencies By CLTV

Weighting Segments By Piggyback Profile




## Weighted Ratios Of Insured Cure Rates To Piggybacks

Insured Cure Rate / Piggyback Cure Rate

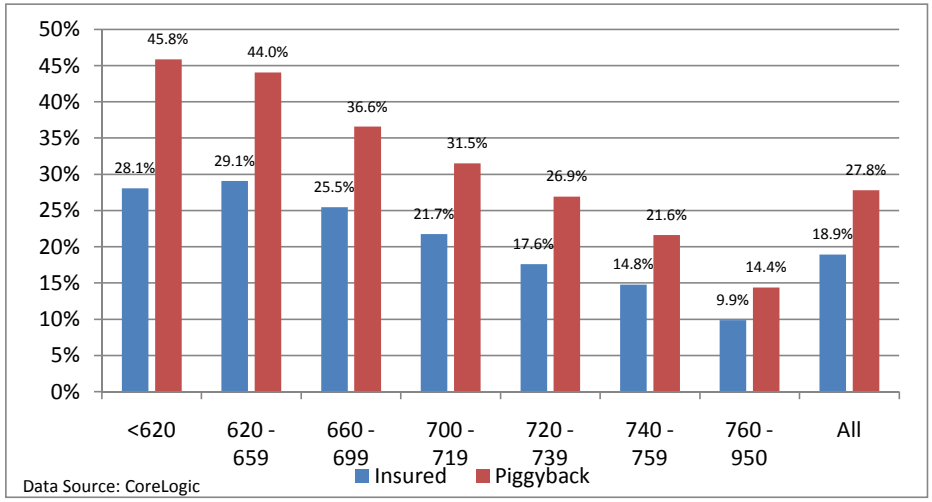



**Piggyback 90+ Delinquency Rates Were Significantly Higher For All CLTV Ranges Except For 95 CLTV**

**Nevertheless, For ALL CLTV Ranges, Including 95 CLTV, Insured Loans Had Significantly Higher Cure Rates**

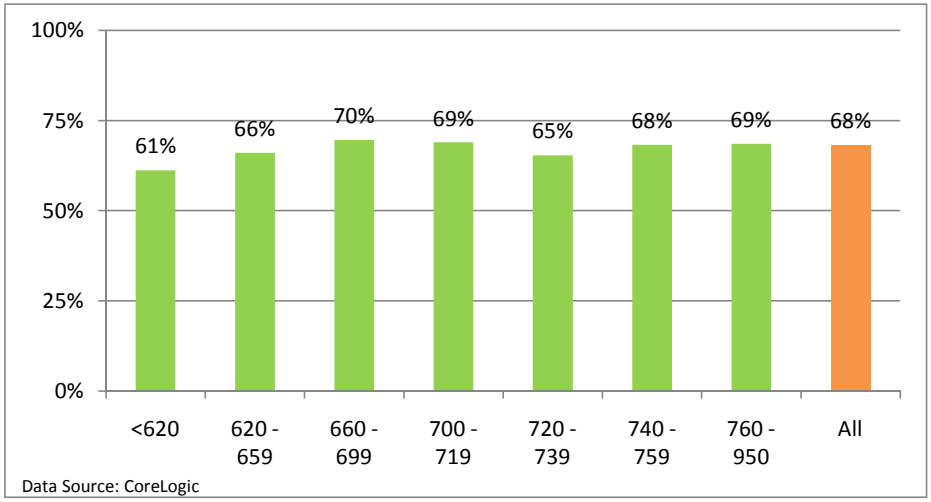
## Ever 90+ Delinquency Rates By FICO Score

Weighting Segments By Piggyback Profile



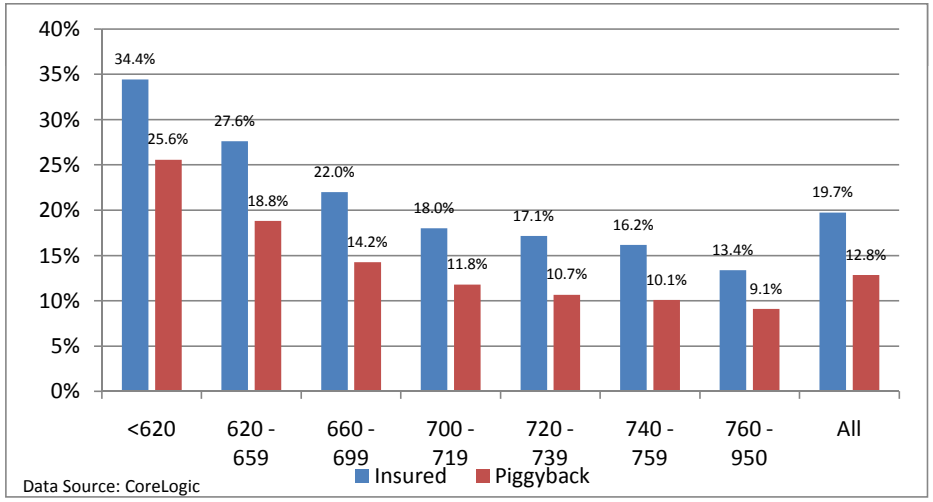

## Weighted Ratios Of Piggyback Delq Rates To Insured Delq Rates

Piggyback ETD 90 Rate / Insured ETD 90 Rate



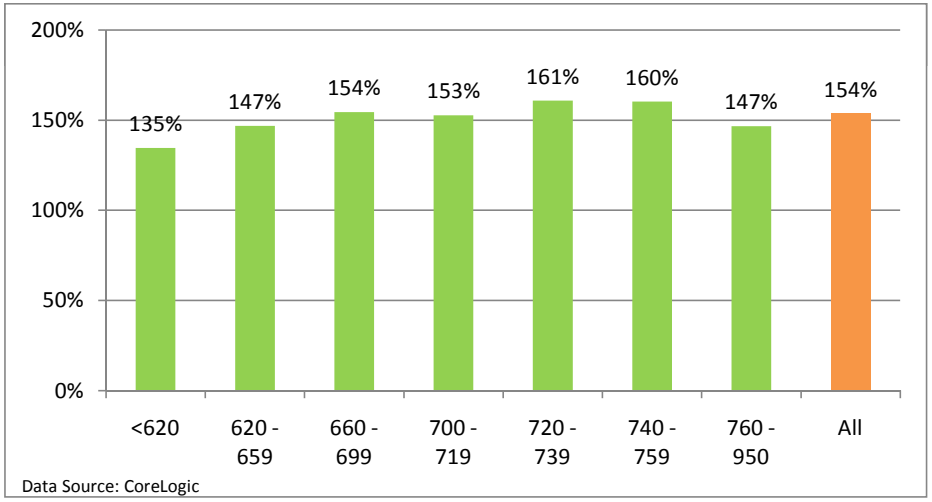

## Cure Rates On Ever 90 Day Delquencies BY FICO Range

Weighting Segments By Piggyback Profile




## Weighted Ratios Of Insured Cure Rates To Piggybacks

Insured Cure Rate / Piggyback Cure Rate

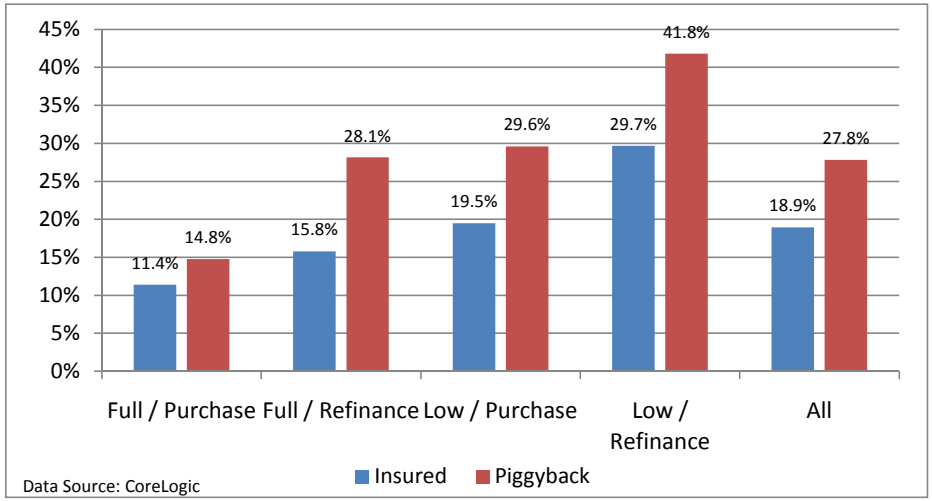



## Piggyback Performance Decidely Worse in Virtually All FICO Ranges

## Cure Rates On Insured Loans Solidly Higher By 35% or More Depending On the FICO Range

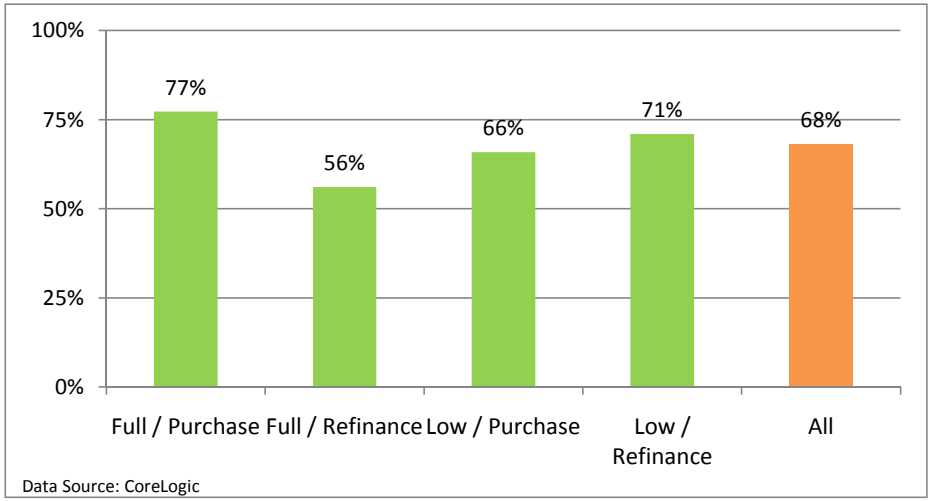
## Ever 90+ Delinquency Rates By Doc Type/Loan Purpose

Weighting Segments By Piggyback Profile



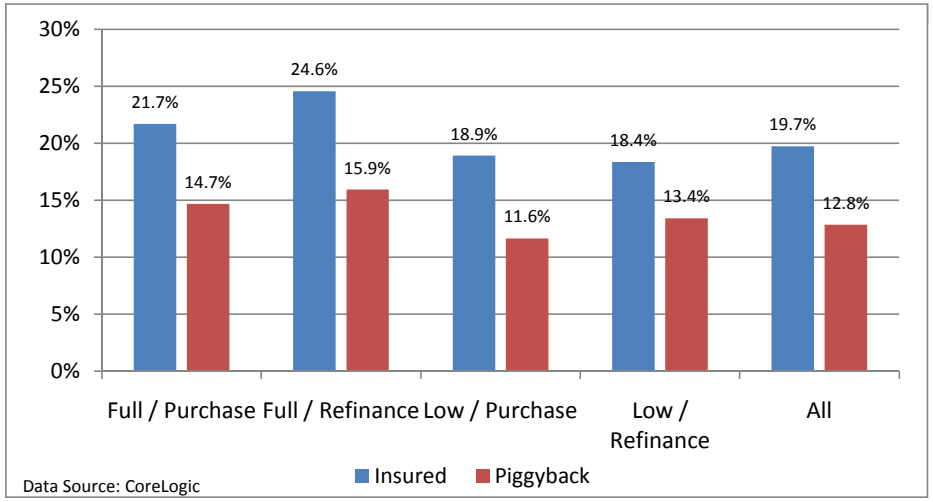

## Weighted Ratios Of Piggyback Delq Rates To Insured Delq Rates

Piggyback ETD 90 Rate / Insured ETD 90 Rate



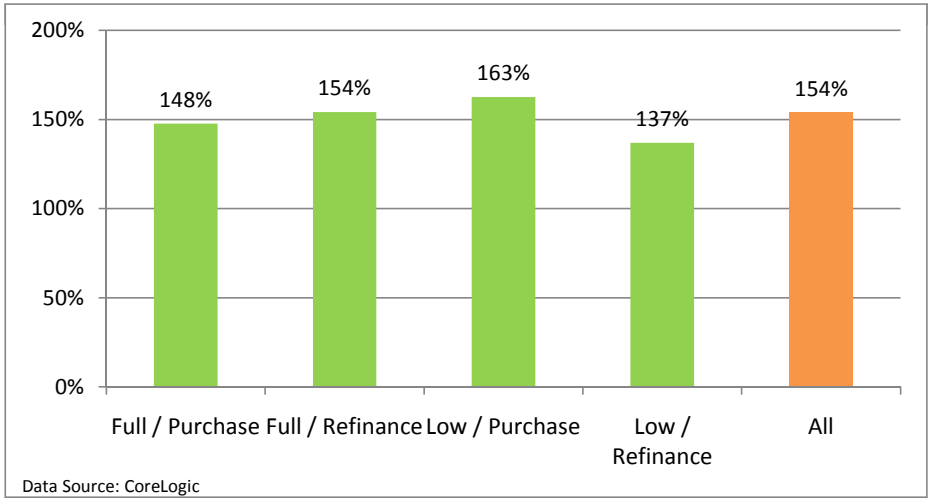

## Cure Rates On Ever 90 Day Delqs By Doc Type/Loan Purpose

Weighting Segments By Piggyback Profile




## Weighted Ratios Of Insured Cure Rates To Piggybacks

Insured Cure Rate / Piggyback Cure Rate

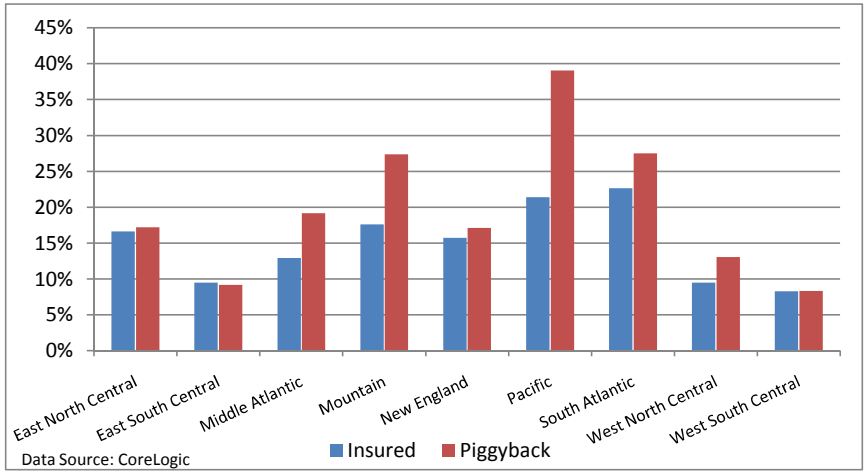



**Evaluation by Documenation & Loan Purpose Shows Insured Loans Clearly Outperform Piggybacks In Each of Segment Roll Ups**

**Insured Loan Cure Rates Were Substantially Higher in All Of These Roll -Up Combinations**

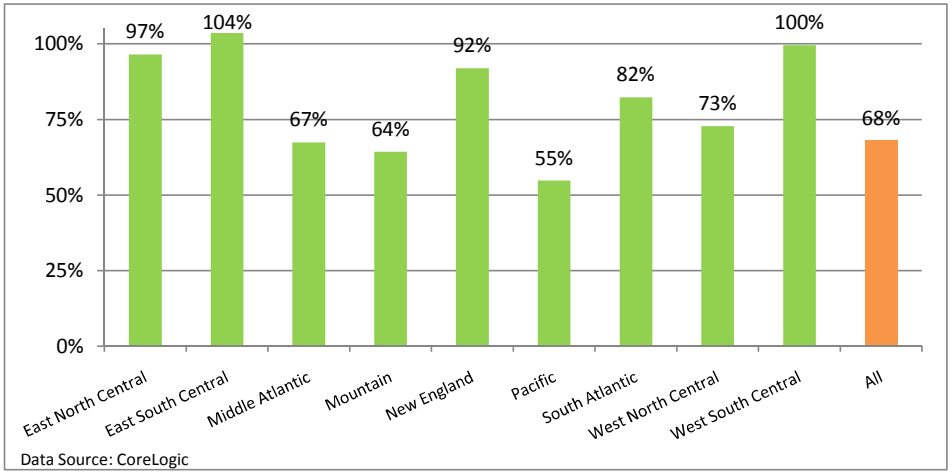
## Ever 90 Day Delinquent Rates By US Census Region

Weighting Segments By Piggyback Profile



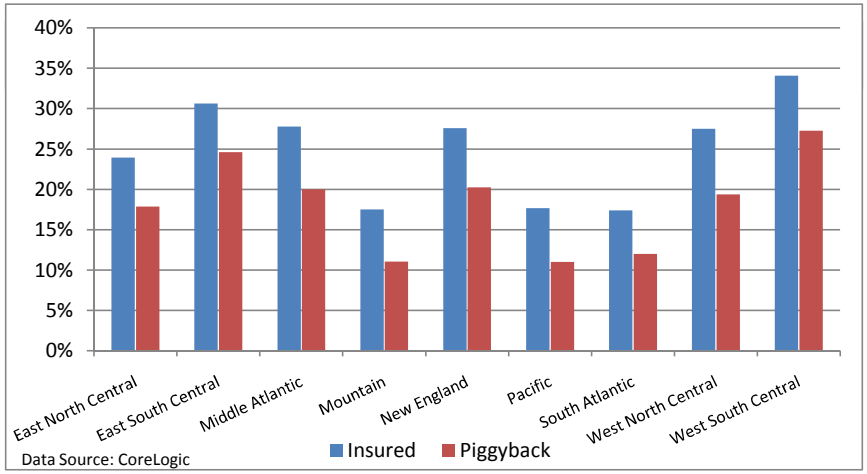

## Weighted Ratios Of Piggyback Delq Rates To Insured Delq Rates

Piggyback ETD 90 Rate / Insured ETD 90 Rate



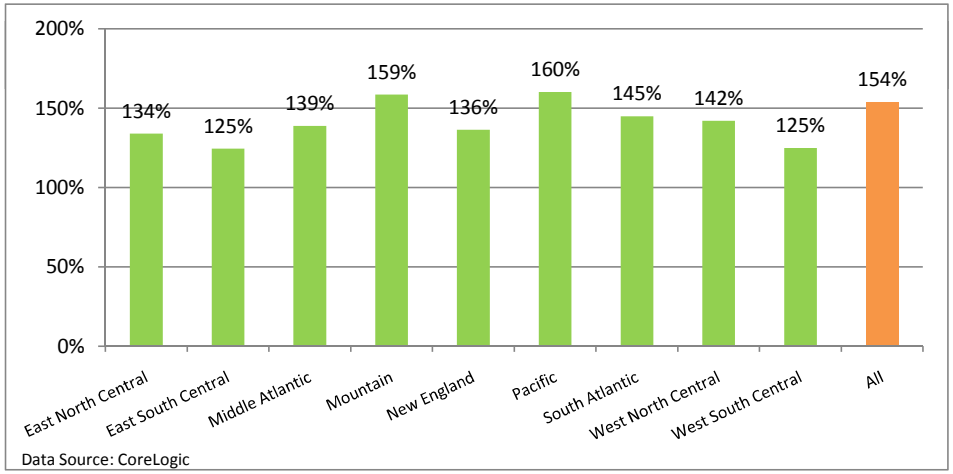

## Cure Rates On Ever 90 Day Delqs By US Census Region

Weighting Segments By Piggyback Profile




## Weighted Ratios Of Insured Cure Rates To Piggybacks

Insured Cure Rate / Piggyback Cure Rate



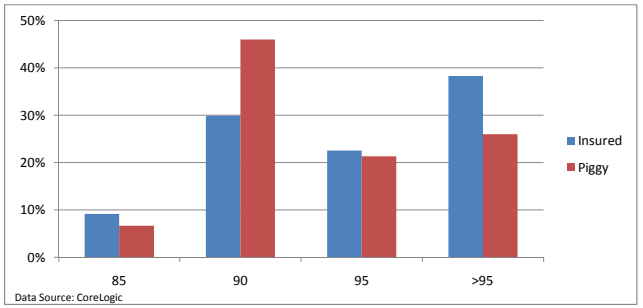

**While Ever 90 Delinquent Performance Differences Were Not Uniform Across All Regions,**

**Such Differences Were Highest In Worse Performing Regions**

**Cure Rates On Insured Loans Remained Significantly Higher Across All US Census Regions**

## Appendix - Differences In Distributions Across Key Metrics

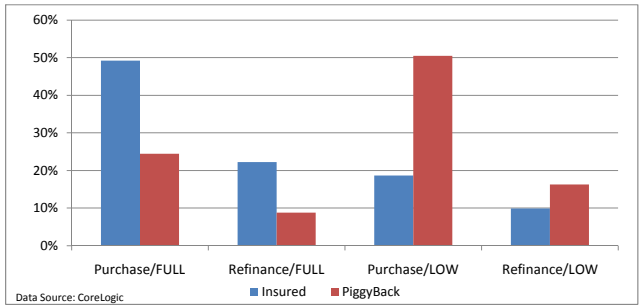
### Distribution By CLTV




**PiggyBacks Had Proportionately More 90 CLTV And Less 85 CLTV**

**Insured Had Proportionately More >95 CLTV**

### Distributions BY Loan Purpose & Doc Type



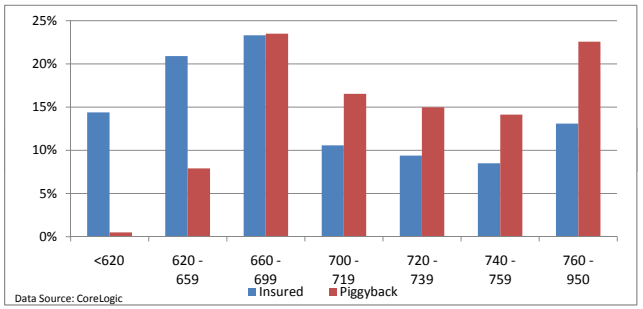

**PiggyBacks Had A Higher Percentage Of Purchase Loans**

( 74.9% vs 67.9% for Insured)

**But Also A Higher Percentage Of Low or NO Documentation**

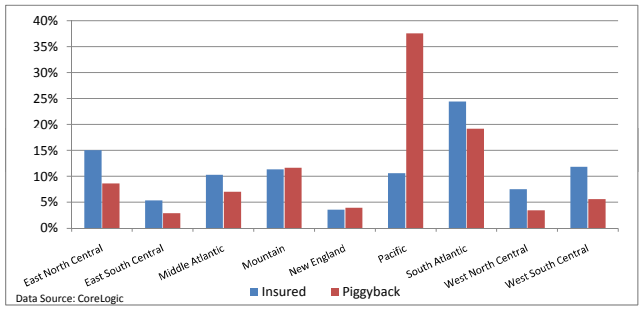
(66.7% Vs 28.6% for Insured)

### Distributions By FICO Range



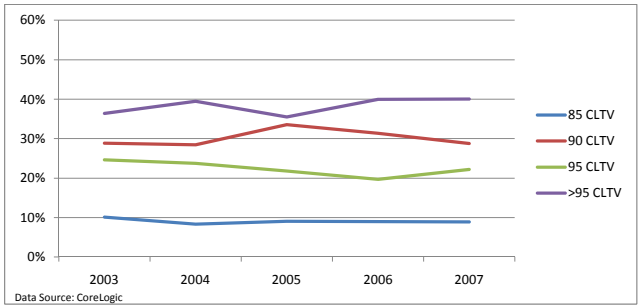

**Piggyback Loans Had Higher Average FICO Scores**

### Distributions By US Census Region




**Piggybacks Highly Concentrated In Pacific Region**

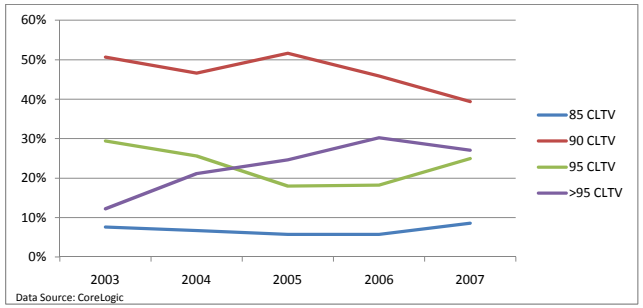
### Insured Loan Distributions By CLTV BY Origination Year




**Insured Loans Maintained Relatively Higher Risk Profile Throughout**

**Pricing For Risk By LTV Range Remained Constant**

### Piggyback Loan Distributions By CLTV By Origination Year

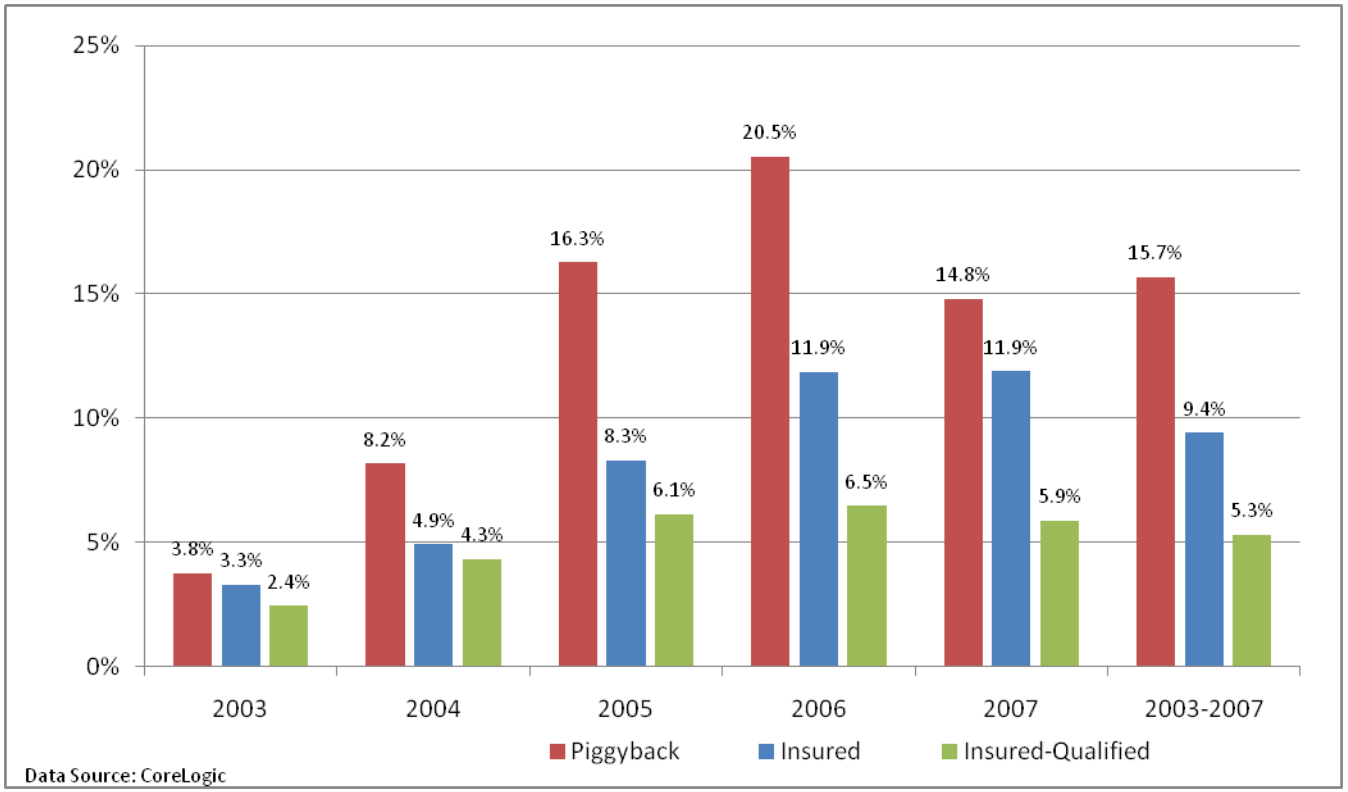



**Piggybacks In Earlier Years Had Lower Risk CLTV Profile**

**Increasingly Riskier Profile Through 2007**

# Qualified Insured Loan Performance

## NON-PERFORMING RATES*




## "Qualified" Insured Loans Have Performed Well Through the Downturn

* Non-Performing Rate: (# Loans Currently 90 or more days delinquent + loans that terminated in default ) / original number of loans

## Appendix H

**Promontory Study**[164]

See attached.

[164] This part of MGIC's response is intended to address **Question 111(a)** of the NPR.

# Assessing the Delinquency and Default Risk of Insured and Non-Insured High LTV Mortgages

**July 15, 2011**

## Table of Contents

## Executive Summary

During the recent housing bubble, many borrowers who lacked a 20% down payment used second mortgages (so-called piggyback loans) as a way of avoiding private mortgage insurance on a first lien with a higher than 80% loan-to-value ratio. In a typical "piggyback" transaction, a borrower would take out a first mortgage for 80% of the home's value, a second for 10%, and make a 10% down payment.

First mortgages with a piggyback second were the most prevalent alternative to the use of mortgage insurance over the past decade. At the request of Genworth Financial, Promontory Financial Group conducted an independent study to assess the relative default performance of piggyback and insured loans. For this study, Promontory analyzed the loan-level details on a sample of 5.6 million mortgages originated from 2003 to 2007. The dataset, provided by First American CoreLogic, included several borrower and loan-level characteristics. Serious delinquency was evaluated using a definition corresponding to a loan having ever been 90 or more days past due (or worse) at any given time.

Using this measure, 29.09% of the non-insured, piggyback loans were ever delinquent, compared to 19.44% of insured loans. For the 2007 origination year, the rates were 34.80% and 27.75%, respectively. For each of the provided loan-level variables, insured loans were found to have lower ever delinquent rates. For example, insured loans with a combined LTV of 95 to 100% had a delinquency rate of 21.97%, compared to 33.47% for non-insured, piggyback loans. Similarly, insured loans with FICO scores below 620 had a delinquency rate of 34.56%, well below the 50.05% rate for non-insured loans. Low-doc insured loans had a delinquency rate of 24.70%, compared to 33.67% for non-insured loans.

Because the rich dataset included loan-level, monthly performance indicators, it was possible to study not only the presence of delinquency, but the timing as well. Using a widely known statistical technique known as survival analysis, Promontory assessed the relative performance of insured and non-insured, piggyback loans over time, while simultaneously controlling for loan characteristics that are indicators of the risk of delinquency, including documentation level, loan purpose, owner-occupied status, combined LTV, and FICO score. In its analysis, Promontory also included several time-varying factors including local unemployment rates, market interest rates, and home price indices, all of which helped to significantly explain borrower propensities to default. After controlling for this wide variety of factors, Promontory still found that MI was associated with lower default rates for both fixed rate and adjustable rate first mortgages. Overall, across both fixed and adjustable rate loans, the proportion of non-insured loans surviving to 72 months was .798, compared to .833 for insured loans. Significantly, this difference implies that the baseline cumulative default rate of non-insured loans is 20.98% percent higher than that of insured loans.

Promontory's approach can quantify the extent to which MI serves as a proxy for unobserved aspects of the mortgage underwriting process, which when implemented serve to lower default risk for observed combinations of borrower and loan characteristics. However, the survival analysis regression methodology does not measure the impact that MI-related underwriting may have on adjusting the factors which are controlled for in the study, such as LTV. Any impact that MI may have on mitigating the risk associated with such factors is likely to be embedded in the model covariates, and would not be reflected in the estimated baseline performance differences between insured and non-insured loans.

Questions or comments relating to this study should be directed to C. Erik Larson, PhD, Director, Promontory Financial Group, email: elarson@promontory.com, phone: 202-384-1200.

## 1. Introduction

This study presents the results obtained by Promontory Financial Group in its review and assessment of the performance of mortgage loans originated with a second "piggyback" lien compared to first-lien MI-insured mortgage loans originated in the years 2003 to 2007.

Section 1 begins by illustrating the performance differences though descriptive tabular analysis of severe (ever 90 days-past-due) delinquency rates and through graphical comparison of vintage cumulative delinquency curves. A conclusion from the tabular and vintage curve analysis is that it will be important to control simultaneously for a potentially large number of risk factors, and to do so in a way that is sensitive to the time-varying impact that such factors may have over the life of the mortgage. An appropriate framework by which to control for such effects in a time-sensitive manner will require a relatively sophisticated modeling approach, that of statistical survival analysis.

Section 2 discusses the need to employ survival analysis in order to control for the presence of "censored" observations in the mortgage data. In the present context, censored observations correspond to the measured time-to-default of those accounts which have not defaulted and remain open at the end of a study period. For a censored observation, it is only known that the actual time to default or payoff will exceed the observed value. Since longer-lived accounts are more likely to be censored, analysis based solely on non-censored observations is likely to result in biased statistical estimates. Note that there are two "events" which may end a mortgage account lifetime: the first is default; the second is payoff. Since either of these two events may impact the probability of observing the other, we consider a "competing risks" survival analysis, though we continue to focus on the risk of extreme delinquency (i.e., default).

Section 3 presents the results from estimation from both simple and extended versions of MI-stratified Cox proportional hazards models, estimated by mortgage interest rate type (fixed rate and adjustable rate). Risk factor parameter estimates are generally in line with expectations as to sign. We also compare the implied baseline survival curves from the estimated models to smoothed Kaplan-Meier estimates of the empirical survival function. Our modeling approach allows us to produce separate baseline survival estimates for insured and non-insured (with piggyback) mortgages. These baseline curves have been controlled for the impact of risk factors on performance in a way that cannot accomplished by simple tabular or graphical analysis of empirical data. Overall, our analysis is supporting of the assertion that the historical performance of first lien MI-insured loans has been associated with lower rates of extreme delinquency or default, when compared to non-insured first lien loans accompanied by a piggyback second lien, and when controlling for various risk factors.

Section 4 concludes.

## 2. Mortgage Performance Data

The data obtained by Promontory for this study contain performance information for 5,676,428 individual residential mortgages. The data were provided by Genworth Financial in 2011, who obtained them from First American CoreLogic's servicing database.

There are a number of reasons why the loans in the Genworth-provided dataset might not mirror those in the population as a whole.

- First, and most importantly, both the current and original Genworth study focus exclusively on loans with <20% down payment (>80% Loan-to-Value), which is only a portion of the first-lien origination market. Loans with LTV in excess of 80% represent approximately 20% of the overall market.
- Second, the CoreLogic database does not cover 100% of the loan market, as not all servicers are CoreLogic customers. Their coverage over the study period is over 60% of loans originated. This fact reduces both the number of piggyback and insured loans in the Genworth dataset, relative to the population. However, the missing servicers during the study period were mainly large diversified national-level players, and there is no reason to think that their omission should have a systematic selectivity bias on the representativeness of mortgage types in our dataset.
- Third, CLTV is not reported on 100% of loans in the CoreLogic dataset. Genworth's definition of a "loan with a piggyback" is a first lien loan with LTV=80 and with reported CLTV >80. This definition serves to reduce the number of piggybacks potentially included in the study, while not reducing insured loans.
- Finally, certain exclusions had already been applied to the dataset before Promontory received it. These included excluding records with missing FICO at origination.

To limit and ensure the comparability of our analysis, Promontory further excluded loans with:

- Missing region;
- Combined loan-to-value (CLTV) greater than 105%;
- Categorization of 'Non Insured, Sold'; and
- A mismatch between the origination date in the dataset and the origination date as calculated from the performance history.

Of the records provided by Genworth, 5,492,097 were used in the benchmarking and vintage curve analysis described below.

## a. Descriptive Statistics

This section presents summary tabular analyses illustrating how insured vs. non-insured (with piggyback) mortgage performance differs with various risk factors that are typically thought to be indicative of borrower or product risk.

Promontory used the performance definition of "ever 90 days past due or worse" (including foreclosure and "real estate owned"), a loan-level variable calculated by Genworth and provided on the analysis dataset. This variable is a measure of severe delinquency and is closely related to the definition of default used by most servicers.

Table 1 presents the lifetime cumulative delinquency rates corresponding to our performance definition (ever 90 days past due or worse). In all years except for 2003, the calculated piggyback delinquency rates are higher than the insured delinquency rates. The overall bad rate on the analysis dataset was 19.44% for insured loans and 29.09% for piggyback loans.

**Table 1: Delinquency Rates by Origination Year**

| Origination Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2003-2007 |
|---|---|---|---|---|---|---|
| Insured | 12.10% | 16.15% | 20.49% | 24.34% | 27.75% | 19.44% |
| Non-Insured with Piggback | 9.40% | 16.18% | 27.47% | 36.73% | 34.80% | 29.09% |

Table 2 illustrates how delinquency rates increase with Combined Loan-to-Value (CLTV). For the insured mortgages, the CLTV value is the same as the LTV of the first lien; for non-insured mortgages, the CLTV represents the combined LTV of both the first and second (piggyback) liens.

**Table 2: Delinquency Rates by CLTV**

| Combined LTV at Origination | 80-85 | 85-90 | 90-95 | 95-100 |
|---|---|---|---|---|
| Insured | 16.14% | 17.29% | 17.57% | 21.97% |
| Non-Insured with Piggback | 30.90% | 29.77% | 21.80% | 33.47% |

As expected, increasing FICO scores are associated with lower delinquency rates, with piggyback loans having higher delinquency rates in all FICO score bands, as documented in Table 3.

**Table 3: Delinquency Rates by FICO Score**

| Origination FICO | 350-619 | 620-659 | 660-699 | 700-719 | 720-739 | 740-759 | 760+ |
|---|---|---|---|---|---|---|---|
| Insured | 34.56% | 24.29% | 18.53% | 15.25% | 12.47% | 9.90% | 7.04% |
| Non-Insured with Piggback | 50.05% | 46.35% | 37.34% | 32.83% | 28.11% | 22.74% | 15.77% |

Table 4 shows little difference in severe delinquency rates between purchase and refinance purposes for insured loans, while non-insured (with piggyback) loans supporting refinance are significantly riskier than loans supporting a new purchase. These patterns run against the traditional thinking that a loan supporting a new purchase is riskier than one supporting a refinance; however one may need to control for other factors to see the expected relationship in these data.

**Table 4: Delinquency by Loan Purpose**

| Loan Purpose | Purchase | Refinance |
|---|---|---|
| **Insured** | 19.76% | 18.66% |
| **Non-Insured with Piggyback** | 26.42% | 38.00% |

Table 5 illustrates that low documentation loans are more risky than full-documentation loans for both insured and non-insured loans.

**Table 5: Delinquency by Documentation Level**

| Documentation Level | Full | Low |
|---|---|---|
| **Insured** | 17.56% | 24.70% |
| **Non-Insured with Piggyback** | 21.07% | 33.67% |

And finally, Table 6 illustrates the dramatically lower delinquency rates for adjustable rate mortgages that are insured, compared to those that are non-insured. The difference is much smaller for fixed rate loans.

**Table 6: Delinquency by Rate Type**

| Rate Type | Fixed Rate | Adjustable Rate |
|---|---|---|
| **Insured** | 19.33% | 22.45% |
| **Non-Insured with Piggyback** | 20.15% | 41.96% |

## b. Vintage Curves

Vintage curves provide powerful summaries of the performance of insured and piggyback loans. To construct our vintage curves, we plot the cumulative monthly severe delinquency rate over time for loans originated in a given year. For each vintage, we present curves for sub-segments of insured and piggyback loans. We segment using origination FICO (<=620 is SubPrime, >620 Prime) and CLTV (less than or equal to 90% and greater than 90%). The early vintages (2003 through 2005) have 72 months of performance. Vintages 2006 and 2007 have 60 and 48 months of performance, respectively. As shown in Figures 1 and 2, below, for the 2007 vintage, piggyback loans have significantly accelerated and higher lifetime cumulative delinquency. Appendix A presents additional curves.

**Figure 1**
Cumulative Bad Rates for 2007 Vintage and CLTV LE90

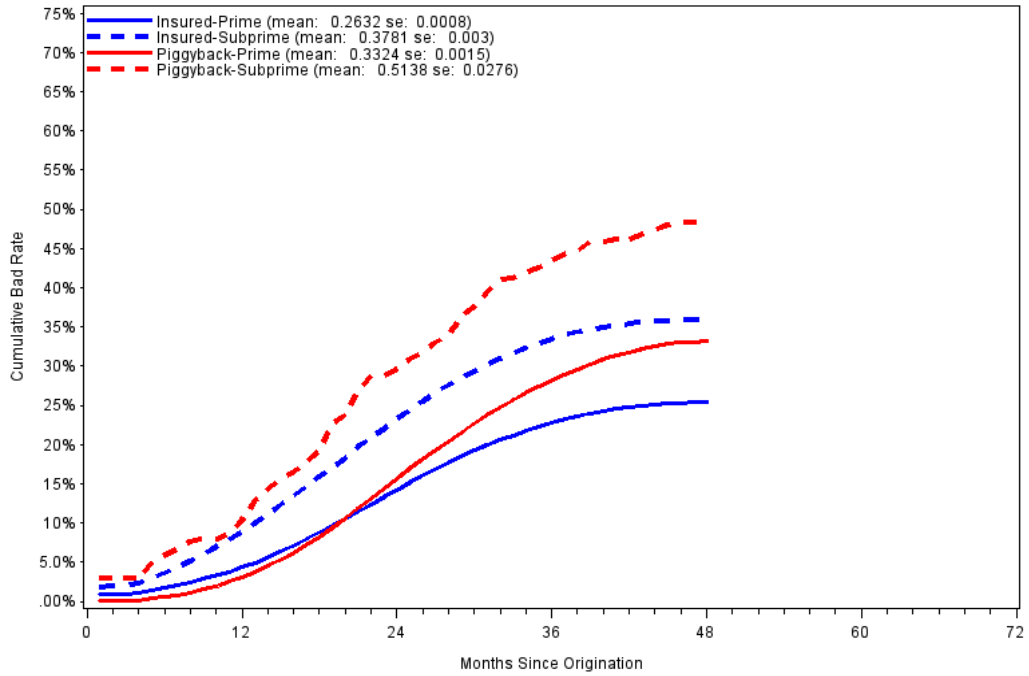
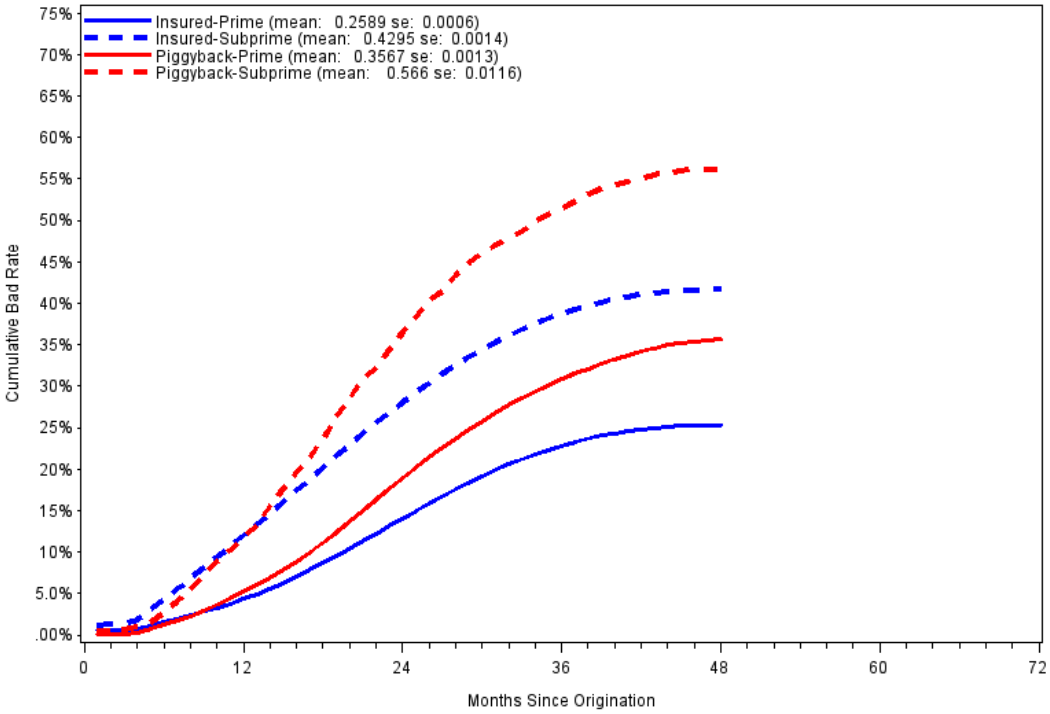



**Figure 2**
Cumulative Bad Rates for 2007 Vintage and CLTV GT90



The tabular analysis and the vintage curve analysis are both strongly suggestive of differing performance characteristics for insured and non-insured (with piggyback) mortgages. However, it is undoubtedly the case that other risk factors, whose level and impact may differ for insured and non-insured (with piggyback) groups, should be controlled for before any conclusions are drawn or stylized facts established.

For instance, while the vintage curves generally illustrate that non-insured loans with piggyback seconds may have cumulative long-term delinquency rates that are higher than their insured counterparts, the vintage curves do at times cross, with insured loan cumulative severe delinquency rates often being greater during the first 12, and in some instances, first 48 months. This occurs even with vintage curves that attempt to control – albeit weakly -- for factors such as origination FICO and CLTV. One potential explanation for this reversal in risk is that differences in payments between the two mortgage types may significantly impact the observed delinquency. In our dataset, and in the population, insured mortgages overwhelmingly have fixed-rate payment structures, while non-insured (with piggyback) mortgages are almost evenly split between fixed- rate and adjustable-rate payment structures. Since initial rate levels of adjustable-rates loans are usually significantly below those carrying a fixed-rate, and because they remain so for months or years before any ARM reset, the initial payments for the fixed rate loans are likely to be significantly higher than the adjustable rate loans. Consequently, it would not be surprising if the higher initial payments of fixed rate mortgages (controlling for CLTV) were associated with an initial higher risk of delinquency for insured, predominantly fixed rate, mortgages.

An obvious takeaway is that it will be important to control simultaneously for a potentially large number of risk factors, and to do so in a way that is sensitive to the time varying impact that such factors may have over the life of the mortgage. Our dataset will allow us to control for such effects, but an appropriate framework in though which to control for such effects in a time-sensitive manner will require a relatively sophisticated modeling approach.

## 3. Survival Models and Analysis

The statistical methods of survival analysis (also called life-table analysis or failure-time analysis) have been developed to analyze the time-to-occurrence of an event as well as the fact of its occurrence. For example, survival analysis has been employed to study the time-to-failure of machine components, time-to-death of patients in a clinical trial, and the duration of unemployment spells of workers.

Introductions to the statistical literature on survival analysis may be found in texts by Kalbfleisch and Prentice (1980), Lawless (1982) and Cox and Oakes (1984). Here, we use survival analysis to model the "lifetimes" of mortgages. Note that there are two "events" which may end a mortgage account lifetime: the first is default, which we have been studying above; the second is payoff. Since either of these two events may impact the probability of observing the other, we consider a "competing risks" survival analysis.

A common feature of survival data is the presence of censored observations. In the present context, censored observations correspond to the measured time-to-default of those accounts which have not defaulted and remain open at the end of a study period. For a censored observation, it is only known that the actual time to default or payoff will exceed the observed value. The study of survival data

typically employs information from both censored and non-censored observations. Since longer-lived accounts are more likely to be censored, survival analysis based solely on non-censored observations is likely to result in biased statistical estimates. Indeed, simple regression analysis of account bad-rates which fails to take account for the impact of censoring is likely to produce biased estimates of the explanatory variables if the censoring is not random or if the mixture of effects is not distributed randomly across censored and uncensored accounts.

## a. Survival and Related Functions

Suppose the population under study consists of mortgage lifetimes for N relatively homogeneous accounts. Each lifetime in the population can be represented by a random variable, $T_i$, where i=1,...,N. If n account lifetimes are to be randomly sampled from the target population, each account will have a potential censoring time (or censoring age) $a_i$ (i=1,...,n). The potential censoring time is determined using the opening date for the account and the closing date for the period during which observations are collected. The sample data consists of n pairs $(c_i,s_i)$, where $s_i=\min(T_i,a_i)$ is the observed lifetime of account i, and $c_i$ is an indicator variable taking the values $c_i=1$ if $T_i \leq a_i$ ($s_i$ is an uncensored observation) and $c_i=0$ if $T_i > a_i$ ($s_i$ is a censored observation).

For the moment, ignore the possibility of censoring. Distributional characteristics of a population of random account lifetimes $T_i$ are summarized by a distribution function, F(t), and survival function, S(t), here defined as

$$F(t) = 1 - S(t) = Probability(T_i < t).$$

F(t) and S(t) are both defined for $0<t<\infty$. Using statistical survival analysis, one can use sample data to make reliable inferences about these population functions.

Note that F(t) reports the proportion of accounts in the population with lifetimes less than t, while S(t), reports the proportion of accounts with lifetimes greater than or equal to t. Also, as t increases from zero, F(t) monotonically increases from zero toward one, while S(t) monotonically decreases from one toward zero.

Closely related to the distribution function, F(t), is the density function, f(t). When t is measured in continuous units, f(t) is defined by

$$f(t) = \partial F(t)/\partial t.$$

The density function can be thought of as the instantaneous probability of the account lifetime ending at t.

The hazard function or age-specific failure rate function, h(t), is related to the distribution, survival and density functions. The hazard function is defined by

$$h(t) = f(t)/S(t).$$

The hazard, h(t), may be interpreted as the "instantaneous" conditional probability that an account will close at age t, given that it has remained open to at least age t. Hazard functions are particularly useful in the analysis of account lifetimes, since they specify the risk of immediate closure of an open account

at age t. The choice of an appropriate statistical model for account lifetimes is aided by the careful study of empirical hazard functions constructed from sample data.

The distribution, survival, density and hazard functions are mathematically equivalent representations of the distributional characteristics of a population of account lifetimes, since each one of them can be derived given any of the others.

## b. Cox Proportional Hazard Models

As part of this study, Promontory estimated a Cox Proportional Hazard (PH) Model to investigate and quantify the relative performance of piggyback and insured loans while controlling for loan-level factors that are commonly thought to be important in describing loan performance. The Cox Proportional Hazard Model is originally due to David Cox (1972). The model has been extended significantly by others (see Therneau and Grambsch (2000)), and has received widespread empirical application. The model is usually written as

$$h_i(t) = \lambda_0(t)\, Exp(\beta_1 X_{i1t} + \beta_2 X_{i2t} + \ldots + \beta_k X_{ikt}).$$

This model specifies that the hazard rate for individual "i" at time "t" is made up from the product of two components: a non-negative "baseline" hazard function $\lambda_0(t)$, and an individual-specific proportionality factor $Exp(\beta_1 X_{i1t} + \beta_2 X_{i2t} + \ldots + \beta_k X_{ikt})$, where $X_{i1t}, X_{i2t}, \ldots, X_{ikt}$ are the values of the observed , possibly time-varying, covariates (hence the indexing of the individual covariates by t.[1]) The corresponding covariate coefficients, $\beta_1, \beta_2, \ldots \beta_k$, are unknown parameters which have to be estimated from the data.

Taking natural logs, the model is also written as:

$$\log h_i(t) = \alpha_0(t) + \beta_1 X_{i1t} + \beta_2 X_{i2t} + \ldots + \beta_k X_{ikt},$$

The Proportional Hazards Model gets its name from the fact that the ratio of hazards for any two individuals is given by the ratio or their proportionality factors. However, there is sometimes a reason to believe that the proportionality assumption underlying the Cox specification might not be warranted, and that it is appropriate to consider extensions of the model for non-proportional hazards. One such extension is through "stratification."

In a stratified model, there is a presumption that the hazards of two (or more) groups of individuals may be written as

$$\log h_i(t) = \alpha_1(t) + \beta_1 X_{i1t} + \beta_2 X_{i2t} + \ldots + \beta_k X_{ikt}, \text{ for individuals } i \text{ that are members of group 1, and}$$

$$\log h_j(t) = \alpha_2(t) + \beta_1 X_{j1t} + \beta_2 X_{j2t} + \ldots + \beta_k X_{jkt}, \text{ for individuals } j \text{ that are members of group 2.}$$

These two specifications can be combined into a single specification for both groups by writing

$$\log h_i(t) = \alpha_c(t) + \beta_1 X_{i1t} + \beta_2 X_{i2t} + \ldots + \beta_k X_{ikt}, \text{ where } \alpha_c(t) = \alpha_1(t) D_{i1} + \alpha_2(t) D_{i2}$$

[1] In order to incorporate time-varying covariates, we utilize a representation of the survival model as a counting process; see Hosmer and Lemeshow (1999), Appendix 2.

where $D_{i1}$ and $D_{i2}$ are zero-one indicator functions identifying an individual's membership in group 1 or 2.

In order to estimate the Cox PH model, methods of partial likelihood maximization are employed (which allows one to avoid specifying the baseline hazard function.)[2] In the case of a stratified model, partial likelihood estimation requires a slightly more complex estimation procedure. Separate partial likelihoods functions are first constructed for each stratification group; these functions are then multiplied together to form an aggregate partial likelihood model that is maximized though numerical estimation of the coefficient vector **β**.

## 4. Estimation

### a. The Survival Analysis Modeling Dataset

Due to the size of the Genworth dataset and the computational demands in terms of memory and time required to estimate the partial likelihood algorithms for the alternative survival models, particularly in the presence of time-varying covariates , Promontory did not find it feasible to estimate the stratified proportional hazard models with the full dataset that had been provided by Genworth. Instead, we have utilized a 10% randomly selected subsample for use as a modeling dataset.[3] This dataset is still very large, containing 538,500 mortgage lifetimes. Summary information is given in the following table.

**Table 7: Counts and Dispositions of Observations in the Modeling Dataset**

| Rate Type | Type | Default | Paid Off | Paying | Total by Rate Type |
|---|---|---|---|---|---|
| All Rate Types | Insured | 83,641 | 144,807 | 203,240 | 538,500 |
| | Non-insured w/ Piggyback | 31,198 | 33,323 | 42,291 | |
| Fixed Rate | Insured | 73,764 | 126,260 | 188,923 | 452,026 |
| | Non-insured w/ Piggyback | 12,774 | 21,275 | 29,030 | |
| Adjustable Rate | Insured | 9,877 | 18,547 | 14,317 | 86,474 |
| | Non-insured w/ Piggyback | 18,424 | 12,048 | 13,261 | |

Appendix B contains additional summary information on loans characteristics in the modeling dataset.

### b. Results

#### *Estimation of Nonparametric (Empirical) Survival Curves*

Rather than proceeding directly to the estimation of a stratified proportional hazards model, it will be useful to first consider the empirical survival distribution curves for default that are implied by the sample data. To this end, we have constructed smoothed estimates of the empirical survival function using the method of Kaplan and Meier (1958.) Figures 3 and 4 show the empirical, or non-parametric, estimated default survival curves for insured and non-insured (with piggyback) mortgage loans, computed for subsamples defined by whether the loans were of fixed rate or adjustable rate type.

[2] Estimation of Cox Proportional Hazards and other survival models is discussed in Kiefer (1988).

[3] Promontory has obtained similar results with alternative randomly selected samples of a similar size.

These curves, as do all the estimates presented in this section, focus exclusively on the risk of default, and treat the competing risk of payoff as a censoring event. This approach is a conventional and meaningful way to present results for a risk of interest (here, default) when competing risks are present.

**Figure 3. Empirical Survival Curve Estimate, Fixed Rate Loans**

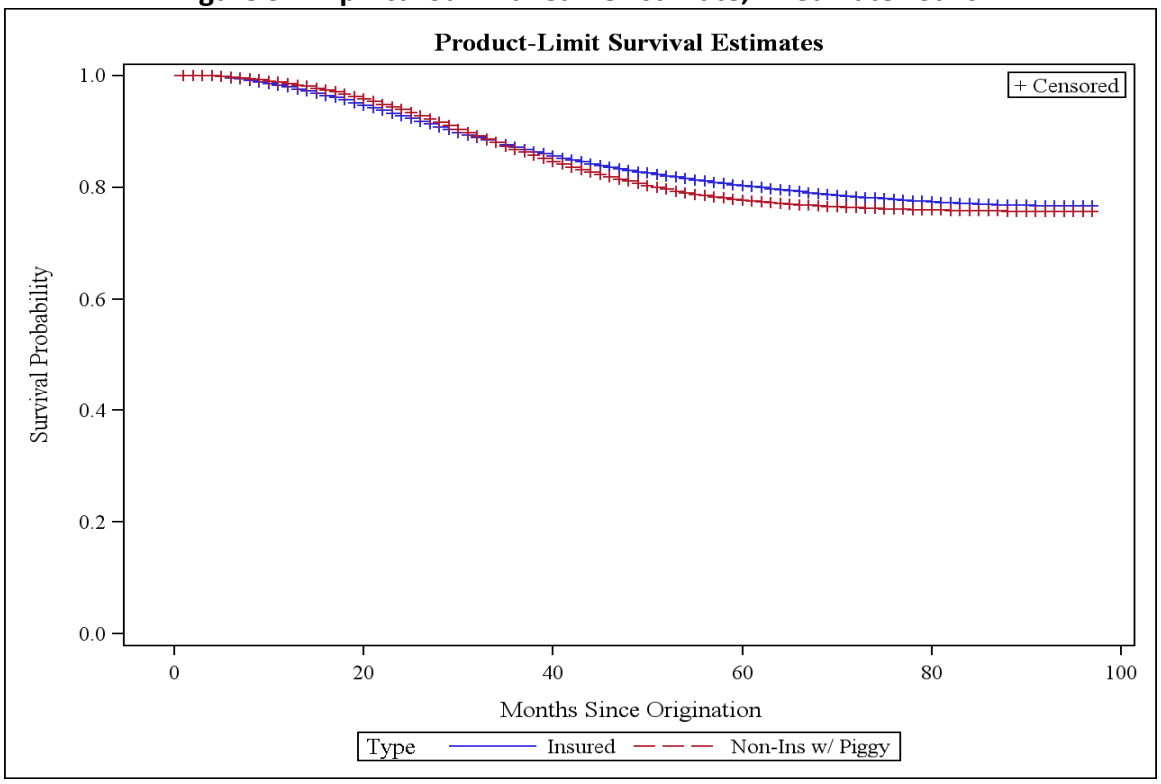
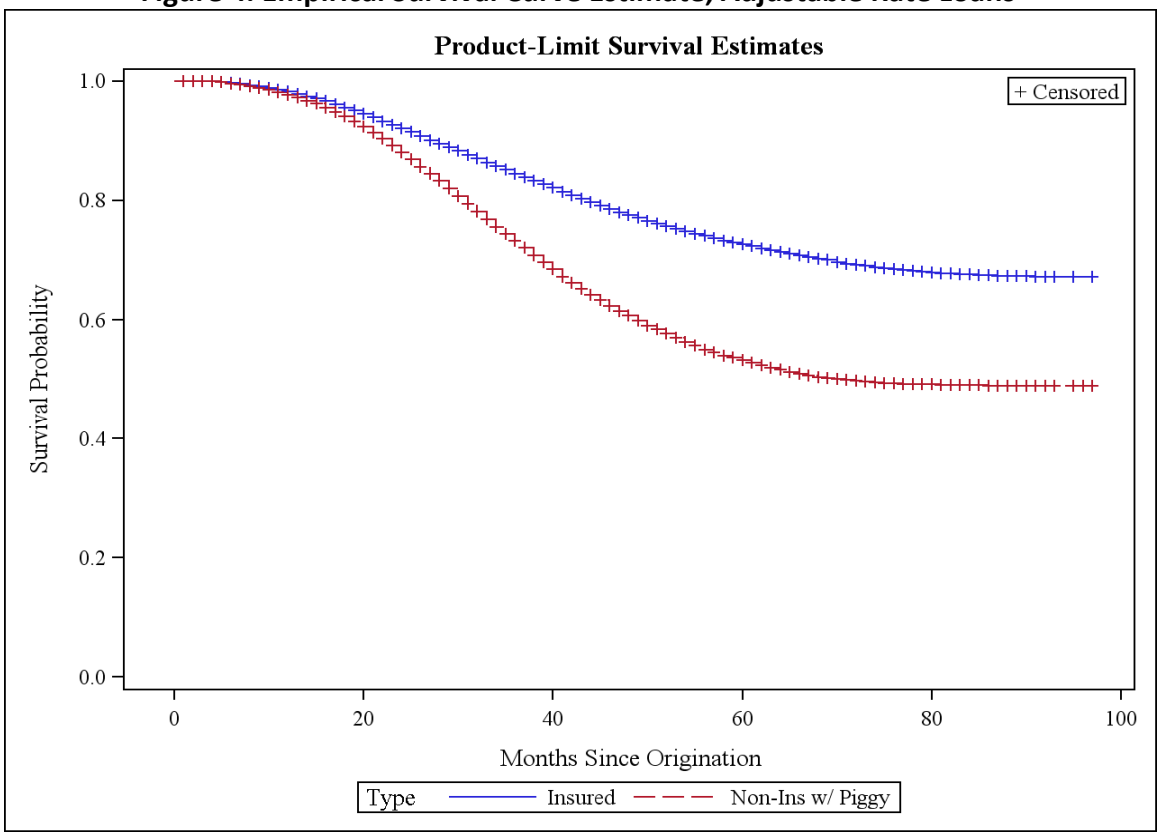


**Figure 4. Empirical Survival Curve Estimate, Adjustable Rate Loans**




Note that even in the empirical survival curves, the long-term higher default risk associated with non-insured loans having piggyback second liens is easy to identify. This is particularly true for the adjustable rate loans, where the survival proportion for the uninsured mortgages ultimately drops well below that of the insured loans.

### *Estimation of a Stratified Proportional Hazards Model*

We are now ready to turn to the estimation of the stratified Cox proportional hazards model. As suggested earlier, we have chosen to specify a model in which we include additional covariates and in which we estimate separate stratified models for subsets of our sample, with loans grouped by rate type. Part of the rationale for estimating different models for different rate types (fixed vs. adjustable) is that borrower behavior in response to changes in economic conditions is likely to be very different across these products. Furthermore, differences in mortgage product types or borrower underwriting practices may exist that are unobservable in our data, but which may result in different magnitudes of the estimated covariate coefficients or in different baseline hazard and survival estimates.

### Covariates

The covariates in our model include several zero-one categorical (or dummy) variables. For each of these variables, a case that has one of the characteristics is coded as a one, and cases without the characteristic are coded as a zero. These variables include the following

- Documentation level (low or full documentation, with full documentation = 1);
- Loan purpose (purchase or refinance, with purchase = 1), and
- Occupancy status (Owner-occupied or not, with owner-occupied = 1).

The model also includes four continuous variables measured at the time of loan origination:

- Combined Loan-to-Value;
- FICO score at origination;
- Original Interest Rate, and
- Original Payment, a constructed variable equal to Original Loan Balance X Initial Interest Rate.

Finally, the model includes four time-varying covariates:

- Interest Rate Differential( t) = Original Interest Rate - Market Interest Rate(t)
- Change in Payment(t) = [Original Interest Rate - Market Interest Rate(t) ] x Original Balance
- Change in Value(t) = (Original Value) x [%Change in Case-Shiller Index(t)], and
- Unemployment Rate(t)

The seasonally adjusted civilian unemployment rate and Case-Shiller Index data were matched to each loan based upon MSA/CBSA if available; otherwise a state or national level measure was used, respectively. The market interest rate data was obtained from Freddie Mac, and it was matched based upon the rate type of the loan. Fixed rate loans were matched to the monthly average of the average weekly 30-year rate; adjustable rate loans were matched to the monthly average of the average weekly 1-year rate.

## Parameter Estimates

Table 8 presents estimation results for the fixed rate and adjustable rate loan group models. Recall that each estimated rate type model has been stratified across insured and non-insured mortgage classes. As a result, we have two sets of parameter estimates, with a given parameter set applying equally to both strata within a given rate group.

The estimated coefficients have signs that are consistent with expectations (recall that due to the proportional hazard specification, a positive parameter indicates that the hazard of default is increasing with the covariate value).

**Table 8: Cox Stratified Proportional Hazards Model Parameter Estimates**

| Loan Type | Fixed Rate | Adjustable Rate |
|---|---|---|
| **Documentation Level (1=Low)** | 0.37310 | 0.76391 |
| **Loan Purpose (1=Purchase)** | -0.05802 | -0.22628 |
| **Occupancy Status (1=Owner-Occupied)** | -0.14402 | -0.38135 |
| **Combined LTV at Origination** | 0.02400 | 0.03127 |
| **FICO Score at Origination** | -0.00880 | -0.00589 |
| **Original Interest Rate** | 0.21298 | -0.12347 |
| **Original Payment (Original Int. Rate*Original Balance)** | -0.00478 | 0.01213 |
| **Rate Differential (Original Int. Rate - Market Int. Rate)** | 0.15648 | 0.09901 |
| **Change in Payment (Original Int. Rate - Market Int. Rate)*Original Balance** | 0.04650 | -0.00108** |
| **Change in Value (Original Value)*(%Change in Case Shiller Index)** | 0.04439 | 0.02643 |
| **Unemployment Rate** | 0.16021 | 0.18988 |

*Note: **Estimate not significantly different from zero. All other estimates are significant at the 0.0001 level.*

Low documentation, non owner-occupied, high CLTV, and low FICO loans are of greater default risk than loans with the opposite characteristics. Somewhat surprisingly, loans supporting refinancing are of greater risk than loans supporting a new purchase – a result seen in the simple descriptive statistics for this period. The coefficients on the time varying covariates measuring the rate differential between original and current market rates, the change in payment and the change in value are also positive. The greater the difference between the original interest rate and the current market rate, or the greater the different between the original home value and the current implied market value (i.e., the absolute value of potential equity loss), the greater the default risk. Similarly, the higher the current level of unemployment in the MSA or state when the property is located, the higher the default risk. All these impacts are similar across both fixed rate and adjustable rate mortgage groups.

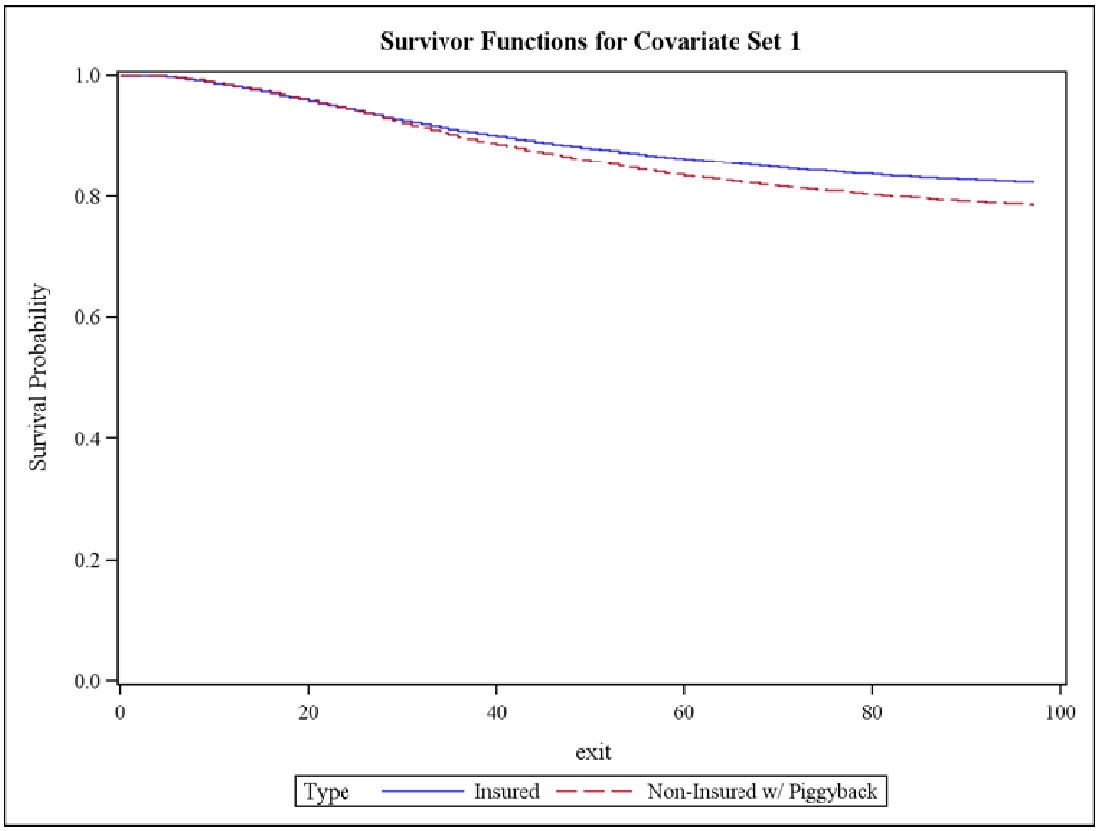
In contrast, when we consider the impact of the level of the original interest rate or the level of the original payment, the signs of the coefficient estimates are reversed between fixed and adjustable rate groups. However, the sign differences make sense: for fixed rate loans, holding original balance constant, higher original interest rates mean higher fixed payments and higher default risk. For

adjustable rate loans, the higher original rate probably implies that the risk of a payment shock when the original rate adjusts to market rates is lowered, along with default risk.

## Baseline Survival Curve Estimates

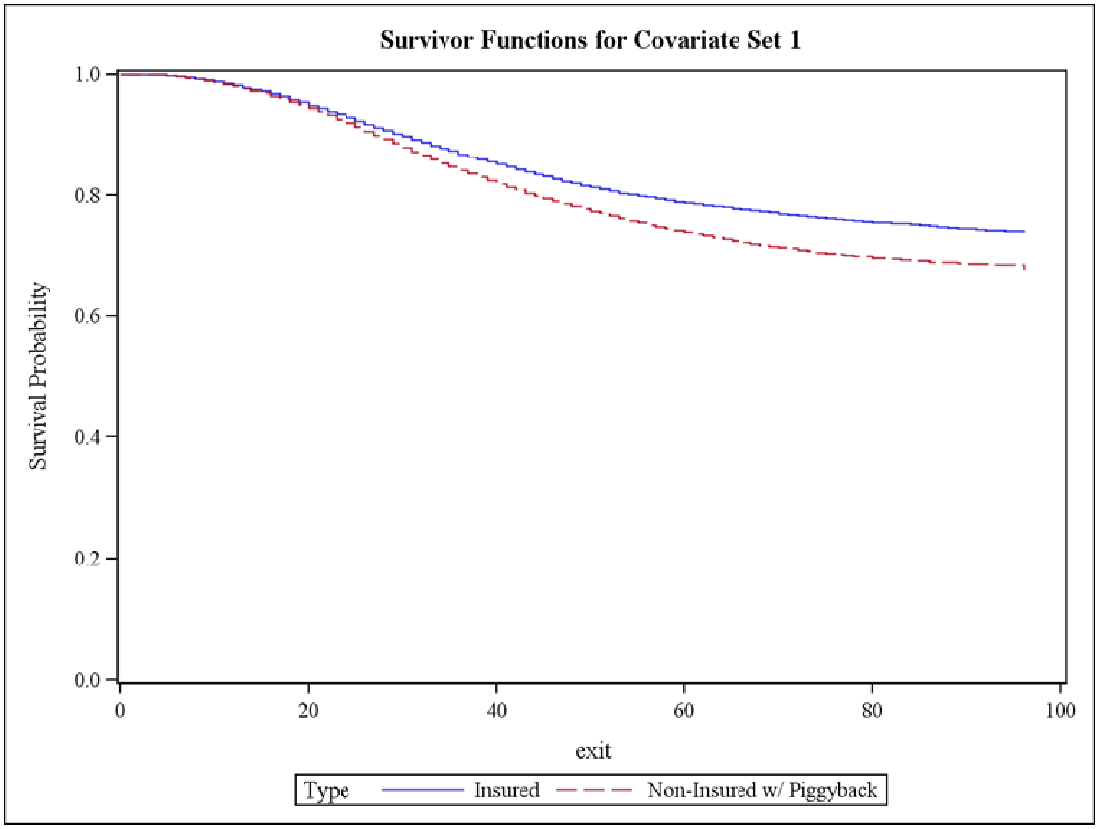
To illustrate the differences between insured and non-insured loans, it is useful to compare the implied baseline survivor functions for the strata corresponding to our estimated set of models[4]. Figures 4 and 5 shows the implied baseline survival curves resulting from our stratified Cox PH model; estimates reflect the survival probability at month t, evaluated at the mean value covariates across the sample population. Effectively, these baseline survival curve estimates illustrate the fundamental differences in performance between insured and non-insured loan groups, controlling simultaneously and equally for all the effects we have been able to attribute to covariates.

**Figure 5. Parametric Baseline Survival Curve Estimates, Fixed Rate Loans**




[4] The baseline hazards and survival functions are estimated as arbitrary functions of time through implementation of a restricted maximum likelihood estimation of the $\alpha_c(t)$ function, in which the covariates for explanatory variables are restricted to their previously estimated values.

**Figure 6. Parametric Baseline Survival Curve Estimates, Adjustable Rate Loans**




In these curves, the higher default risk associated with the non-insured (with piggyback) loans is very clear – at times even more so than in the empirical survival curves (which did not control for the effect of covariates). For both fixed rate and adjustable rate mortgages, controlling for the impact of covariates results in implied baseline (strata specific) survival curve estimates in which insured loans continue to demonstrate lower extreme delinquency and default risk than non-insured (with piggyback) loans.

Tables 9 and 10 respectively present the estimated numerical baseline survival rates and cumulative default rates, by strata, for selected months-since-origination. Overall, across both fixed and adjustable rate loans, the proportion of non-insured loans surviving to 72 months was .798, compared to .833 for insured loans. Significantly, as shown in Table 10, this difference implies that the baseline cumulative default rate of non-insured loans is 20.98% percent higher than that of insured loans.

**Table 9. Estimated Baseline Survival Rates, S(t)**

**Proportion Surviving to Selected Months**

| Rate Type | Type | Months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 12 | 24 | 36 | 48 | 60 | 72 |
| All | Insured | 0.983 | 0.943 | 0.903 | 0.873 | 0.851 | 0.833 |
| | Non-Insured w/ Piggyback | 0.983 | 0.942 | 0.890 | 0.851 | 0.820 | 0.798 |
| | Percent Difference (Non-Insured relative to Insured ) | *0.04%* | *-0.13%* | *-1.44%* | *-2.52%* | *-3.65%* | *-4.20%* |
| Fixed Rate | Insured | 0.983 | 0.946 | 0.910 | 0.884 | 0.863 | 0.846 |
| | Non-Insured w/ Piggyback | 0.983 | 0.946 | 0.900 | 0.865 | 0.835 | 0.815 |
| | Percent Difference (Non-Insured relative to Insured ) | *0.08%* | *0.04%* | *-1.13%* | *-2.15%* | *-3.22%* | *-3.66%* |
| Adj. Rate | Insured | 0.983 | 0.930 | 0.869 | 0.820 | 0.788 | 0.767 |
| | Non-Insured w/ Piggyback | 0.981 | 0.920 | 0.841 | 0.782 | 0.740 | 0.710 |
| | Percent Difference (Non-Insured relative to Insured ) | *-0.19%* | *-0.99%* | *-3.16%* | *-4.62%* | *-6.10%* | *-7.32%* |

**Table 10: Estimated Baseline Cumulative Default Rates, F(t)**

**Cumulative Proportion Defaulting by Selected Months**

| Rate Type | Type | Months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 12 | 24 | 36 | 48 | 60 | 72 |
| All | Insured | 0.017 | 0.057 | 0.097 | 0.127 | 0.149 | 0.167 |
| | Non-Insured w/ Piggyback | 0.017 | 0.058 | 0.110 | 0.149 | 0.180 | 0.202 |
| | Percent Difference (Non-Insured relative to Insured ) | *-2.15%* | *2.09%* | *13.47%* | *17.40%* | *20.79%* | *20.98%* |
| Fixed Rate | Insured | 0.017 | 0.054 | 0.090 | 0.116 | 0.137 | 0.154 |
| | Non-Insured w/ Piggyback | 0.017 | 0.054 | 0.100 | 0.135 | 0.165 | 0.185 |
| | Percent Difference (Non-Insured relative to Insured ) | *-4.60%* | *-0.65%* | *11.38%* | *16.32%* | *20.23%* | *20.10%* |
| Adj. Rate | Insured | 0.017 | 0.070 | 0.131 | 0.180 | 0.212 | 0.233 |
| | Non-Insured w/ Piggyback | 0.019 | 0.080 | 0.159 | 0.218 | 0.260 | 0.290 |
| | Percent Difference (Non-Insured relative to Insured ) | *10.78%* | *13.11%* | *20.99%* | *21.08%* | *22.66%* | *24.02%* |

## c. Diagnostics: Evaluating the Proportional Hazards Assumption

The assumption of the proportional relationship between hazards and covariates that is implied by the Cox model specification should be subjected to an empirical assessment. To perform such an assessment, it is increasingly common to construct residuals along the lines proposed by Schoenfeld (1982). Instead of a single residual for each individual observation, Schoenfeld's method results in

constructing separate residuals for each covariate, for each individual loan, using only those loans that defaulted (were not censored.)

Since the Schoenfeld residuals are, in principle, independent of time, a plot that shows a non-random pattern against time is evidence of violation of the proportional hazards assumption. Appendix C provides plots of the estimated, scaled Schoenfeld Residuals against rank time. The minimal departures from a general, random zero-slope pattern vs. time provide reasonable support for the proportional hazards specification used in our analysis.

## 5. Conclusions

The analysis conducted by Promontory generally confirms the results presented in Genworth's 2010 study, and shows that, controlling for various factors, mortgages with piggyback second lien loans have historically experienced higher lifetime rates of severe delinquency than insured mortgages. This conclusion is supported by tabular analysis, graphical vintage curve analysis and by the results from conducting an analysis using statistical methods of survival analysis.

We present the results from estimation from both simple and extended versions of stratified Cox proportional hazards models, the latter estimated across and by US census region. Risk factor parameter estimates are generally in line with expectations as to sign, although variability in the magnitude of estimates exists across regions. We also compare the implied baseline survival curves from the estimated models to smoothed Kaplan-Meier estimates of the empirical survival function. Our modeling approach allows us to produce separate baseline survival estimates for insured and non-insured (with piggyback) mortgages. These baseline curves have been controlled for the impact of risk factors on performance in a way that cannot accomplished by simple tabular or graphical analysis of empirical data

Overall, our analysis supports the assertion that the historical performance of first lien MI-insured loans has been associated with lower rates of extreme delinquency or default, when compared to non-insured first lien loans accompanied by a piggyback second lien, and when controlling for various risk factors.

In closing, it is important to note that the stratified survival analysis regression methodology we deploy does not measure the impact that MI-related underwriting may have on adjusting the factors which are controlled for in the study, such as LTV. Any impact that MI may have on mitigating the risk associated with such factors is likely to be embedded in the model covariates, and would not be reflected in our estimated baseline performance differences between insured and non-insured loans.

The above point should serve to emphasize the importance of the multi-pronged approach that we have taken to consider the impact of MI, and should stimulate further research on this important issue.

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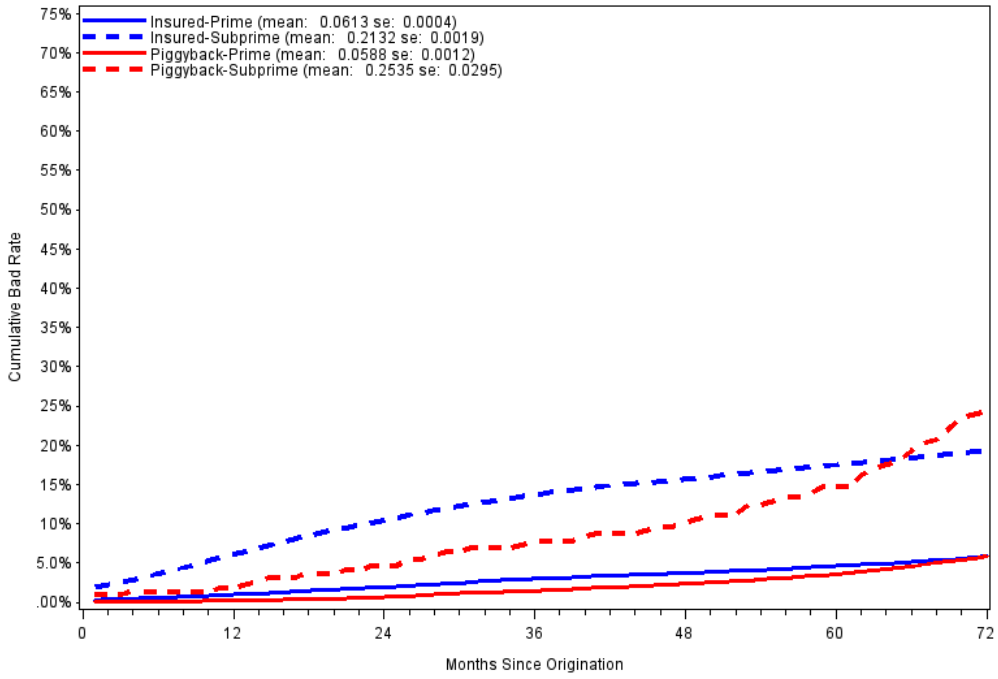
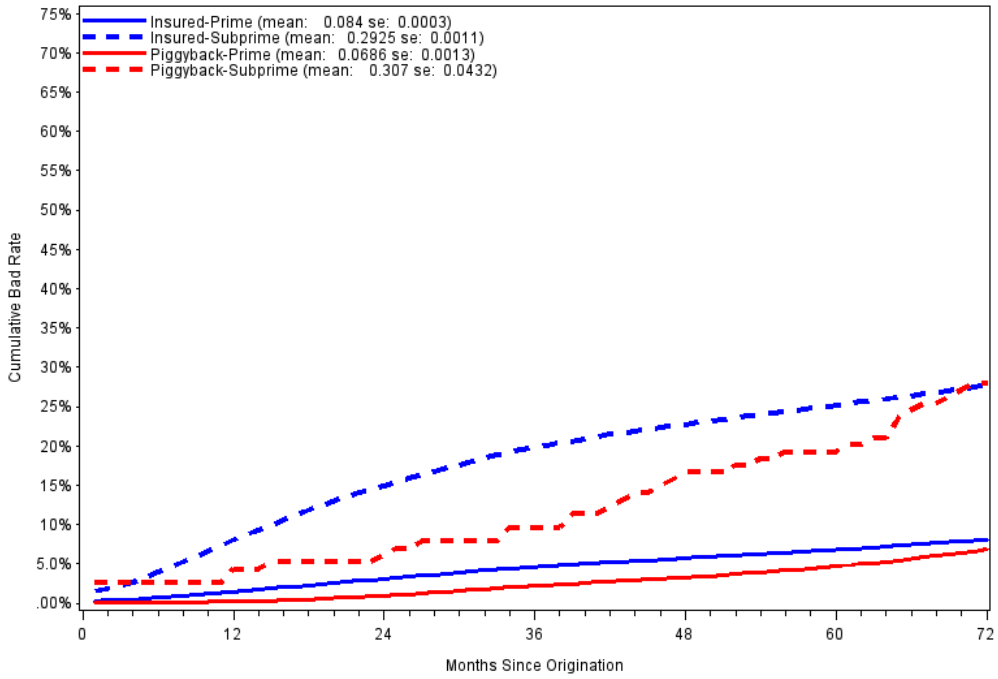
## Appendix A: Vintage Curves

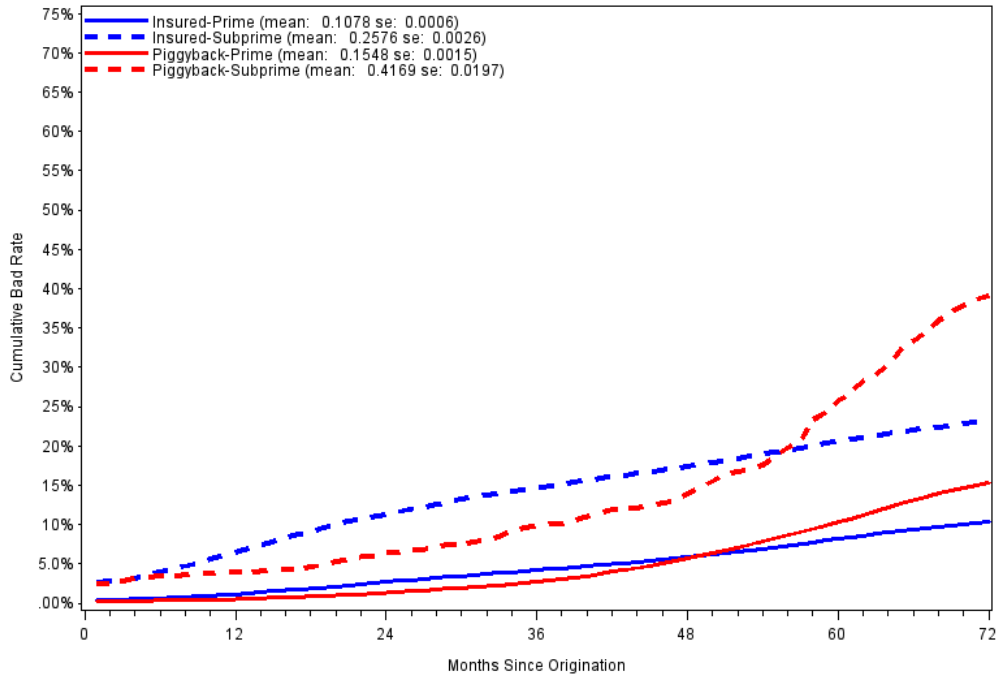
Cumulative Bad Rates for 2003 Vintage and CLTV LE90



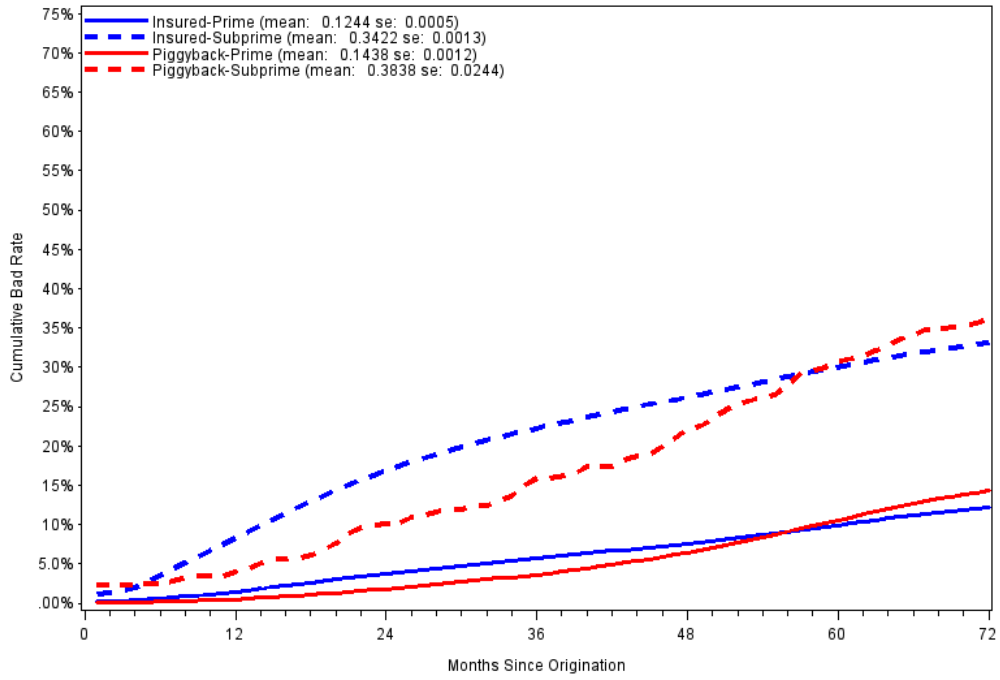

Cumulative Bad Rates for 2003 Vintage and CLTV GT90



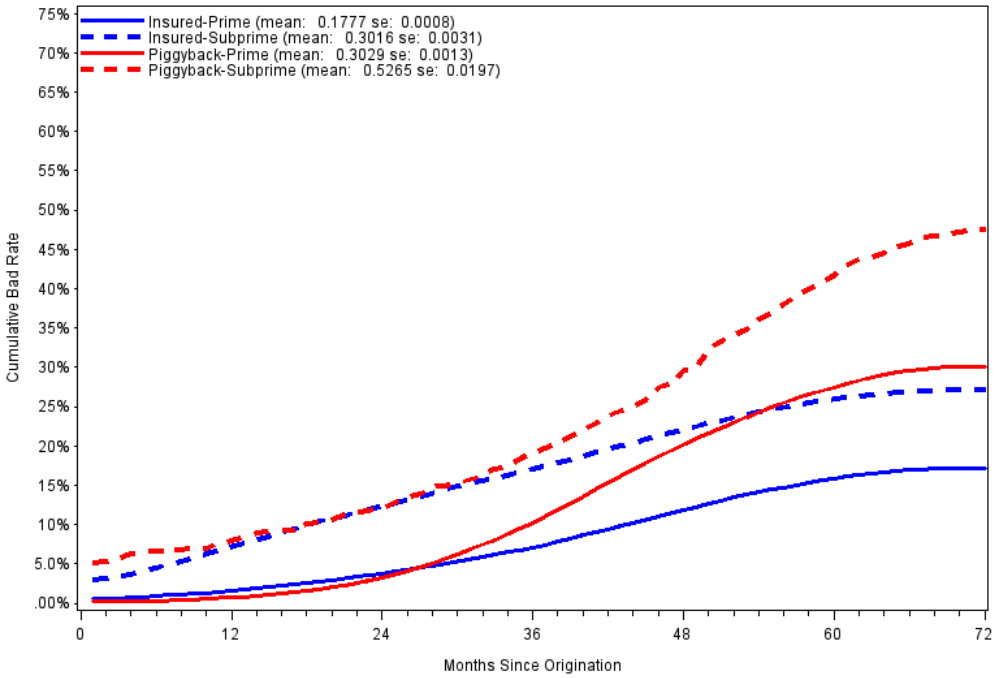
Cumulative Bad Rates for 2004 Vintage and CLTV LE90



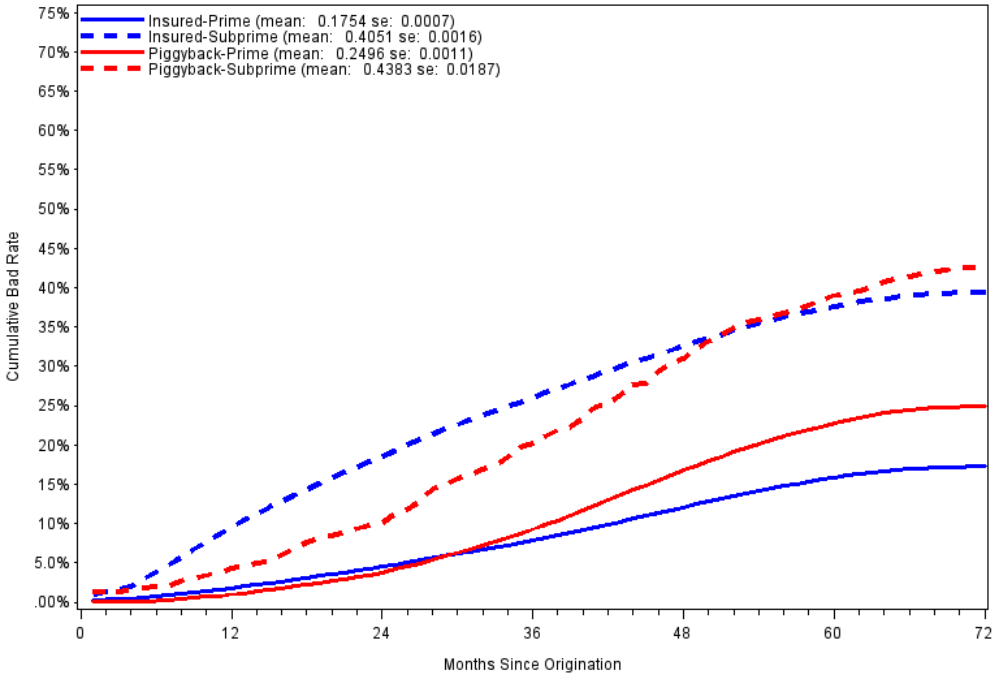

Cumulative Bad Rates for 2004 Vintage and CLTV GT90



Cumulative Bad Rates for 2005 Vintage and CLTV LE90




Cumulative Bad Rates for 2005 Vintage and CLTV GT90



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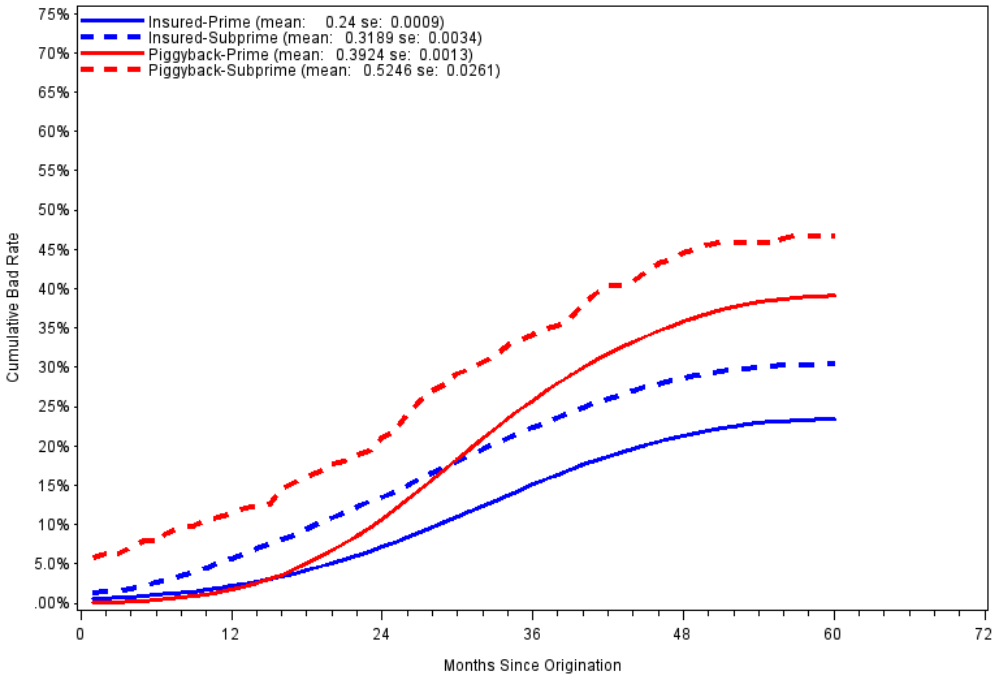
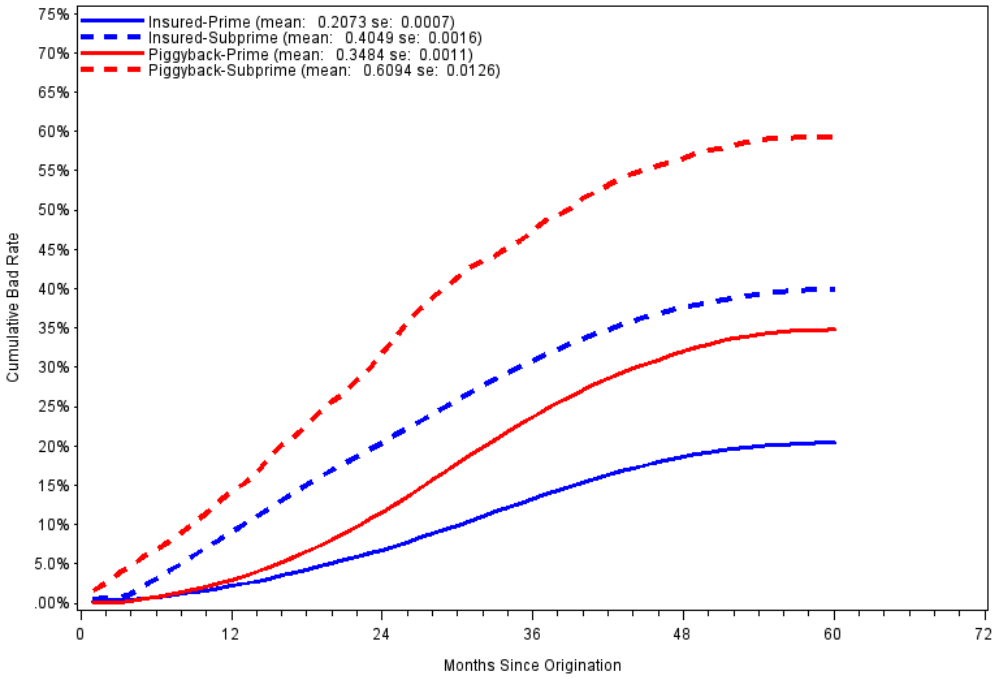



## Cumulative Bad Rates for 2006 Vintage and CLTV GT90



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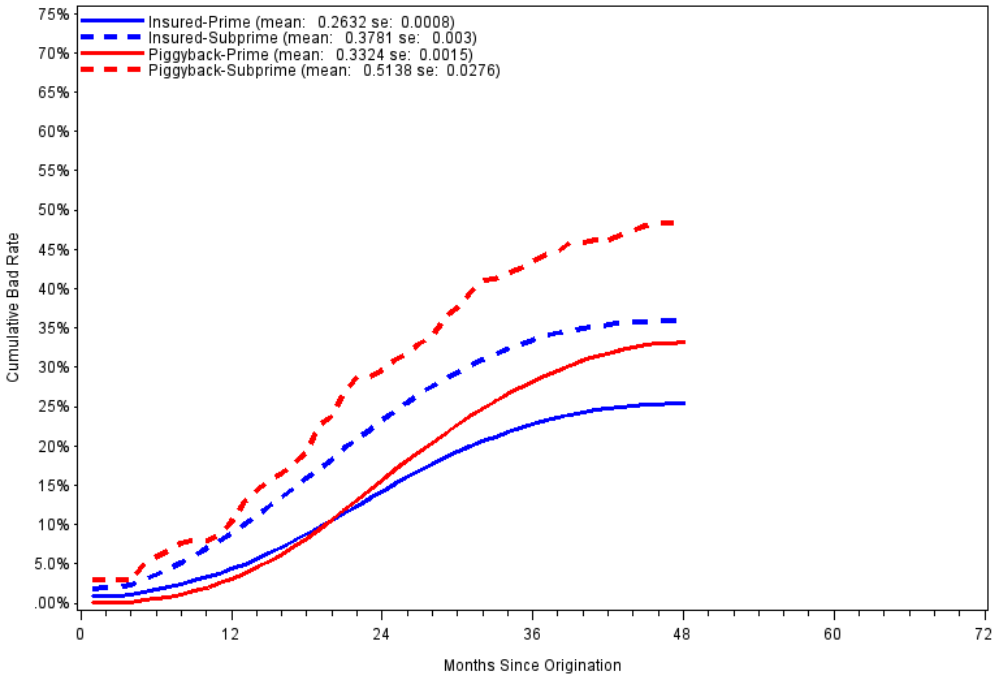


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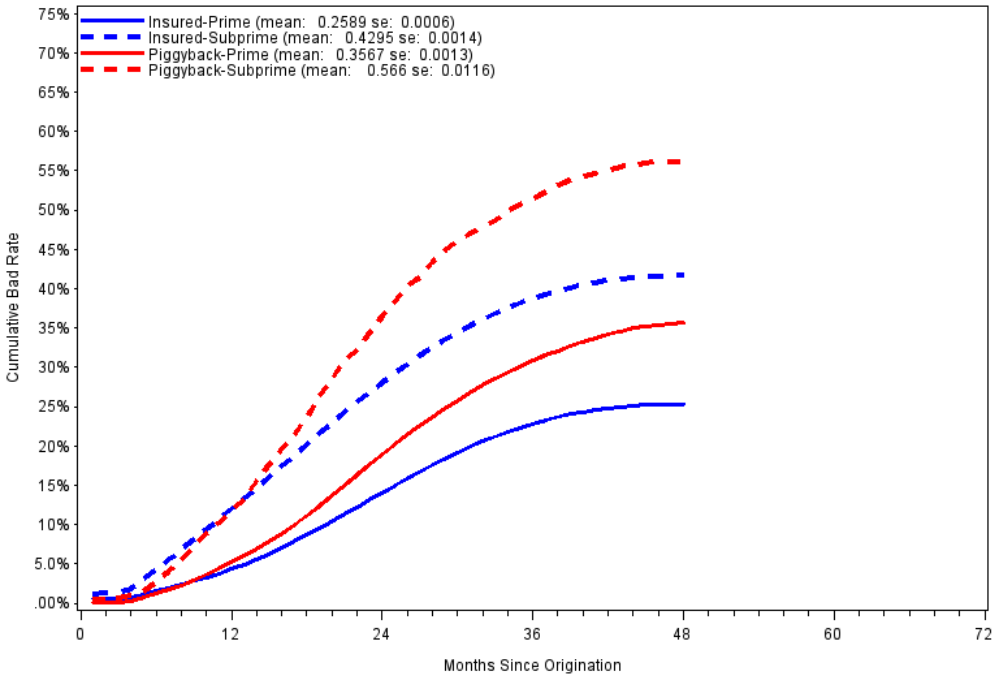
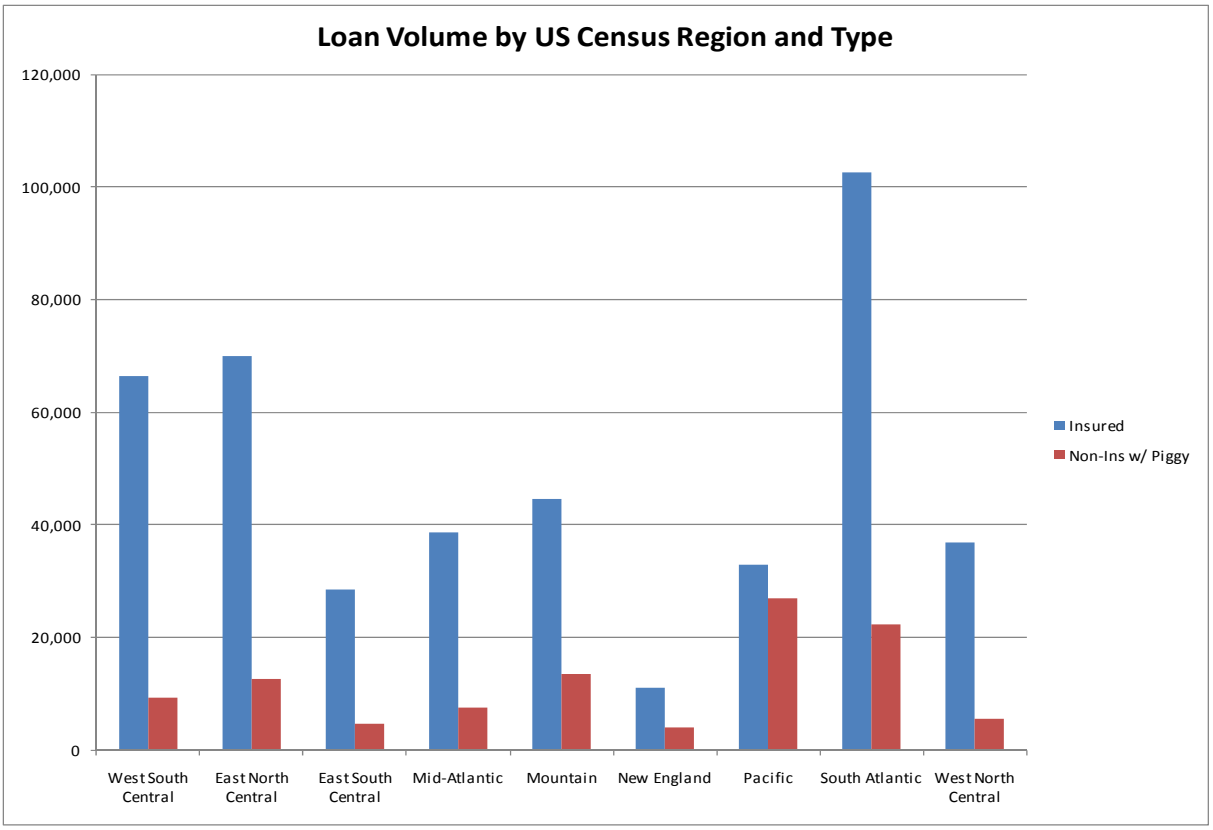
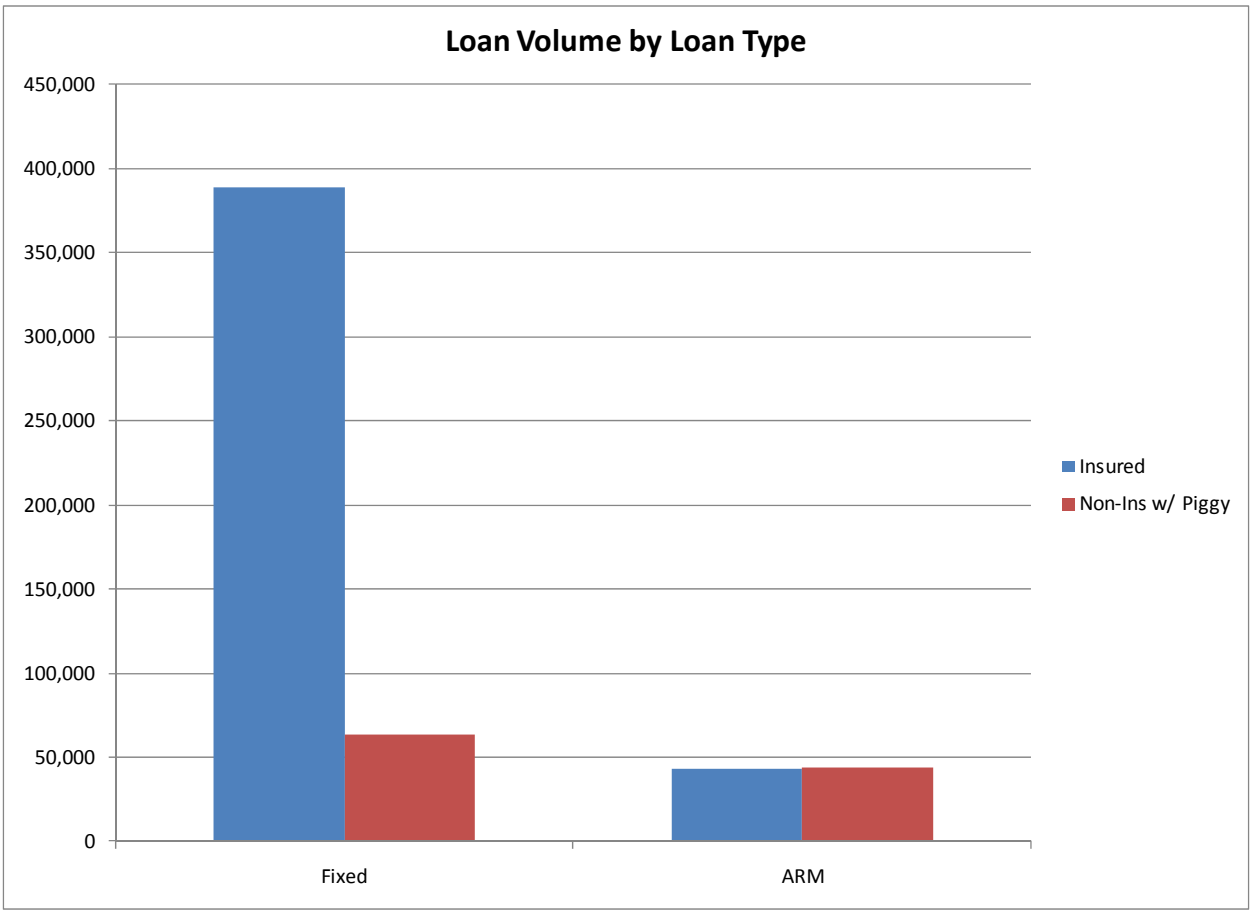
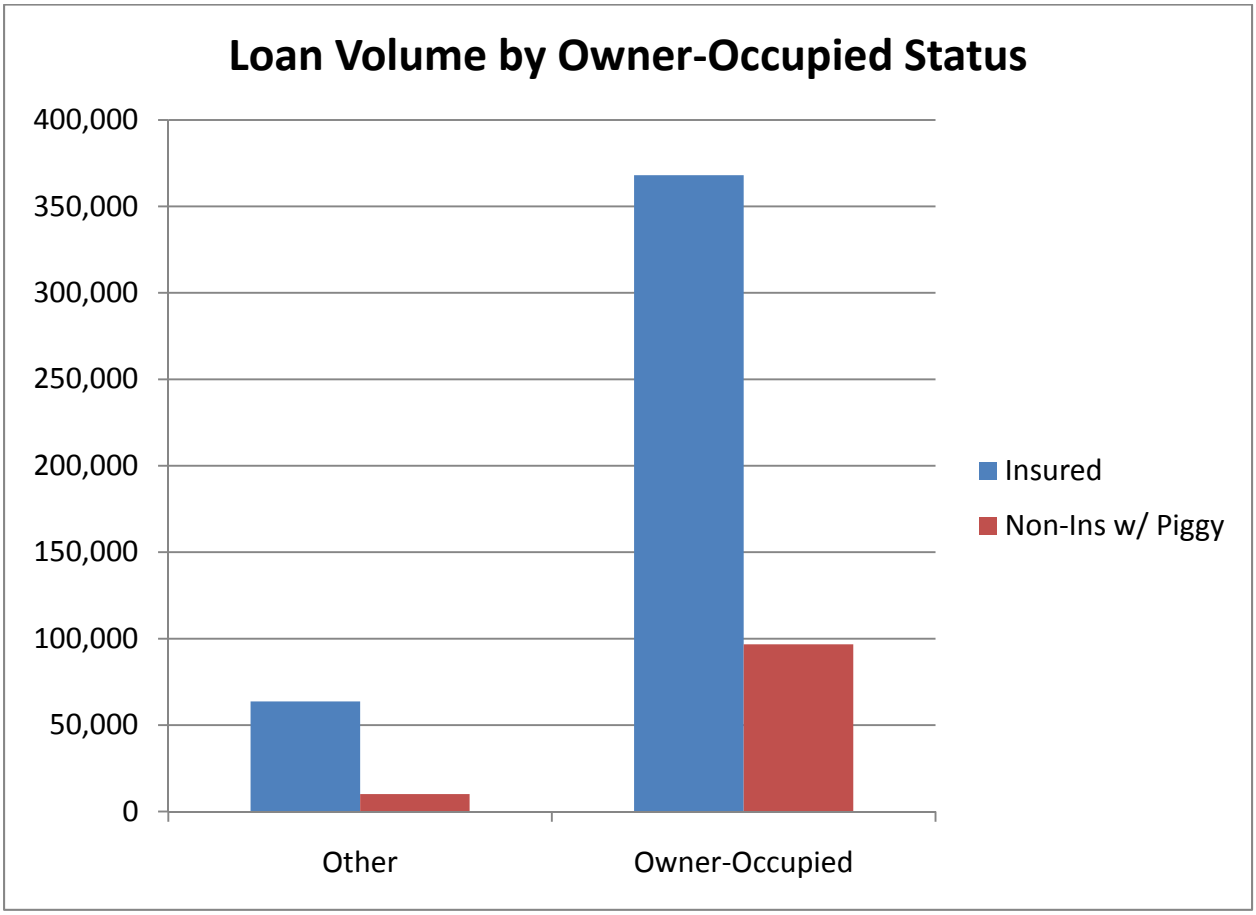
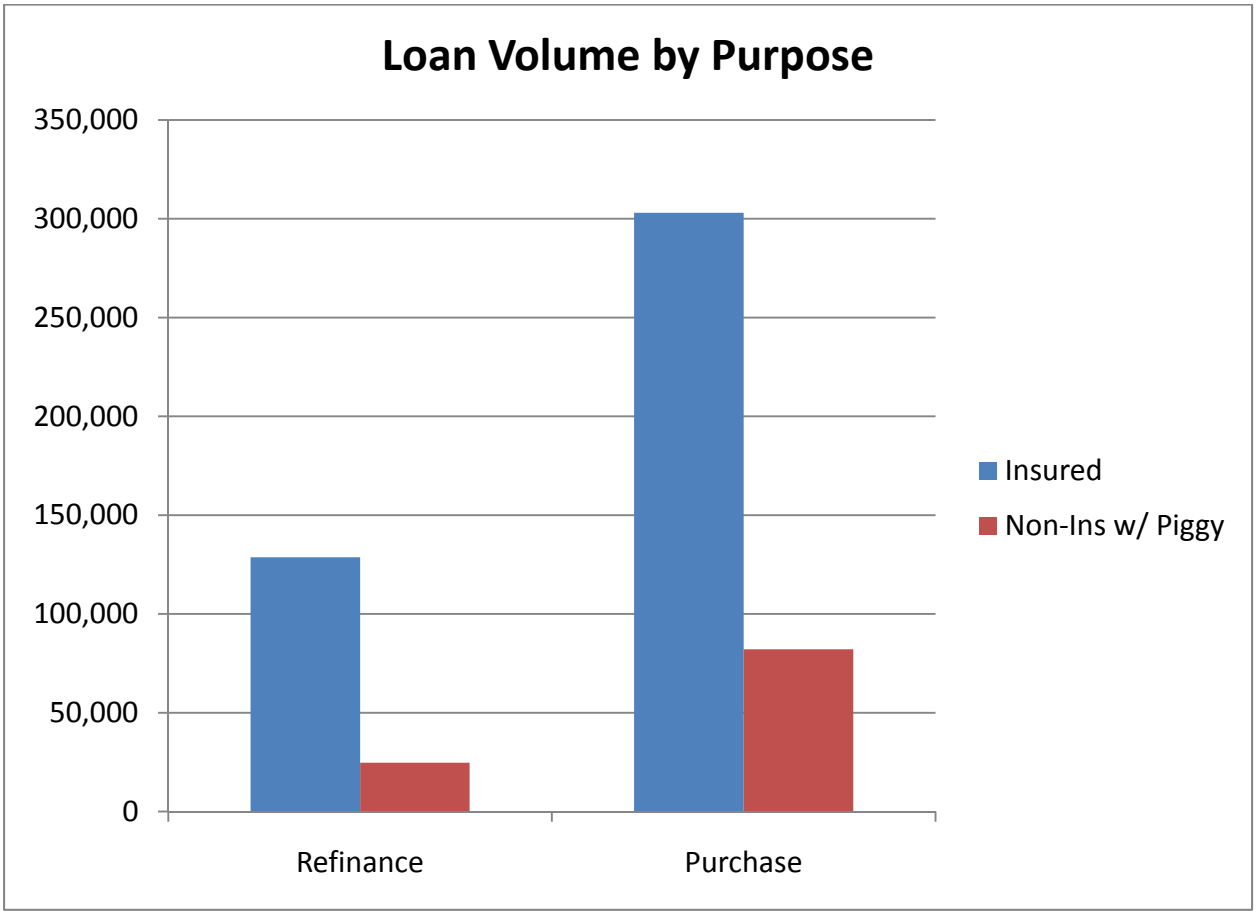


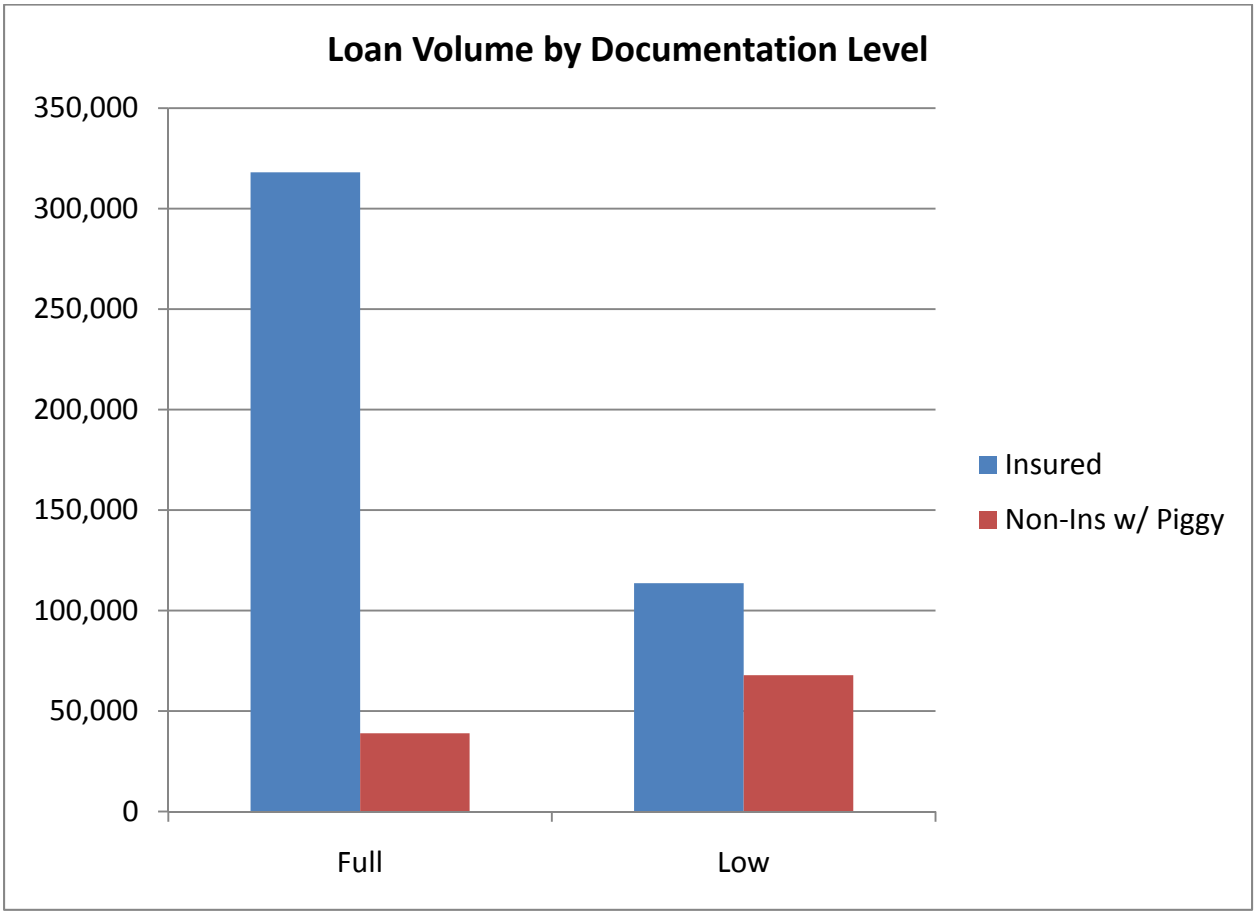
## Appendix B: Survival Analysis Modeling Dataset Summary

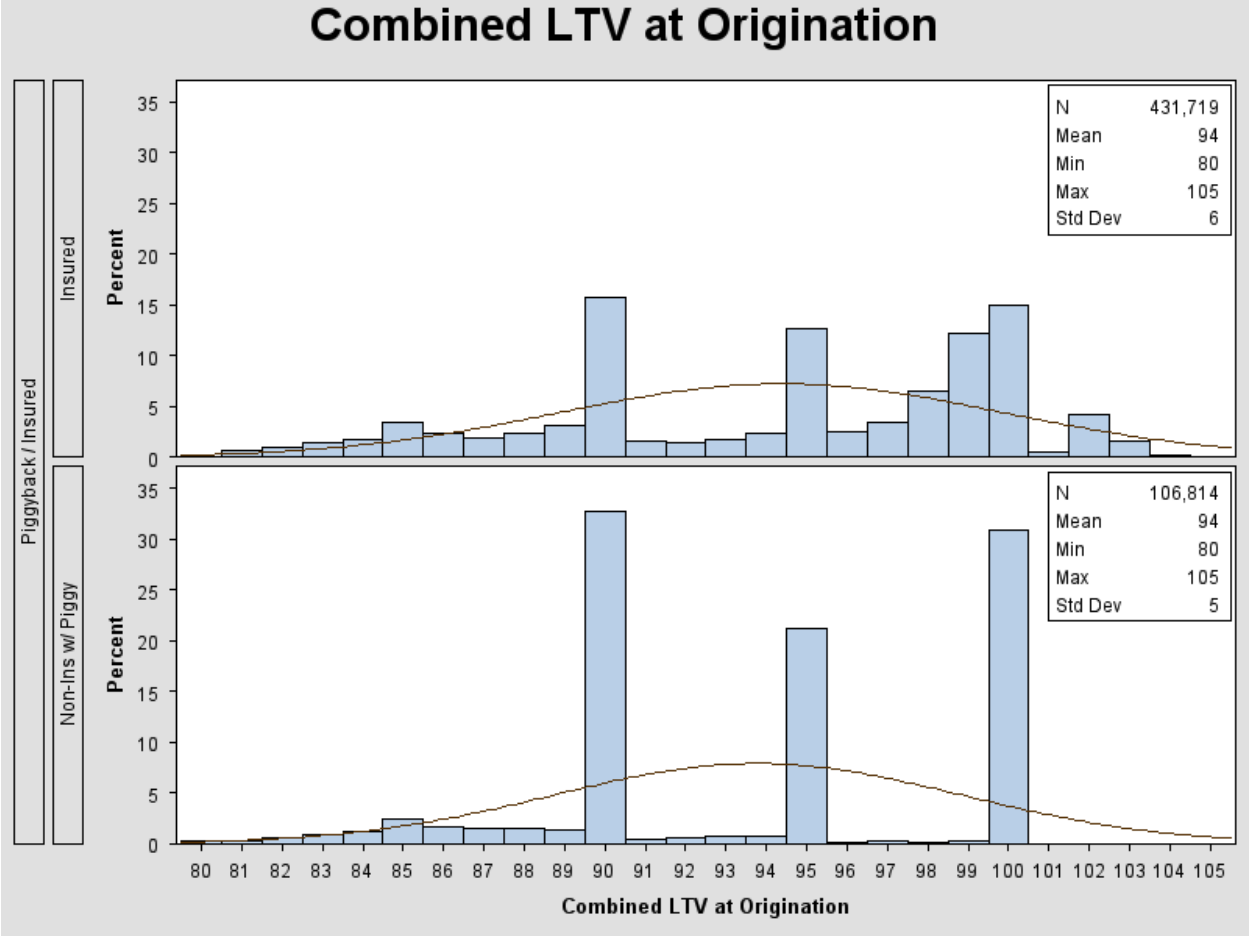


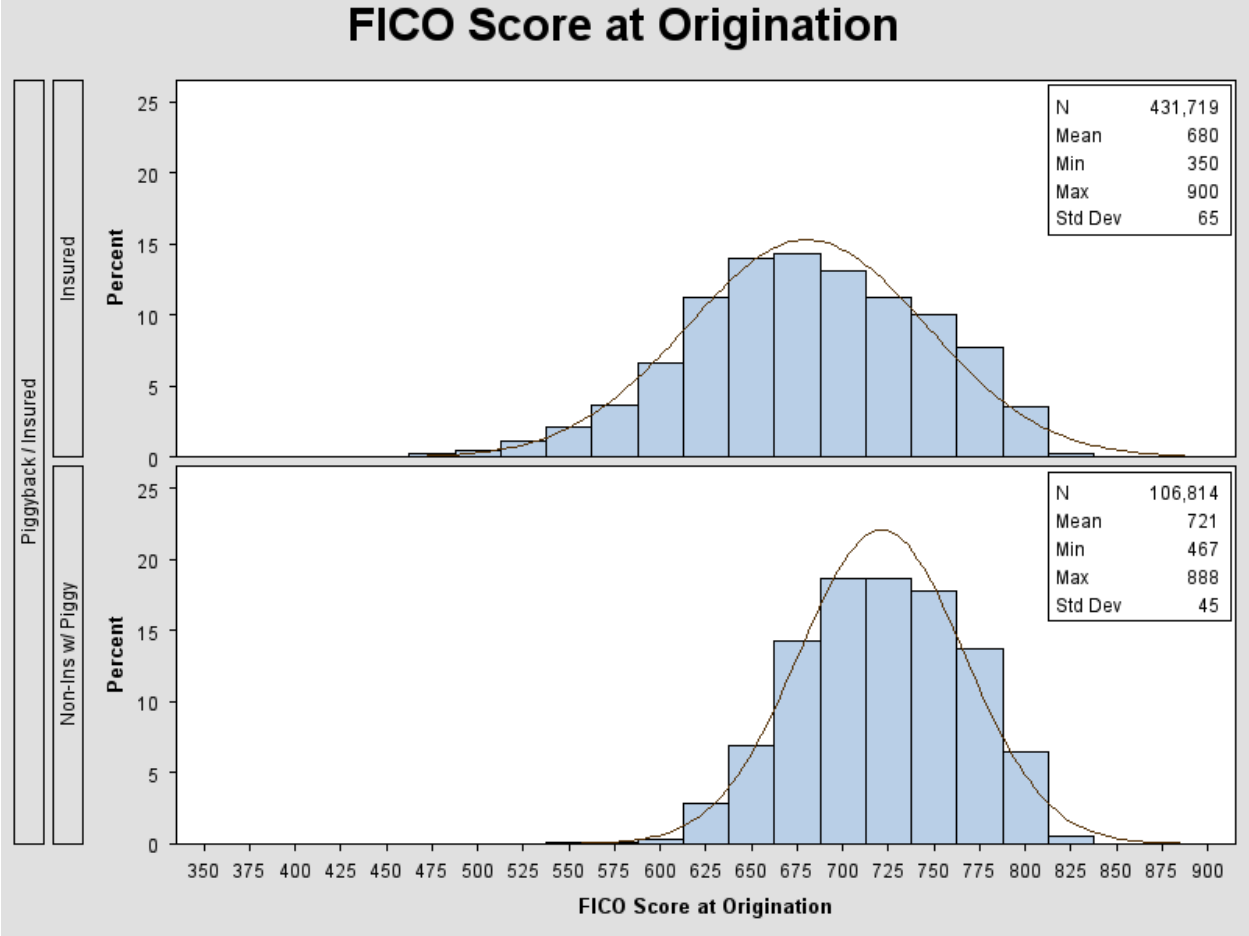












## Appendix C: Scaled Schoenfeld Residual Plots

The Schoenfeld residual, $r_{ik}$ is the covariate value, $X_{ik}$, for the $i^{th}$ loan which actually defaulted at time t, minus the expected value of the covariate for the risk set at time t (i.e., a weighted-average of the covariate, weighted by each loan's likelihood of defaulting at t).

Because they will vary in size and distribution, the Schoenfeld residuals are usually scaled before being analyzed. The k-dimensional vector of **Scaled Schoenfeld Residuals, SR,** for the $i^{th}$ loan is defined as:

$SR = \boldsymbol{\beta} + D*Cov(\boldsymbol{\beta})*\mathbf{r}_i'$

where

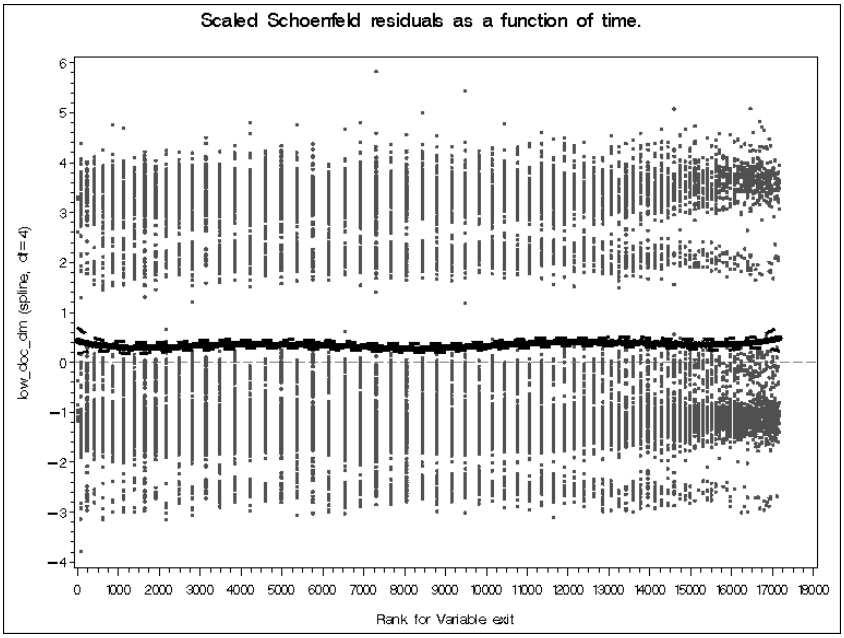
$\boldsymbol{\beta}$=the estimated Cox model coefficient vector

D= the number of loans defaulting, and

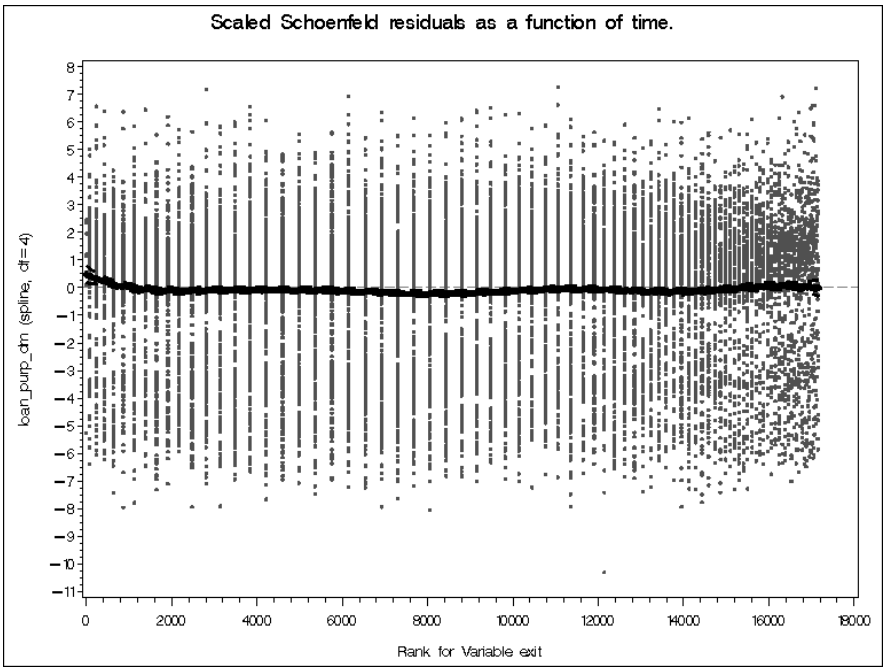
$\mathbf{r}_i$= the vector of Schoenfeld residuals for loan i.

## Plots for Fixed-Rate Loans, by Covariate

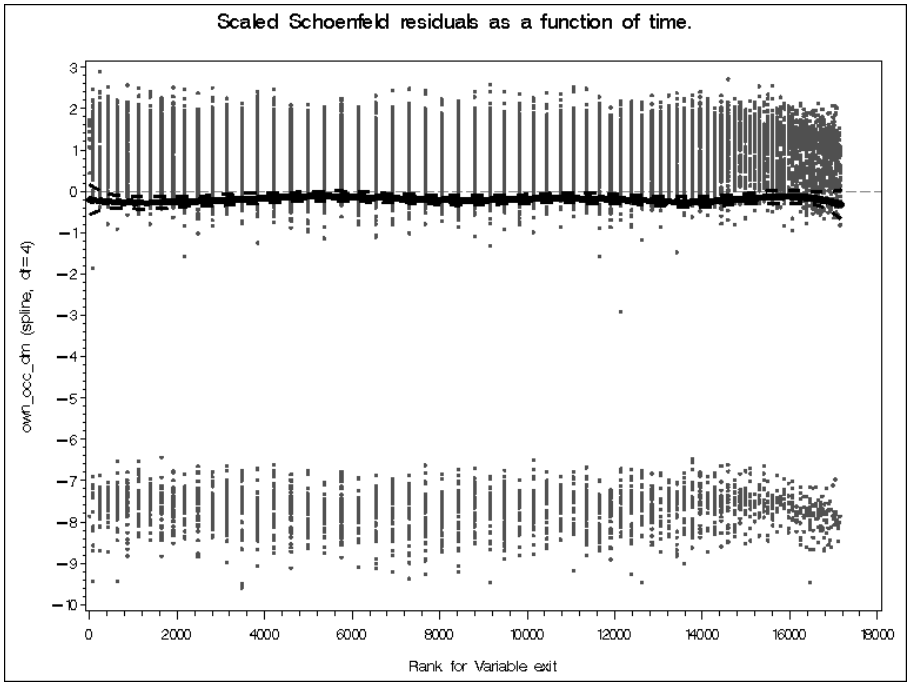
**Documentation Level**



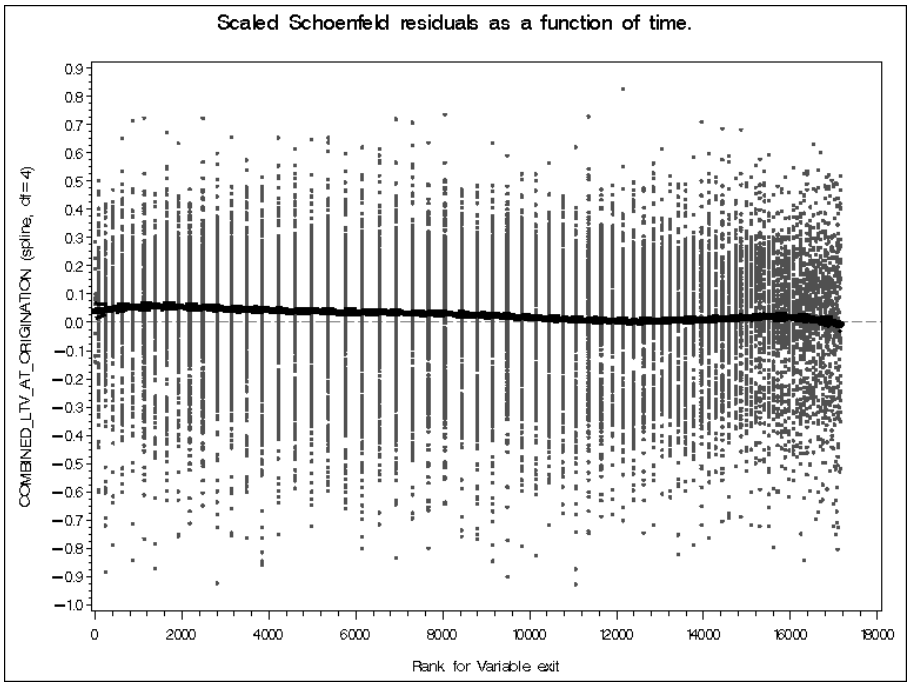
## Loan Purpose



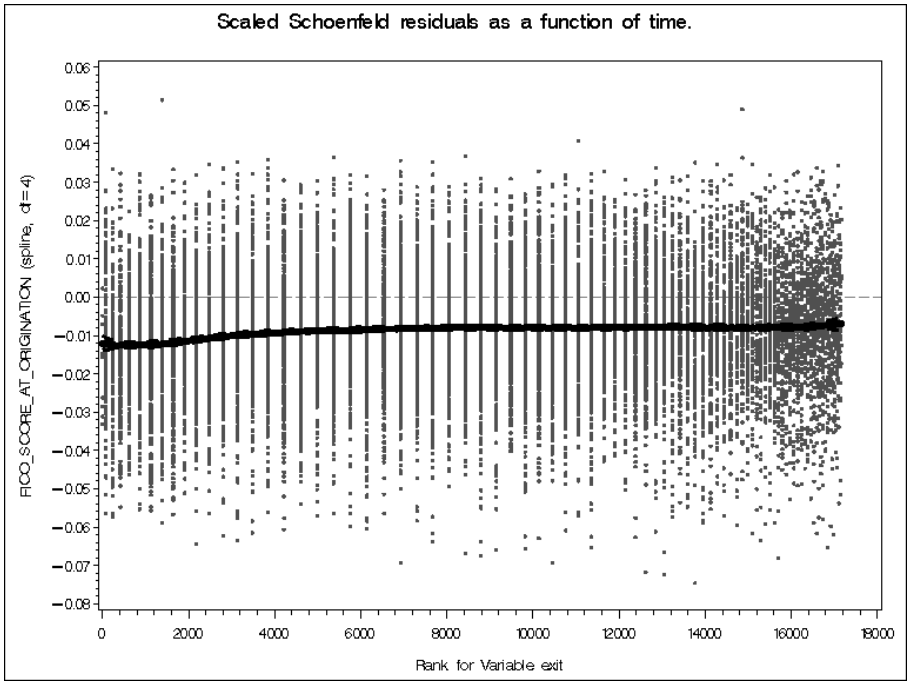

## Occupancy Status



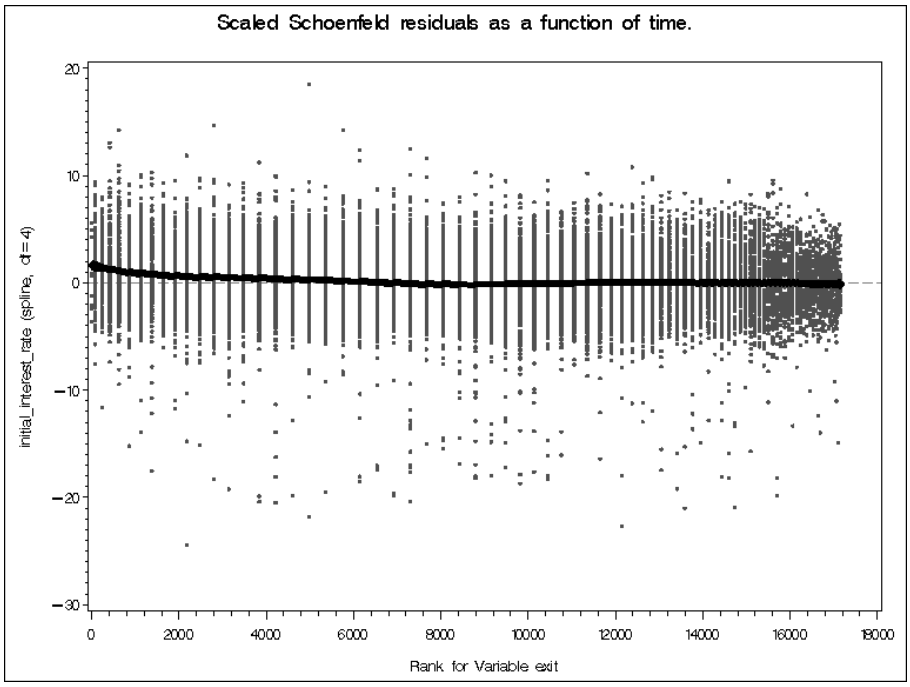
## Combined LTV at Origination



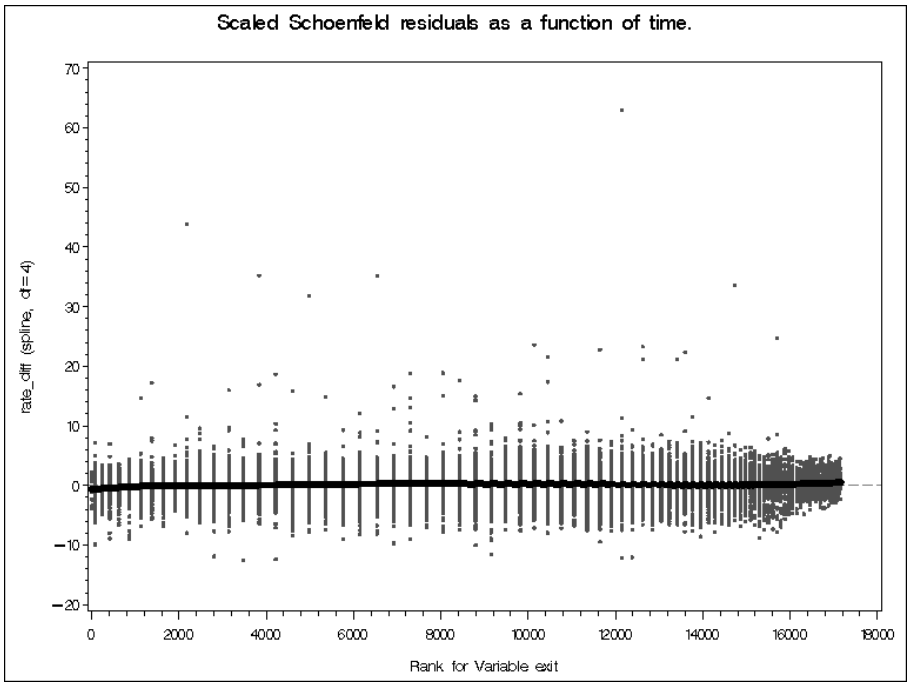

## FICO Score at Origination



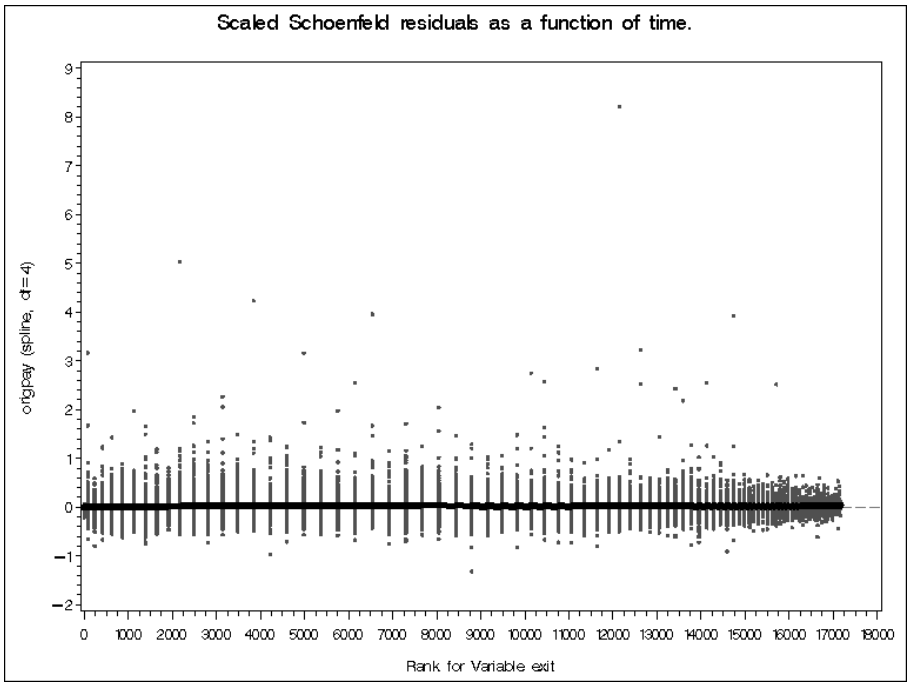
## Original Interest Rate



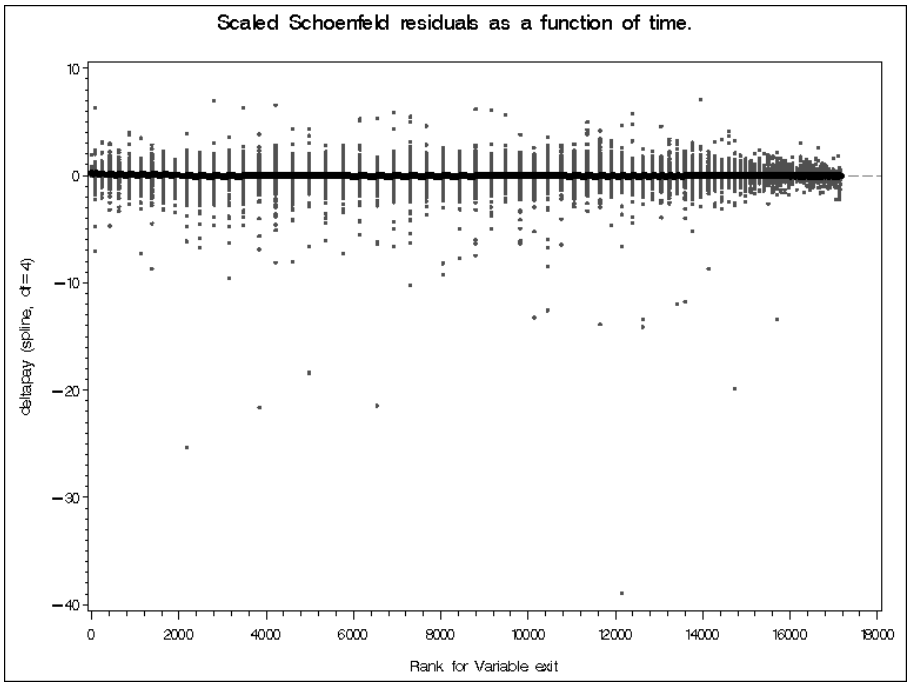

## Rate Differential (t)



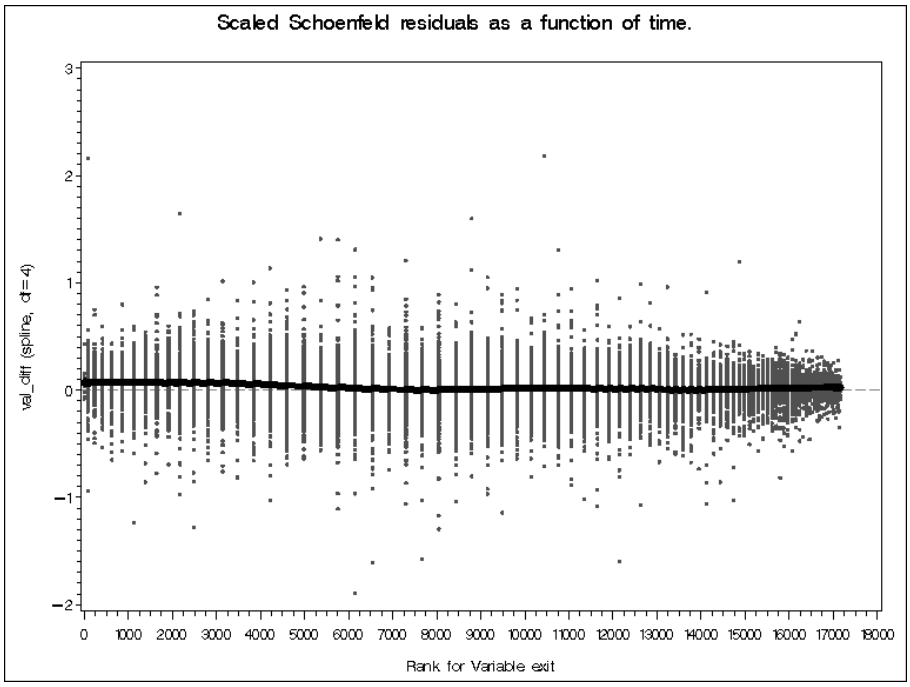
## Original Payment



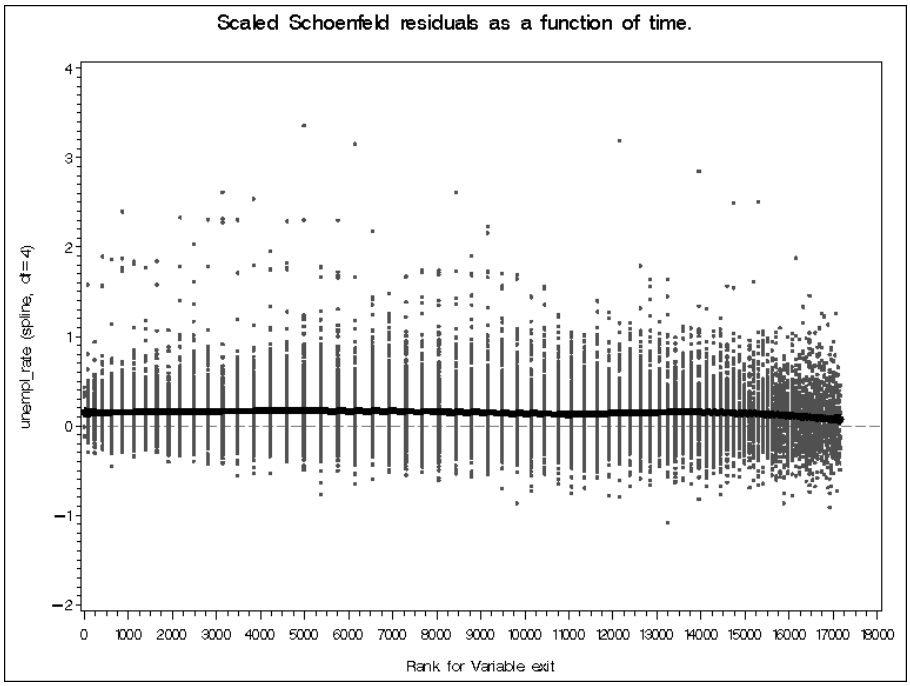

## Change in Payment (t)



## Change in Value (t)

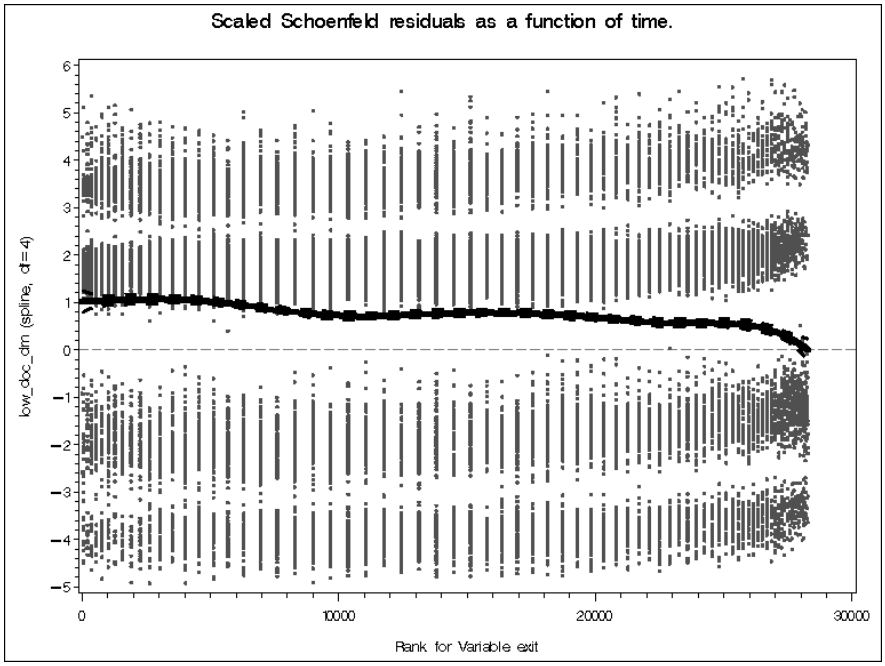



## Unemployment Rate (t)

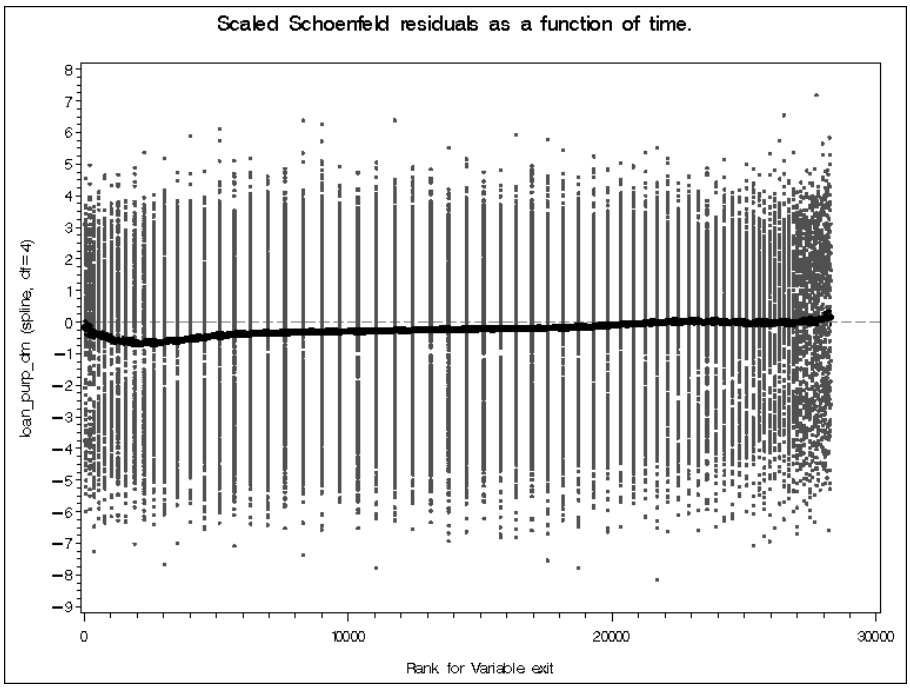


## Plots for Adjustable-Rate Loans, by Covariate

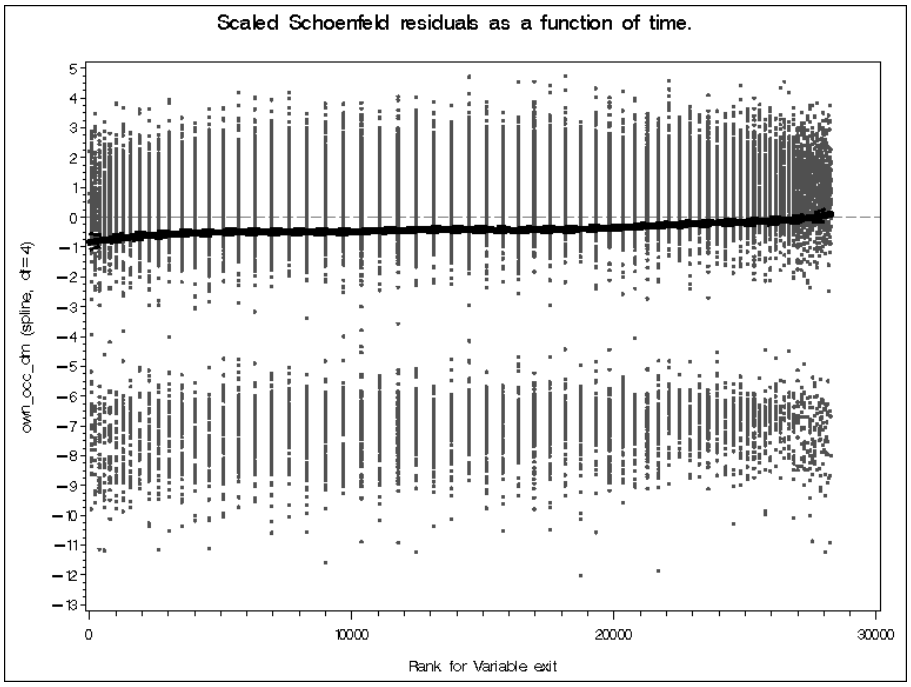
### Documentation Level



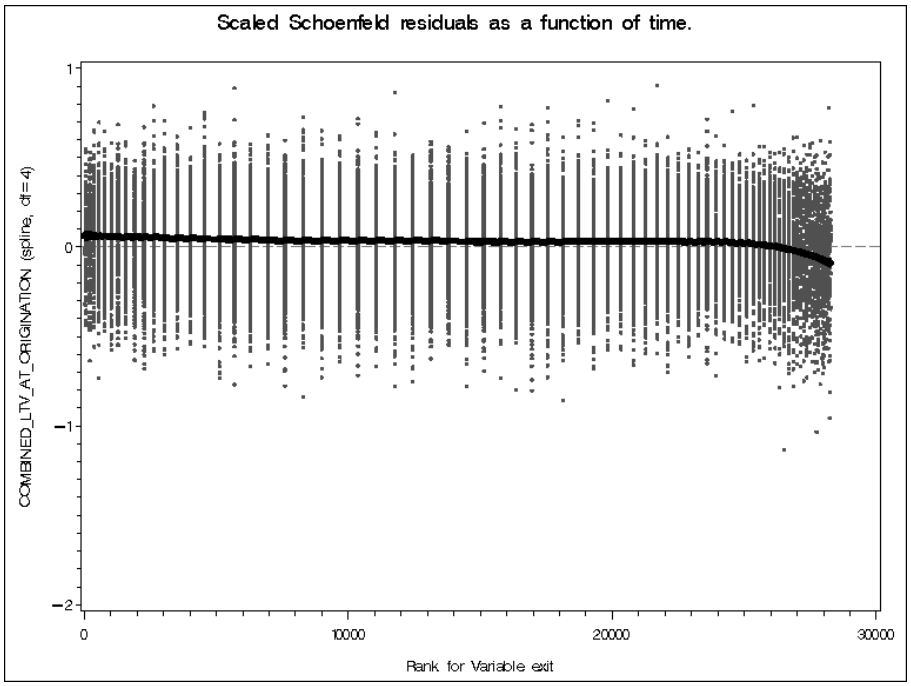

### Loan Purpose



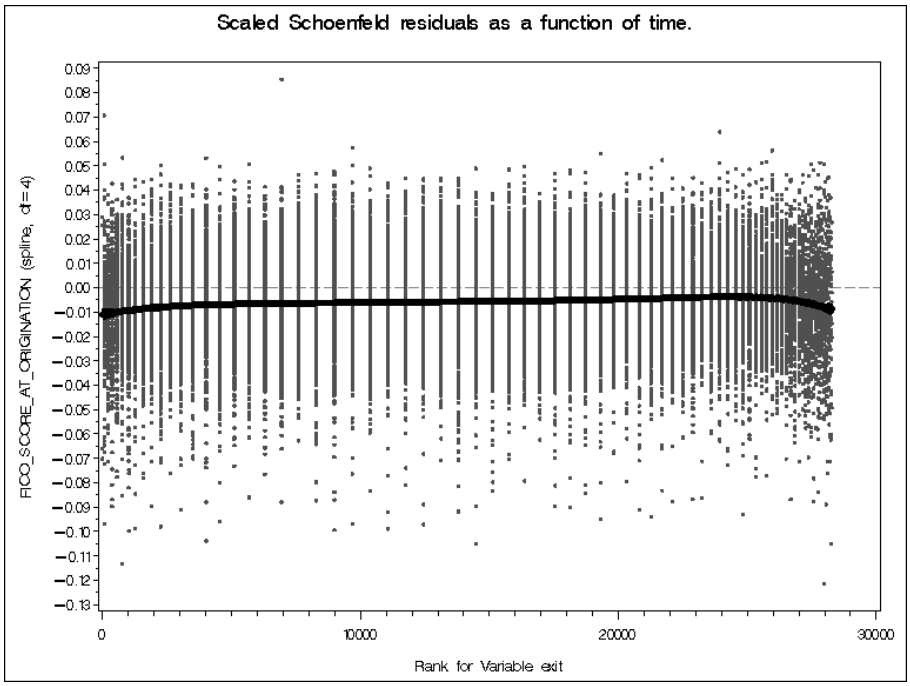
## Occupancy Status




## Combined LTV at Origination



## FICO Score at Origination

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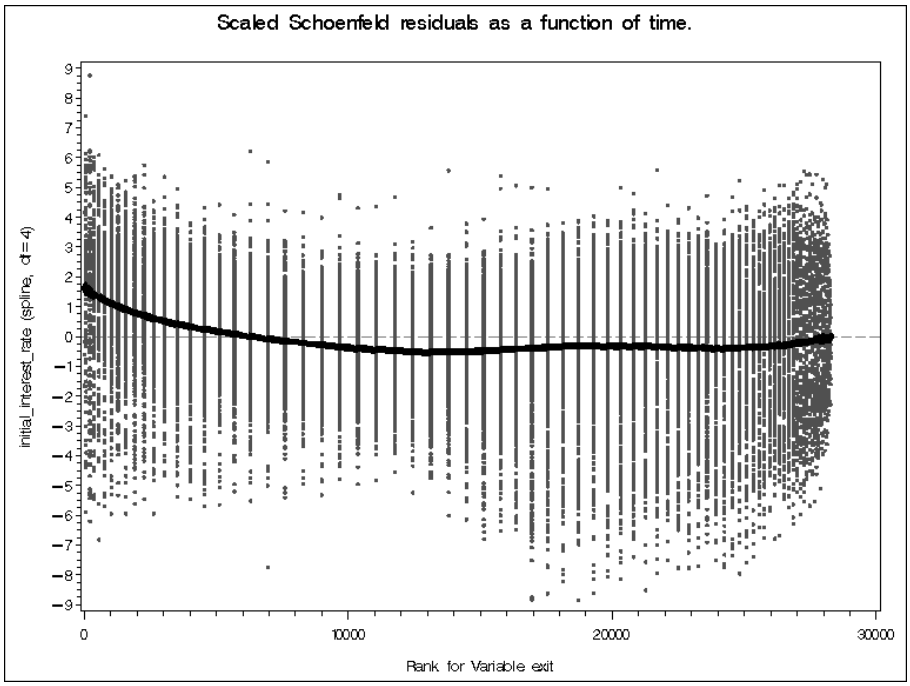
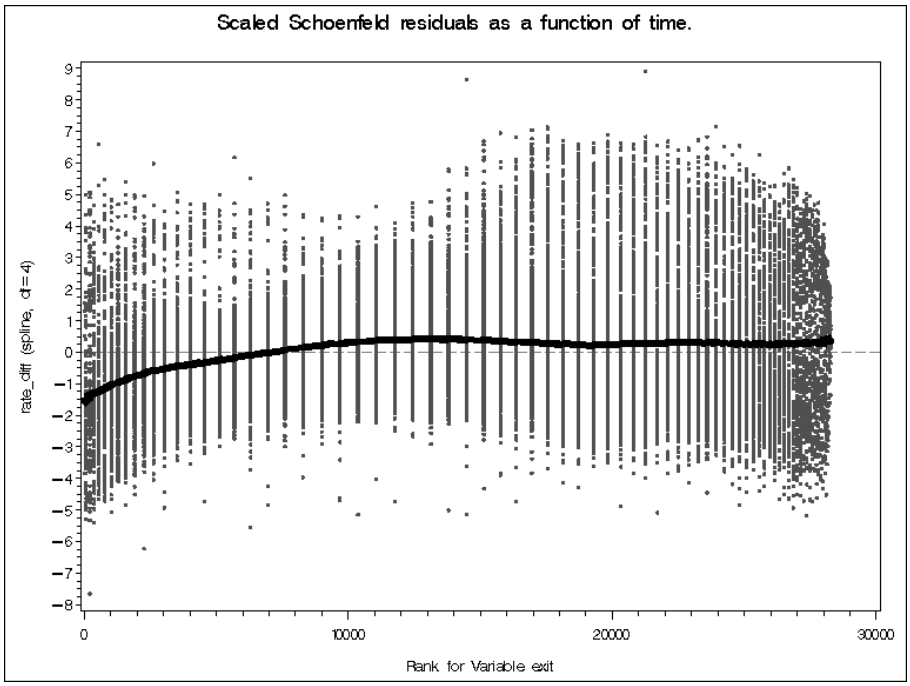


## Rate Differential (t)

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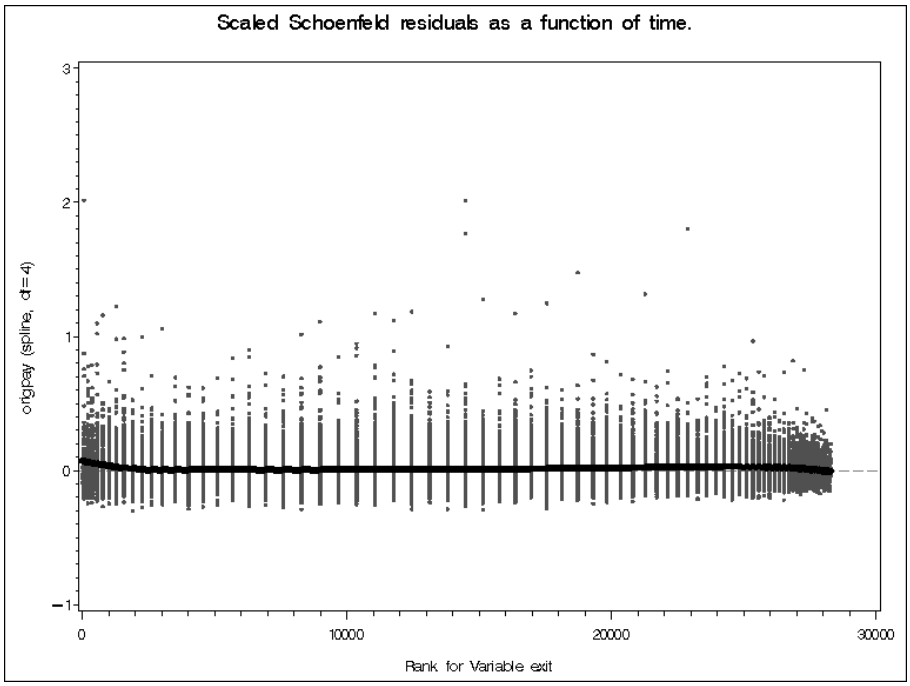
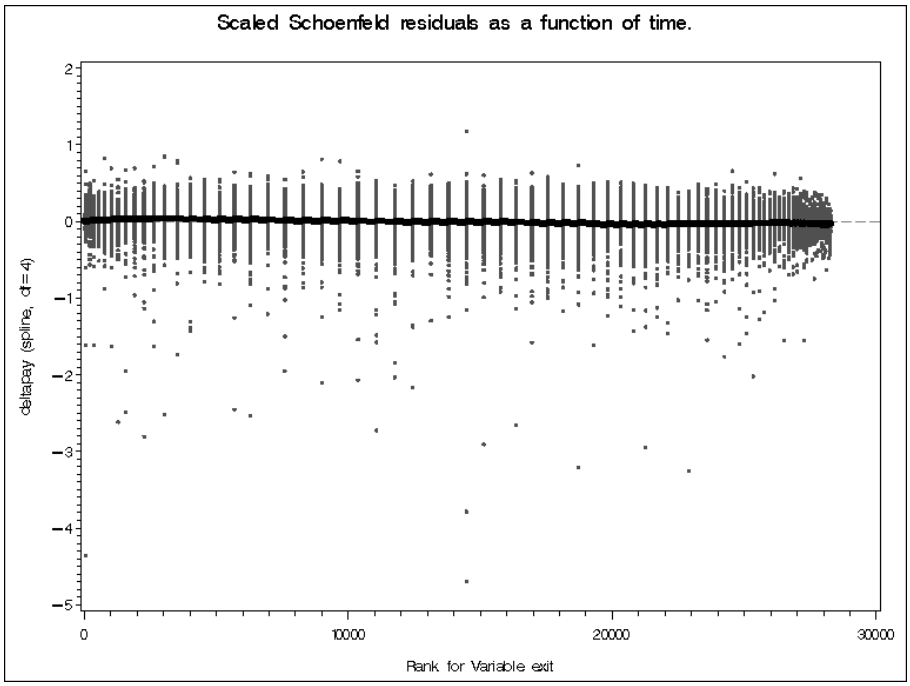
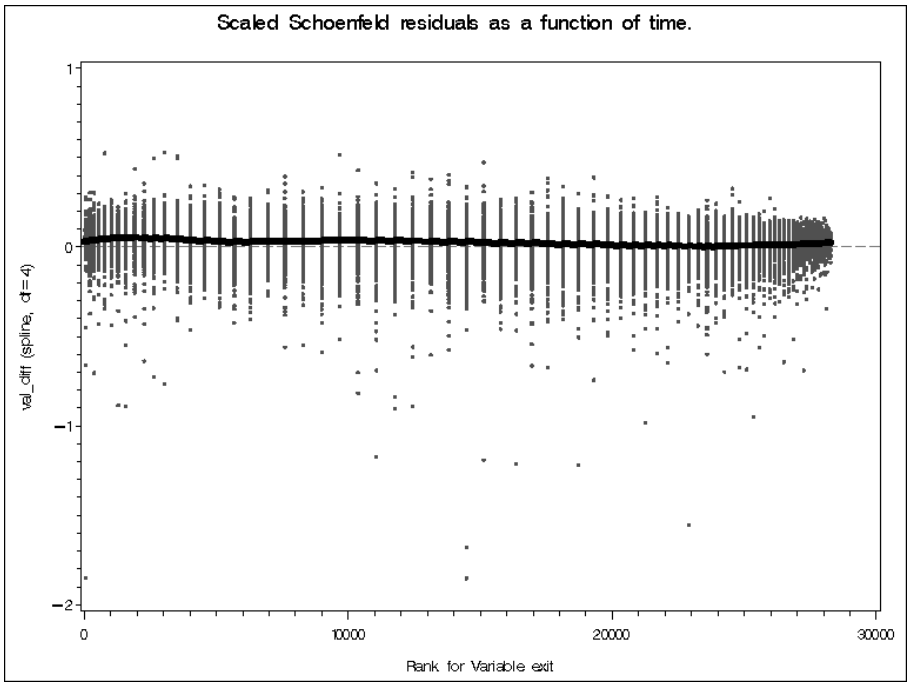


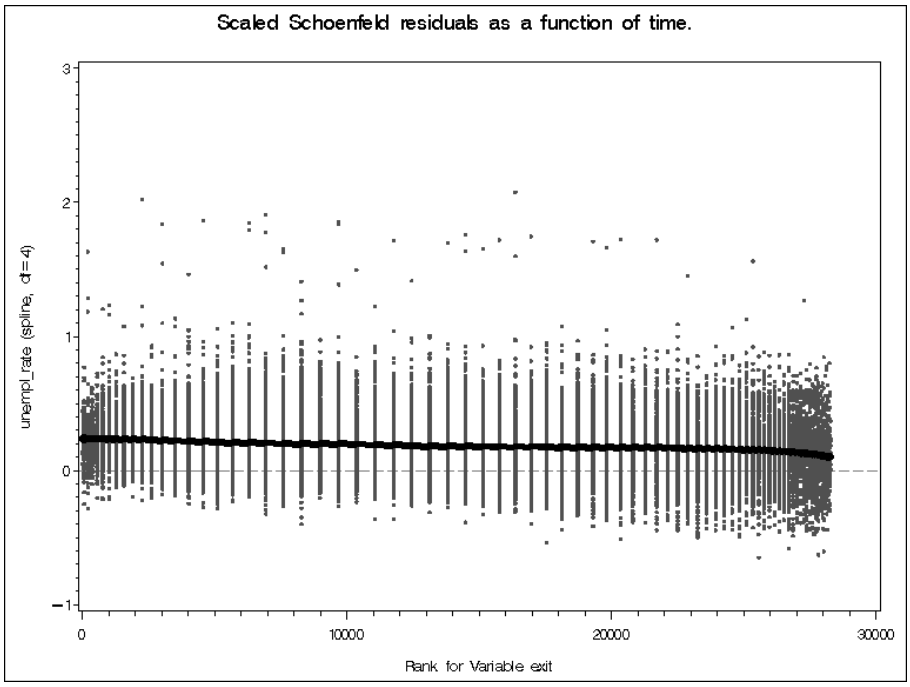
## Change in Payment (t)




## Change in Value (t)



## Unemployment Rate (t)



## Appendix I

**Milliman Study**[165]

See attached.

[165] This part of MGIC's response is intended to address **Question 111(a)** of the NPR.

# MORTGAGE INSURANCE COMPANIES OF AMERICA

## MORTGAGE INSURANCE LOAN PERFORMANCE ANALYSIS
## AS OF MARCH 31, 2011

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# MORTGAGE INSURANCE COMPANIES OF AMERICA

## MORTGAGE INSURANCE LOAN PERFORMANCE ANALYSIS
## AS OF MARCH 2011

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# MORTGAGE INSURANCE COMPANIES OF AMERICA

## MORTGAGE INSURANCE LOAN PERFORMANCE ANALYSIS
## AS OF MARCH 2011

### INTRODUCTION AND BACKGROUND

The Office of the Comptroller of the Currency, Treasury, the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the U.S. Securities and Exchange Commission, the Federal Housing Finance Agency, and the Department of Housing and Urban Development (the Agencies) are proposing rules to implement the credit risk retention requirements of section 15G of the Securities Exchange Act of 1934 (15. U.S.C. § 78o-11), as added by section 941 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. Section 15G generally requires the securitizer of asset-backed securities to retain not less than five percent of the credit risk of the assets collateralizing the asset-backed securities. Section 15G includes a variety of exemptions from these requirements, including an exemption for asset-backed securities that are collateralized exclusively by residential mortgages that meet the definition of a "qualified residential mortgage" (QRM) as such term is defined by the Agencies. Section 15G directs the Agencies to define jointly what constitutes a QRM, taking into consideration underwriting and product features that historical loan performance data indicate result in a lower risk of default. In March 2011 the Agencies issued a report outlining the proposed definition of a QRM; the report provided a number of questions on the proposed definition of a QRM for which the agencies are seeking comments.

As required by section 15G, the Agencies considered information regarding the credit risk mitigation effects of mortgage guarantee insurance or other credit enhancements obtained at the time of origination. According to the QRM proposal, "the Agencies considered a variety of information and reports related to such guarantees and other credit enhancements. While this insurance protects creditors from losses when borrowers default, the Agencies have not identified studies or historical loan performance data adequately demonstrating that mortgages with such credit enhancements are less likely to default than other mortgages after adequately controlling for loan underwriting or other factors known to influence

credit performance, especially considering the important role of LTV ratios in predicting default. Therefore, the Agencies are not proposing to include any criteria regarding mortgage guarantee insurance…"

Further in the proposal, "The Agencies seek comment on whether mortgage guarantee insurance or other types of insurance or credit enhancement obtained at the time of origination would or would not reduce the risk of default of a residential mortgage that meets the proposed QRM criteria but for a higher adjusted LTV ratio." This report intends to address the issue of whether or not mortgage guarantee insurance at loan origination has an influence on borrower default rates. This report investigates performance differences between loans with and without mortgage insurance at loan origination.

## SCOPE OF ANALYSIS

Mortgage Insurance Companies of America (MICA) engaged Milliman to analyze performance differences in insured mortgage loans versus uninsured mortgage loans. Specifically, Milliman has been asked to use statistical methods to investigate the hypothesis that insured loans and uninsured loans perform differently when controlling for other influential variables. The purpose of this study is to assess whether loans with mortgage insurance at origination have a lower incidence of default than uninsured loans. To do this, Milliman analyzed loan-level data from Corelogic's LoanPerformance Loan Level Servicing Database with logistic regressions of default performance and compared the modeled coefficients of insured and uninsured loans. Milliman analyzed five different loan populations to investigate the qualitative and quantitative robustness of the model indications. The loan populations vary by insurance type, underwriting characteristics, and original investor. This allowed Milliman to investigate performance differences between insured and uninsured loans and to specifically probe a question posed by MICA with regard to performance differences in loans that meet the proposed QRM definition but for higher combined loan-to-value (CLTV) ratios.

This report presents the results of our analysis.

## EXECUTIVE SUMMARY

The purpose of this study is to assess whether loans that are similar in every aspect except for the presence of mortgage insurance at origination have a lower incidence of default than uninsured loans for loans that meet the proposed QRM definition but for higher combined LTV. Milliman invoked a multivariate modeling approach to control for characteristics besides insurance presence and investigate performance differences between groups of loans with and without mortgage insurance. Milliman's results generally indicate loans with mortgage insurance at origination have historically been associated with a lower rate of default when compared to similar loans without mortgage insurance, after controlling for influential underwriting characteristics and economic trends.

Milliman utilized CoreLogic's LoanPerformance Loan Level Servicing Database (Corelogic Data) for this analysis. The Corelogic Data contains loan-level underwriting characteristics and monthly performance history for prime mortgage loans, as determined by Corelogic, beginning with performance data in 1998. Milliman filtered the data as described in the data section of this report to produce a robust dataset of performance history for each loan; Milliman applied additional loan level filters to the data to produce a final clean dataset useful for comparing the relative default performance of insured loans against uninsured loans. Using the filtered dataset, Milliman performed various regressions[1] to develop a statistical comparison of the relative default incidence for uninsured loans versus insured loans that controls for both underwriting characteristics and economic conditions.

Milliman analyzed five different loan populations to investigate the qualitative and quantitative robustness of the model indications. A description of the five different loan populations is provided in Table 1:

[1] All of the regressions discussed in this study are logistic regressions

| Table 1<br>Loan Population Summary | | | | | |
|---|---|---|---|---|---|
| **Population** | **Description** | **Excludes FHA Loans[2]** | **Excludes GT95 CLTV[3]** | **Meets proposed QRM definition (except for LTV and DTI limits)[4]** | **Excludes GSE Investor Loans[5]** |
| 1 | All loans in the data after applying the data filers described in the data section of this report | No | No | No | No |
| 2 | All loans excluding FHA and GT95 CLTV | Yes | Yes | No | No |
| 3 | QRM loans excluding FHA and GT95 CLTV | Yes | Yes | Yes | No |
| 4 | All loans excluding FHA, GT95 CLTV, and GSE | Yes | Yes | No | Yes |
| 5 | QRM loans excluding FHA, GT95 CLTV, and GSE | Yes | Yes | Yes | Yes |

Table 2 below provides the loan count for each population for both terminated and active loans and terminated loans only. Terminated loans are loans that have paid off either through early repayment, foreclosure, repossession, or by any other means; active loans are loans that have not terminated.

| Table 2<br>Loan Count Summary by Population | | |
|---|---|---|
| **Population** | **Terminated and Active Loans** | **Terminated Loans Only** |
| Population 1 – All loans in the data | 6,045,900 | 3,365,360 |
| Population 2 – All loans excluding FHA and GT95 CLTV | 4,380,969 | 2,495,367 |
| Population 3 – QRM loans excluding FHA and GT95 CLTV | 1,110,159 | 618,357 |
| Population 4 – All loans excluding FHA, GT95 CLTV, and GSE | 1,500,352 | 998,173 |
| Population 5 – QRM loans excluding FHA, GT95 CLTV, and GSE | 285,739 | 207,974 |

Population (1) allows investigation into performance differences between insured and uninsured loans in the entire loan population. That is, Population (1) does not filter for QRM requirements and uses all available data.

Population (2) removes from Population (1) FHA loans and loans with an initial CLTV greater than 95%. Loans insured by the Federal Housing Administration (FHA Loans) are considered insured loans for this

[2] An "FHA Loan" is any loan insured by the Federal Housing Administration or any loan purchased by Ginnie Mae
[3] "GT95 CLTV" corresponds to any loan where the initial combined loan-to-value ratio on the loan is greater than 95%
[4] "DTI" = Debt-to-income ratio
[5] "GSE Investor Loans" correspond to any loan purchased by either Freddie Mac or Fannie Mae

study, however, this insurance is provided by the government. A purpose of our study is to determine performance differences between privately insured and uninsured loans. Since a majority of FHA Loans are concentrated in the GT95 CLTV bucket, the remaining GT95 CLTV bucket is also removed from the population.

Population (3) removes from Population (2) loans that do not meet the proposed QRM criteria. Models based on Population (3) can be used to investigate performance differences between insured and uninsured loans that otherwise meet the proposed QRM criteria, excluding loans insured by the FHA and loans with an initial CLTV greater than 95%.

Population (4) removes from Population (2) loans purchased by the GSE's. During the period in which the studied loans were originated, in many instances the private mortgage insurance companies delegated approval authority to the GSE's and their automated underwriting systems. It is difficult to distinguish the impact of these underwriting systems from that of private mortgage insurance on those loans. Therefore, Milliman removed loans purchased by the GSEs within 3 months of origination from this loan population to investigate the impact the GSE purchased loans may have on results as compared to Population (2).

Population (5) removes from Population (4) loans that do not meet the proposed QRM criteria. Models based on Population (5) can be used to investigate performance differences between insured and uninsured loans for loans meeting the proposed QRM criteria but for higher CLTV when private mortgage insurers were allowed to independently underwrite (i.e. without following the automated underwriting systems of the GSEs) and provide loss mitigation.

To investigate performance differences (i.e. differences in default rates) between insured and uninsured loans Milliman first compared the actual default rates on loans with mortgage insurance to loans without mortgage insurance. This comparison suggested that loans with mortgage insurance have historically

had lower default rates than loans without mortgage insurance for similar loan cohorts. Default rates for each cohort are provided in the Tables 3 through 7 starting on page 9.

Quantitative analysis was performed separately on each of the 5 loan populations to explore the robustness of insured vs. uninsured loan performance results and to test important hypotheses regarding the observable impact of mortgage insurance on loan performance. For each loan population Milliman assigned each loan to one of four distinct sub-populations depending upon the home price appreciation (HPA) range from loan origination through the end of the evaluation period generating four separate models for each of the five loan populations.

To segment each population into insured and uninsured cohorts, Milliman created a combined explanatory variable in the regression using the original CLTV of each loan and an insurance indicator. For example, Milliman assigned each loan with a CLTV between 90 and 95 to one of two cohorts: "95 Insured" or "95 Uninsured". This allowed Milliman to directly compare groups of insured and uninsured loans by CLTV cohort by comparing the parameter estimates of the regression. If the parameter estimate for an insured loan is smaller than the parameter estimate for an uninsured loan for the same CLTV cohort, then the model indicates loans with mortgage insurance have a lower default incidence than uninsured loans for that cohort of loans all else equal. As a result of the regression model form Milliman used, the test statistic to quantify the difference between the uninsured and insured model parameters can be equivalently expressed as an arithmetic difference in the parameters or as a ratio of the exponentiated parameters (Odds). Milliman refers to the ratio of the exponentiated parameter estimates (Odds) for uninsured loans relative to insured loans as the Odds Relativity.[6] The Odds Relativity then measures the relative default incidence of uninsured loans relative to insured loans. For example, an Odds Relativity of 1.5 would indicate the odds of an uninsured loan defaulting is 1.5 times that of an insured loan, all else equal. Milliman applied statistical tests to determine if observed performance

[6] In this analysis, the Odds Relativity is a comparison of the parameter estimates of the uninsured parameter estimate relative to the insured parameter estimate for the same CLTV category. Mathematically, as Milliman used a logistic regression to calibrate the models described in this report, the Odds Relativity is equal to $e^{(\text{uninsured parameter estimate})}/e^{(\text{insured parameter estimate})}$. Odds in favor of an event are the probability of the event divided by the probability of the event complement, or p/(1-p).

differences between uninsured and insured loans are statistically significant at conventionally accepted levels.

For each population and each HPA range, Milliman performed the analysis twice. Once for loans terminated at the end of the evaluation period and once for loans that were either active or terminated as of the evaluation period (all loans). The evaluation period used for all analysis in this study is 20 quarters. A 20 quarter evaluation period implies that each loan is potentially observable for 20 quarters (through 5 years of loan age). Performance after 20 quarters is ignored and acts to provide a uniform maximum default exposure time for all loans in the study. Loans without at least 20 quarters of development time were excluded from the analysis; therefore, the study includes loan originated between the years 2002 Q1 and 2006 Q1 as loans originated after 2006 Q1 do not have 20 quarters of development as of March 31, 2011. The tables below provide the results of Milliman's analysis for each loan population using the default definition of default and did not cure (Default_NC) as described in the text of this report.

Each table provides four statistics for each loan population and HPA range. The first statistic shown in the tables is the observed default rate on insured loans (Insured Default Rate) calculated as the number of defaults in the data divided by the number of loans for insured loans only. The second statistic shown is the observed default rate for uninsured loans (Uninsured Default Rate) calculated as the number of defaults in the data divided by the number of loans for uninsured loans only. The third statistic is the ratio of the uninsured default rate to the insured default rate; if this ratio is larger than 1, then based on historical default rates, insured loans default less frequently than uninsured loans. Finally, the fourth statistic in each table is the Odds Relativity (which measures the relative default incidence of uninsured loans relative to insured loans in a statistical framework as described above) and the associated statistical significance.

1) All loans:

| Table 3<br>Population 1 : All Loans<br>Origination Years 2002-2006<br>Modeled Default Rate: Default_NC | | | | | | |
|---|---|---|---|---|---|---|
| | Terminated and Active Loans | | | Terminated Loans Only | | |
| | CLTV 90 | CLTV 95 | CLTV > 95 | CLTV 90 | CLTV 95 | CLTV > 95 |
| **HPA Range** | **Insured Default Rate** | | | **Insured Default Rate** | | |
| HPA<=-20% | 29.0% | 30.8% | 27.1% | 30.4% | 33.5% | 30.3% |
| -20%<HPA<=0% | 11.9% | 12.1% | 14.4% | 10.9% | 10.9% | 16.7% |
| 0%<HPA<=20% | 5.7% | 5.9% | 9.5% | 5.8% | 6.1% | 11.7% |
| 20%<HPA | 2.7% | 3.3% | 6.2% | 2.7% | 3.4% | 6.7% |
| **HPA Range** | **Uninsured Default Rate** | | | **Uninsured Default Rate** | | |
| HPA<=-20% | 45.0% | 43.5% | 53.1% | 53.8% | 59.5% | 68.2% |
| -20%<HPA<=0% | 19.2% | 16.8% | 27.9% | 19.7% | 18.4% | 30.9% |
| 0%<HPA<=20% | 7.8% | 7.1% | 18.5% | 8.6% | 8.0% | 18.8% |
| 20%<HPA | 3.0% | 3.3% | 13.8% | 3.8% | 3.9% | 15.5% |
| **HPA Range** | **Ratio of Uninsured to Insured Default Rate** | | | **Ratio of Uninsured to Insured Default Rate** | | |
| HPA<=-20% | 1.55 | 1.41 | 1.96 | 1.77 | 1.77 | 2.25 |
| -20%<HPA<=0% | 1.61 | 1.38 | 1.94 | 1.80 | 1.69 | 1.86 |
| 0%<HPA<=20% | 1.37 | 1.20 | 1.95 | 1.48 | 1.33 | 1.61 |
| 20%<HPA | 1.13 | 1.01 | 2.24 | 1.41 | 1.13 | 2.30 |
| **HPA Range** | **Modeled Odds Relativity*** | | | **Modeled Odds Relativity*** | | |
| HPA<=-20% | 1.20 | 1.25 | 1.84 | 1.94 | 1.81 | 2.18 |
| -20%<HPA<=0% | 1.33 | 1.36 | 2.22 | 1.53 | 1.37 | 1.70 |
| 0%<HPA<=20% | 1.41 | 1.49 | 2.47 | 1.45 | 1.40 | 1.97 |
| 20%<HPA | 1.43 | 1.33 | 2.28 | 1.60 | 1.31 | 2.38 |

*Each result significant at the 0.001 level

For all of the cohorts in Table 3 (and for the remaining tables that follow) the empirical default rate is consistent with the expectation that negative HPA environments are associated with higher default rates and positive HPA environments are associated with lower default rates. Within the CLTV 90 cohort (an initial CLTV between 80% and 90% ) for uninsured loans, the default rate for the lowest HPA range is 45.0% while the default rate for the highest HPA range is 3.0%.

For Population (1), insured loans have a lower empirical default rate within all of the HPA and CLTV cells for all loans (i.e. active and terminated loans) and terminated only loans. For example, the default rate for terminated and active uninsured loans for CLTV 90 with HPA of less than or equal to -20% after 20 quarters of development was 45.0%. This compares to a default rate for the similar cohort of insured loans of 29.0%. The empirical default relativity for this cohort was 1.55 (1.55 = 0.45 / 0.29). The empirical odds relativity for this cohort was 2.00 (2.00 = [(0.45/(1-0.45)] / [0.29/(1-0.29)].

A disadvantage of using a one-way analysis of empirical rates like what was just described is that when the two groups being compared differ in ways other than the segmenting characteristic it is difficult to justify that observed differences are due to the segmenting characteristic and not some other difference between the groups that was not considered. To control for important risk characteristics known to influence default rates besides CLTV range and home price change environment, Milliman fit logistic regression models to the loan level data. Milliman then computed the Odds Relativity to compare the relative default incidence of insured loans to uninsured loans, all else equal. For each of the cohorts listed in Table 3, the Odds Relativity of uninsured loans to insured loans is greater than one and is significant at the 0.1% level.

2) All loans in the filtered dataset excluding Federal Housing Administration (FHA)-insured loans and excluding loans with a CLTV above 95%:

**Table 4**
**Population 2 : All Loans Excluding FHA-Insured Loans and Loans with a CLTV Above 95%**
**Origination Years 2002-2006**
**Modeled Default Rate: Default_NC**

| | Terminated and Active Loans | | | Terminated Loans Only | | |
|---|---|---|---|---|---|---|
| | **CLTV 90** | **CLTV 95** | **CLTV > 95** | **CLTV 90** | **CLTV 95** | **CLTV > 95** |
| **HPA Range** | **Insured Default Rate** | | | **Insured Default Rate** | | |
| HPA<=-20% | 30.4% | 32.1% | NA | 32.3% | 35.2% | NA |
| -20%<HPA<=0% | 12.5% | 12.8% | NA | 11.6% | 11.4% | NA |
| 0%<HPA<=20% | 5.7% | 5.7% | NA | 5.8% | 5.6% | NA |
| 20%<HPA | 2.4% | 2.9% | NA | 2.3% | 2.8% | NA |
| **HPA Range** | **Uninsured Default Rate** | | | **Uninsured Default Rate** | | |
| HPA<=-20% | 45.0% | 43.5% | NA | 53.8% | 59.5% | NA |
| -20%<HPA<=0% | 19.2% | 16.8% | NA | 19.7% | 18.4% | NA |
| 0%<HPA<=20% | 7.8% | 7.1% | NA | 8.6% | 8.0% | NA |
| 20%<HPA | 3.0% | 3.3% | NA | 3.8% | 3.9% | NA |
| **HPA Range** | **Ratio of Uninsured to Insured Default Rate** | | | **Ratio of Uninsured to Insured Default Rate** | | |
| HPA<=-20% | 1.48 | 1.35 | NA | 1.67 | 1.69 | NA |
| -20%<HPA<=0% | 1.53 | 1.31 | NA | 1.70 | 1.62 | NA |
| 0%<HPA<=20% | 1.36 | 1.24 | NA | 1.50 | 1.45 | NA |
| 20%<HPA | 1.27 | 1.15 | NA | 1.69 | 1.39 | NA |
| **HPA Range** | **Modeled Odds Relativity*** | | | **Modeled Odds Relativity*** | | |
| HPA<=-20% | 1.12 | 1.16 | NA | 1.78 | 1.63 | NA |
| -20%<HPA<=0% | 1.14 | 1.12 | NA | 1.29 | 1.10 | NA |
| 0%<HPA<=20% | 1.18 | 1.22 | NA | 1.17 | 1.13 | NA |
| 20%<HPA | 1.25 | 1.19 | NA | 1.32 | 1.12 | NA |

* Each result significant at the 0.001 level except in the two cases discussed below.

When FHA loans and loans with a CLTV above 95% are removed from the data the empirical insured default rate, in general, increases for HPA ranges less than 0 and decreases for HPA ranges greater than 0 relative to the default rate in Population (1). The uninsured loan population does not change from Population (1) for loans with a CLTV less than 95% as FHA loans are categorized as insured loans in this analysis. Removing FHA loans from the data does not affect the uninsured loan population.

For the second population of loans, all of the empirical default ratios of uninsured loans to insured loans and the Odds Relativities are greater than one and are significant at the 0.1% level, with the exception of the -20% < HPA <=0% which has a p-value of 0.2% and the 20%<HPA range which has a p-value of 5.0% for the terminated loans only in the CLTV 95 group (reference Exhibit 3, Page 10). These results indicate that for this population of loans, insured loans have historically had a lower default rate than uninsured loans, all else equal.

3) Only loans meeting the proposed QRM definition with the exception of loan-to-value (LTV) and debt-to-income (DTI) requirements, excluding FHA loans and excluding loans with a CLTV above 95%:

| Table 5<br>Population 3 : QRM Loans Only Excluding FHA-Insured Loans and Loans with a CLTV Above 95%<br>Origination Years 2002-2006<br>Modeled Default Rate: Default_NC | | | | | | |
|---|---|---|---|---|---|---|
| | Terminated and Active Loans | | | Terminated Loans Only | | |
| | CLTV 90 | CLTV 95 | CLTV > 95 | CLTV 90 | CLTV 95 | CLTV > 95 |
| **HPA Range** | **Insured Default Rate** | | | **Insured Default Rate** | | |
| HPA<=-20% | 17.5% | 19.1% | NA | 20.1% | 21.1% | NA |
| -20%<HPA<=0% | 5.8% | 5.5% | NA | 4.7% | 4.9% | NA |
| 0%<HPA<=20% | 1.9% | 1.8% | NA | 1.7% | 1.6% | NA |
| 20%<HPA | 0.9% | 1.0% | NA | 0.9% | 1.1% | NA |
| **HPA Range** | **Uninsured Default Rate** | | | **Uninsured Default Rate** | | |
| HPA<=-20% | 16.5% | 19.2% | NA | 33.4% | 40.9% | NA |
| -20%<HPA<=0% | 5.1% | 5.9% | NA | 6.0% | 6.2% | NA |
| 0%<HPA<=20% | 1.8% | 2.0% | NA | 2.8% | 2.8% | NA |
| 20%<HPA | 0.6% | 0.8% | NA | 1.3% | 1.4% | NA |
| **HPA Range** | **Ratio of Uninsured to Insured Default Rate** | | | **Ratio of Uninsured to Insured Default Rate** | | |
| HPA<=-20% | 0.94 | 1.01 | NA | 1.66 | 1.94 | NA |
| -20%<HPA<=0% | 0.89 | 1.06 | NA | 1.27 | 1.27 | NA |
| 0%<HPA<=20% | 0.92 | 1.11 | NA | 1.62 | 1.70 | NA |
| 20%<HPA | 0.69 | 0.81 | NA | 1.47 | 1.28 | NA |
| **HPA Range** | **Modeled Odds Relativity (Significance)** | | | **Modeled Odds Relativity (Significance)** | | |
| HPA<=-20% | 0.98 (0.730) | 1.00 (0.986) | NA | 1.84 (<0.001) | 2.28 (<0.001) | NA |
| -20%<HPA<=0% | 1.02 (0.762) | 1.01 (0.873) | NA | 1.25 (0.024) | 1.05 (0.659) | NA |
| 0%<HPA<=20% | 1.10 (0.184) | 1.12 (0.103) | NA | 1.46 (<0.001) | 1.33 (0.010) | NA |
| 20%<HPA | 0.84 (0.134) | 0.87 (0.242) | NA | 1.26 (0.375) | 1.08 (0.744) | NA |

Population (3) is identical to Population (2) with the exception that the proposed QRM underwriting requirements are applied to the loans (except for LTV and DTI requirements). The empirical default rates and Odds Relativities for Population (3) cohorts are notably lower and more similar in magnitude than comparable figures for Population (2). This is consistent with expectations since the qualifying characteristics for population inclusion are more narrowly defined by levels associated with less risky loans, for example, no FICO less than 690. For terminated and active loans, the Odds Relativities show little difference between insured and uninsured loans, with all results insignificant at the 10% level except for the CLTV 95 cohort in the 0%<HPA<=20% range (which indicates insured loans perform better).

When looking at only terminated loans, the empirical default rate ratio of uninsured to insured default rates do indicate insured loans have a lower default incidence than uninsured loans. The empirical observation is supported by the Odds Relativity for all cohorts, most of which are significant at the 10% level.

4) All loans in the filtered dataset excluding FHA loans, loans with a CLTV greater than 95%, and excluding government-sponsored enterprise (GSE) loans:

**Table 6**
**Population 4 : All Loans Excluding FHA-Insured Loans, Loans with a CLTV Above 95%, and GSE Purchased Loans**
**Origination Years 2002-2006**
**Modeled Default Rate: Default_NC**

| | Terminated and Active Loans | | | Terminated Loans Only | | |
|---|---|---|---|---|---|---|
| | CLTV 90 | CLTV 95 | CLTV > 95 | CLTV 90 | CLTV 95 | CLTV > 95 |
| **HPA Range** | **Insured Default Rate** | | | **Insured Default Rate** | | |
| HPA<=-20% | 33.6% | 36.1% | NA | 29.1% | 30.5% | NA |
| -20%<HPA<=0% | 12.9% | 13.7% | NA | 8.9% | 9.2% | NA |
| 0%<HPA<=20% | 6.0% | 6.4% | NA | 5.2% | 4.8% | NA |
| 20%<HPA | 3.0% | 3.4% | NA | 2.8% | 2.9% | NA |
| **HPA Range** | **Uninsured Default Rate** | | | **Uninsured Default Rate** | | |
| HPA<=-20% | 48.8% | 51.9% | NA | 54.3% | 62.9% | NA |
| -20%<HPA<=0% | 24.9% | 23.6% | NA | 24.7% | 24.2% | NA |
| 0%<HPA<=20% | 11.9% | 12.5% | NA | 12.6% | 12.0% | NA |
| 20%<HPA | 4.9% | 7.5% | NA | 6.8% | 8.7% | NA |
| **HPA Range** | **Ratio of Uninsured to Insured Default Rate** | | | **Ratio of Uninsured to Insured Default Rate** | | |
| HPA<=-20% | 1.45 | 1.43 | NA | 1.86 | 2.06 | NA |
| -20%<HPA<=0% | 1.93 | 1.72 | NA | 2.77 | 2.63 | NA |
| 0%<HPA<=20% | 1.97 | 1.96 | NA | 2.40 | 2.51 | NA |
| 20%<HPA | 1.62 | 2.24 | NA | 2.38 | 3.01 | NA |
| **HPA Range** | **Modeled Odds Relativity*** | | | **Modeled Odds Relativity*** | | |
| HPA<=-20% | 1.30 | 1.41 | NA | 2.23 | 2.09 | NA |
| -20%<HPA<=0% | 1.43 | 1.38 | NA | 2.07 | 1.54 | NA |
| 0%<HPA<=20% | 1.42 | 1.44 | NA | 1.61 | 1.52 | NA |
| 20%<HPA | 1.36 | 1.48 | NA | 1.53 | 1.64 | NA |

* Each result significant at the 0.001 level

Population (4) removes from Population (2) loans purchased by the GSE's within a three month time period from origination. For Terminated and Active loans, the default rates are greater for both insured and uninsured loans relative to Population (2). The simple average of the default rates for all insured cohorts across all HPA ranges is 13.3% for Population (2) and 14.4% for Population (4). The simple

average of the default rates for all uninsured cohorts across all HPA ranges is 18.2% for Population (2) and 23.2% for Population (4). Both the empirical ratio and Odds Relativity for uninsured default rates relative to insured default rates is greater than 1 for all HPA ranges and CLTV cohorts, and the Odds Relativity is highly significant.

For terminated loans only, the simple average of the default rates for all insured cohorts across all HPA ranges is 13.3% for Population (2) and 11.7% for Population (4). The simple average of the default rates for all uninsured cohorts across all HPA ranges is 22.0% for Population (2) and 25.8% for Population (4). Both the empirical ratio and Odds Relativity for uninsured default rates relative to insured default rates is greater than 1 for all HPA ranges and CLTV cohorts, and the Odds Relativity is highly significant.

5) Only loans meeting the proposed QRM definition with the exception of loan-to-value (LTV) and debt-to-income requirements, excluding FHA loans, loans with a CLTV greater than 95%, and excluding government-sponsored enterprise (GSE) loans:

**Table 7**
**Population 5 : QRM Loans Only Excluding FHA-Insured Loans, Loans with a CLTV Above 95%, and GSE Purchased Loans**
**Modeled Default Rate: Default_NC**

| | Terminated and Active Loans | | | Terminated Loans Only | | |
|---|---|---|---|---|---|---|
| | **CLTV 90** | **CLTV 95** | **CLTV > 95** | **CLTV 90** | **CLTV 95** | **CLTV > 95** |
| **HPA Range** | **Insured Default Rate** | | | **Insured Default Rate** | | |
| HPA<=-20% | 16.1% | 17.2% | NA | 12.2% | 12.5% | NA |
| -20%<HPA<=0% | 4.7% | 4.9% | NA | 2.6% | 3.4% | NA |
| 0%<HPA<=20% | 1.9% | 1.8% | NA | 1.6% | 1.6% | NA |
| 20%<HPA | 1.7% | 1.6% | NA | 1.9% | 1.7% | NA |
| **HPA Range** | **Uninsured Default Rate** | | | **Uninsured Default Rate** | | |
| HPA<=-20% | 18.0% | 25.1% | NA | 30.5% | 40.8% | NA |
| -20%<HPA<=0% | 5.8% | 8.1% | NA | 5.7% | 7.3% | NA |
| 0%<HPA<=20% | 2.2% | 2.9% | NA | 2.9% | 3.5% | NA |
| 20%<HPA | 0.6% | 1.1% | NA | 0.9% | 1.4% | NA |
| **HPA Range** | **Ratio of Uninsured to Insured Default Rate** | | | **Ratio of Uninsured to Insured Default Rate** | | |
| HPA<=-20% | 1.12 | 1.46 | NA | 2.49 | 3.26 | NA |
| -20%<HPA<=0% | 1.24 | 1.65 | NA | 2.22 | 2.14 | NA |
| 0%<HPA<=20% | 1.17 | 1.58 | NA | 1.80 | 2.19 | NA |
| 20%<HPA | 0.32 | 0.68 | NA | 0.50 | 0.79 | NA |
| **HPA Range** | **Modeled Odds Relativity (Significance*)** | | | **Modeled Odds Relativity (Significance*)** | | |
| HPA<=-20% | 1.20 (0.088) | 1.43 (0.012) | NA | 2.54 | 3.78 | NA |
| -20%HPA<=0% | 1.49 | 1.45 (0.003) | NA | 2.36 | 1.91 (0.001) | NA |
| 0%<HPA<=20% | 1.31 (0.017) | 1.44 (0.005) | NA | 1.83 (0.002) | 1.84 (0.001) | NA |
| 20%<HPA | 0.48 | 0.84 (0.381) | NA | 0.41 (0.134) | 0.61 (0.420) | NA |

*Unless otherwise shown, result significant at 0.001 level

Finally, in Population (5) Milliman applied the proposed QRM restrictions to the loans in Population (4). Similar to Population (3), the default rate for Population (5) is lower than Population (4). However unlike Population (3), once GSE loans are removed from the data, the relative performance of insured loans in this population have historically demonstrated lower default rates than comparable uninsured loans, with the exception of periods of instances where home prices have appreciated by more than 20% over a five year period. In addition, the Odds Relativity is greater than 1 for all HPA categories and is significant in many instances at the 1% level. The exception is the greater than 20% HPA range where for three of the four possible CLTV cohorts the results are not statistically significant at the 10% level.

Milliman's results generally indicate loans with mortgage insurance at origination have historically been associated with a lower rate of default when compared to similar loans without mortgage insurance, after controlling for influential underwriting characteristics and economic trends. This result is consistent across the five loan populations reviewed for this study. Loans with mortgage insurance showed the largest and most significant differences from uninsured loans in the negative HPA ranges. When applying the proposed QRM filters with the exception of LTV and DTI requirements, the results support the position that, if private mortgage insurance companies are not subject to pre-defined underwriting systems, loans with private mortgage insurance default at a lower rate than comparable loans without mortgage insurance.

The results are generally stronger and more significant in the terminated only loan populations when compared to the terminated and active loan populations. For the terminated only subset of loans, the ultimate performance of each loan is known as of the evaluation period of 20 quarters, which possibly imparts more stability in discerning statistical differences than the all loans models at any given evaluation period by reducing sample size and variation.

## DATA USED IN ANALYSIS

Milliman subscribes to the CoreLogic LoanPerformance Loan Level Servicing Data (Corelogic Data). The Corelogic Data contains loan-level underwriting and performance history for prime mortgage loans beginning with performance data in 1998. Note the servicing database is a distinct database from the CoreLogic LoanPerformance Loan Level Securities Database. The securities database includes loans typically classified as "sub-prime" and "alt-a" mortgages that were sold to the public via private-label mortgage-backed securities; the securities database was not used for this analysis. The servicing database includes a majority of prime loans and represents about 80% of the active prime mortgage market, according to CoreLogic.

The data from the Servicing database contains underwriting characteristics and loan performance data such as loan status and loan balance from calendar years 1998 through 2011 (the last month of observation for this study is March 2011). Milliman processed the monthly payment records of the Corelogic Data to obtain the following for each loan:

- the first month the loan appeared in the monthly data;
- the last month the loan appeared in the monthly data;
- the month it became a 90 day delinquency, if any;
- the month it became a Foreclosure, if any;
- the month it became a REO, if any;
- the month its status changed from active to closed; and
- any months its delinquency status changed from a 30, 60, 90, FCL or REO to a status of Current (i.e., all months it cured), if any.

This information was then merged with the origination characteristics (static attributes) dataset and the data were then scrubbed for the following data defects:

- Any loans for which the difference between the origination month and first month the loan appeared in the monthly file was greater than 3 months were removed. This gives us loans for which we know the history from start to finish, or the current state, as we did not wish to speculate on the occurrence of default events that may have occurred between origination and the month at which the Monthly Performance data was first recorded; and
- We next removed any loans where the Active Status fluctuated between Active and Closed. Changes in this status from Active to Closed in the performance can be triggered by delinquency statuses of 'S' or 'T' (Servicing sold released, Loan status no longer provided/available, respectively) where, in subsequent periods, the statuses are not 'S' or 'T' and, thus, the status reverts from Closed back to Active. Our interest was in the "well defined" history which would not include loans such as these that have missing months of data.

The resulting dataset then contained various fields flagging the event of a 90 day delinquency status and the month it first occurred and similar fields for foreclosure, REO, cure post default and subsequent re-default as well as when the loan terminated.

The ultimate purpose of this study is to assess whether loans with mortgage insurance at origination have a lower incidence of default than uninsured loans for loans that meet the proposed QRM definition but for higher combined LTV ratios. Therefore, Milliman applied the following additional filters on the data:

***Loans included in analysis:***

- First lien loans;
- 1-4 Family property types;
- Loans with a combined loan-to-value ratio at origination inclusively between 80 and 105;
- Loans originated between 2002 Q1 and 2006 Q1;
- Loans with a first lien LTV equal to or greater than 80%;
- Loans with a CLTV greater than 80% and no insurance (Uninsured loans); and
- Loans with a first lien LTV greater than 80% and private mortgage insurance (Insured loans).

***Loans excluded from analysis:***

- Second lien or greater loans;
- Commercial, 5+ Unit, Co-op, mixed-use, and unknown property types;
- Loans with a missing FICO score; and
- Loans with an amortization type that is invalid or unknown.

Milliman appended home price appreciation data to the loan-level database using the Federal Housing Finance Agency (FHFA) home price indices at the metropolitan statistical area (CBSA) with actual home price indices as of December 31, 2010. Milliman relied on Moody's Economy.com home price index forecasts to extrapolate from the December 31, 2010 actual index values through March 31, 2011 where applicable.

***Description of the Five Loan Populations***

Milliman analyzed five different loan populations from the final dataset to investigate the qualitative and quantitative robustness of the model indications. The five different loan populations are:

1) All loans in the filtered dataset

This scenario covered all high LTV insured loans in addition to high LTV uninsured loans. The regression equations used in this scenario include underwriting variables to control for the impact of risky underwriting characteristics such as documentation type, loan term, interest only indicators, negative amortization indicators, etc. A complete list of the underwriting variables in the regression can be found in the "Description of Regression Model" section. A majority of the high LTV uninsured loans are piggyback loans.

2) All loans in the filtered dataset excluding Federal Housing Administration (FHA)-insured loans and excluding loans with a CLTV above 95%.

One question raised in the proposed QRM definition is whether or not the presence of mortgage insurance itself reduces the incidence of default. FHA-insured loans are explicitly excluded from the proposed risk-retention requirements of the Dodd-Frank Act. In addition, loans insured by the FHA must follow the underwriting guidelines, originator oversight, and servicer oversight set by the FHA. In order to provide a clean comparison of the relative default incidence of privately insured loans (which must follow the specifications of the private mortgage insurer) against uninsured loans, Milliman removed FHA-insured loans from the population.

After reviewing the remaining loan population of loans not insured by the FHA, Milliman also removed loans with a CLTV of greater than 95%. Milliman removed this segment of loans from the study because:

a) FHA-insured loans are concentrated in the greater 95% CLTV category;
b) Loans with a CLTV greater than 95% represents business that is unlikely to be written going forward, particularly for loans that meet the final definition of a QRM.

3) Only loans meeting the proposed QRM definition with the exception of loan-to-value (LTV) and debt-to-income (DTI) requirements, excluding FHA loans and excluding loans with a CLTV above 95%

The regulators issuing the proposed QRM definition issued a request to determine whether or not the presence of mortgage insurance itself at the time of origination reduces the incidence of default *for loans that meet the proposed QRM criteria but for a higher adjusted LTV ratio.* Therefore, Milliman filtered the data for the proposed QRM requirements as described in the data section of this report. DTI filters were not applied due to the lack of data and reliability of DTI ratios in the data used for this study[7].

[7] For the loan population used in this study, approximately 50% of the observations were missing a debt-to-income ratio. Upon further review it was determined loans missing a DTI were not randomly distributed among the loan population.

4) All loans in the filtered dataset excluding FHA loans, loans with a CLTV greater than 95%, and excluding government-sponsored enterprise (GSE) loans.

During the period in which the studied loans were originated, the private mortgage insurance companies delegated approval authority to the GSE's and their automated underwriting systems. It is difficult to separate the impact of the decisions made by Desktop Underwriter (Fannie Mae's automated underwriting system) and Loan Prospector (Freddie Mac's automated underwriting system) from the impact of the private mortgage insurance companies in those loans. Therefore, Milliman removed loans purchased by the GSEs within 3 months of origination for this loan population to test the resulting impact of the analysis against the results of the analysis of Population (2).

5) Only loans meeting the proposed QRM definition with the exception of loan-to-value (LTV) and debt-to-income requirements, excluding FHA loans, loans with a CLTV greater than 95%, and excluding government-sponsored enterprise (GSE) loans.

For the last population of loans, Milliman applied the QRM filters to the loan population described in Population (4). The regulators issuing the proposed QRM definition issued a request to determine whether or not the presence of mortgage insurance itself at the time of origination reduces the incidence of default *for loans that meet the proposed QRM criteria but for a higher adjusted LTV ratio.* As GSE loans are also excluded from risk retention requirements, and the GSEs also have specific underwriting and servicing requirements, Milliman removed GSE loans from the population to provide a clean comparison of the relative default incidence of privately insured loans (which must follow the specifications of the private mortgage insurer) against uninsured loans.

***Description of the QRM Filter***

Milliman filtered the underwriting data to meet the definition of a QRM per the proposed definition from the Agencies with the exception of filters for debt-to-income ratios and loan-to-value (LTV) ratios. Milliman did not filter on debt-to-income ratios due to the lack of data availability and reliability for this field; for example, approximately 50% of the observations under the proposed QRM definition were missing a DTI ratio. Milliman did not filter on loan-to-value ratios as mortgage insurance is typically provided for high LTV loans. The purpose of this study is to assess whether loans with mortgage insurance at origination have a lower incidence of default than uninsured loans for loans that meet the proposed QRM definition but for higher combined LTV ratios.

To define the loan population meeting the QRM proposal, Milliman applied additional filters to the loan level origination data to include only loans meeting the following proposed QRM requirements:

***Loans included in the proposed QRM definition:***

- Adjustable-rate mortgages with an annual maximum rate reset of less than or equal to 2 percentage points and a lifetime maximum rate reset of less than or equal to 6 percentage points;
- Loans with an amortization period equal to or less than 360 months;
- Full documentation loans;
- Loans with an occupancy type of primary residence / owner occupied; and
- Loans with a FICO score between 690 and 850.

***Loans excluded from the proposed QRM definition:***

- Interest-only loans;
- Loans with a balloon payment;
- Negative amortization loans; and
- Loans with a prepayment penalty.

***Loan Counts for Each Population***

The loan count for each population used in this study is summarized in Table 8 below.

**Table 8**
**Loan Count Summary by Population**

| Population | Terminated and Active Loans | Terminated Loans Only |
|---|---|---|
| Population 1 – All loans in the data | 6,045,900 | 3,365,360 |
| Population 2 – All loans excluding FHA and GT95 CLTV | 4,380,969 | 2,495,367 |
| Population 3 – QRM loans excluding FHA and GT95 CLTV | 1,110,159 | 618,357 |
| Population 4 – All loans excluding FHA, GT95 CLTV, and GSE | 1,500,352 | 998,173 |
| Population 5 – QRM loans excluding FHA, GT95 CLTV, and GSE | 285,739 | 207,974 |

## APPROACH TO ANALYSIS

To assess whether loans with mortgage insurance (MI) perform differently than uninsured loans with respect to default incidence, Milliman first reviewed the empirical default rates of the various cohorts according to the default definitions and cohorts described below. The empirical default rates provide an approximation of the relative default frequency of insured loans relative to uninsured loans. However, the empirical default rates may not provide controlling factors for the observed performance difference such as home price appreciation and underwriting characteristics. For example, the insured population may have less concentration in low documentation loans for Population (1) relative to uninsured loans, and the difference in the low documentation concentration may contribute more to the performance difference than the presence of mortgage insurance.

### *Description of the Logistic Regression*

In order to control for such potential differences, Milliman performed logistic regressions on the Corelogic Data using a combination of underwriting data and home price appreciation categories. Milliman performed the analysis at 20 quarters of development[8]. Fixing the development period creates a homogeneous set of data across loan origination years with respect to the time duration of exposure to default; this methodology was used because cumulative loan default probabilities increase monotonically with time. Furthermore, the ultimate resolution of every loan in this study is not yet known. A mortgage loan will, at ultimate development, either terminate due to default or pay the mortgage in full through the amortization schedule of the mortgage or through early repayment. An ultimate default rate can only be known once all loans in the population are terminated. Therefore, we defined cumulative default rates as of a specific development period, i.e. 20 quarters of development, to control for time. This allowed us to compare the model results for differently defined default horizons and ensure that loans in a given model were exposed to default hazard for equal amounts of time.

[8] The study therefore includes loans originated from 2002 through 2006. Preliminary analyses inclusive of the 2007 book at 16 quarters of development show similar results to those obtained in this study.

The home price appreciation (HPA) environment that a borrower is subject to affects the value of the collateral behind each loan, which impacts both a borrowers' ability to refinance a loan and willingness to repay a loan. For each loan, Milliman associated an HPA measure for the metropolitan area or state in which the loan was located during the development period of the data considered. Borrowers who are not able to repay their mortgage through refinancing (possibly due to negative equity or due to the lack of available credit) present a greater default incidence than a similar loan that is able to refinance. Borrowers who face large declines in the value of their property have a greater propensity to default on their mortgages than borrowers who face large increases in the value of their property, all else equal.

After consideration of the exceptional rise and subsequent decline in home prices and the corresponding performance of mortgage loans over the time period utilized for this analysis, Milliman believes the relationships between the dependent variables in this analysis and the corresponding independent underwriting loan variables may not be constant across the diverse HPA environments experienced in the United States. This presents a modeling problem because any single statistical model relies on the assumption presented in its equation that the relationship between a dependent and independent variable can be characterized in part with a constant parameter. Specifically the assumption is that the parameter for the independent variable is an estimate of the "true" constant coefficient. If that "true" constant is not constant but in fact variable over the range of data considered, then the results of a model that assumes otherwise are questionable. One approach to deal with this problem is to build models for each cohort by segmenting the data into smaller ranges with respect the "controlling" variable in question, here metropolitan HPA.

For this particular analysis, Milliman treated HPA as a segmenting variable and subsetted the data according to distinct home price appreciation ranges. Specifically, Milliman grouped the loans according to the cumulative HPA categories after 20 quarters of development: HPA ≤ -20%, -20% < HPA ≤ 0%, 0 < HPA ≤ 20%, and 20% < HPA.

An alternative to segmenting the data by HPA would be to introduce HPA as a right hand side (RHS) variable. Milliman believes its approach to segment the loans into distinct HPA environments allows for a better understanding of the relationships between the dependent variables and independent underwriting variables in each model without sacrificing the explanatory power of the underwriting variables to the HPA environment of each loan. Model comparisons of insured versus uninsured loans are then made between cohorts of loans that were subject to similar HPA environments.

***Description of the Datasets Used in the Analysis***

For each defined loan population, Milliman created four datasets corresponding to four distinct HPA environments. The cumulative HPA categories after 20 quarters of development are: HPA ≤ -20%, -20% < HPA ≤ 0%, 0 < HPA ≤ 20%, and 20% < HPA.

Milliman calculated cumulative home price appreciation using metropolitan and state FHFA home price indices. If the property was located in a Core Based Statistical Area (CBSA), Milliman used the HPA for the CBSA. If the property was not located in a CBSA then Milliman used the state home price index to calculate cumulative home price appreciation. For each loan, Milliman calculated the home price appreciation at the end of 20 quarters of development. For example, for a loan originated in the first quarter of 2002, Milliman calculated HPA for that loan as the percentage change in the relevant home price index from the first quarter of 2002 through the first quarter of 2007 (20 quarters). HPA was calculated from loan origination date to the development age of 20 quarters for each loan, regardless of whether or not the loan terminated prior to the development age. Milliman did this to avoid measuring HPA at different times of development for different loans within the evaluation period. Milliman believes this method identifies the HPA environment in which the loan existed for model segmentation purposes.

Milliman performed analysis on:

1. populations of loans that are still active or terminated at the evaluation horizon; and
2. only loans have that terminated (i.e. full resolution of the loan is known) by the evaluation horizon.

For loans that have not terminated, the full performance history of the loan is not known; these loans may default in the future, may cure from a given delinquency status, and/or may repay their obligation in full.

A logistic regression models a binary dependent variable, usually with the signal of interest assigned an outcome of 1. For the models described in this analysis, the dependent variable is assigned a 1 if the loan has reached a pre-determined default status and a 0 otherwise. Since the data is not at ultimate, we defined default as of a given development age as discussed above. A nontrivial consideration is whether the models should be calibrated based on all loans or only those loans that have terminated by a given development age to evaluate whether insured loans perform differently than uninsured loans. If one is interested in the ultimate default rates for cohorts of loans, then the two data sets (all loans and terminated loans only) can be viewed as two distinct approximations. In order to provide a complete analysis of the independent variable relationships with the dependent variables, Milliman created a pair of data sets, one with all loans and one with only those loans that terminated as of the development age, for each HPA segment and calibrated a model based on each data set. Therefore, there are 8 distinct datasets for each population in this analysis (4 sets for the HPA segments * 2 sets for all loans (terminated and active loans) and terminated only loans, separately).

***Description of Regression Models***

For each regression model, Milliman used a stepwise selection procedure to determine which underwriting variables, in combination, were significant at the 10% level. The general equation form for the probability of a given response outcome in a logistic model is:

$P_i = e^{\Sigma \beta i Xi} / (1 + e^{\Sigma \beta i Xi})$, where the Xi are the independent covariates with βi as their associated coefficients.

Below is a summary of the variables included in the stepwise procedure and Milliman's view regarding these loan characteristics and their effect on default frequency:

- *Amortization (Reference Level = Fixed, Other Levels = ARM)*: ARMs are subject to interest rate risk and potential payment fluctuations with the market. Potentially higher interest rates for ARM borrowers without a proportional increase in income create greater mortgage service obligations for the borrower and an increased probability of default. On the other hand potentially lower interest rates for ARM borrowers without a proportional decrease in income create a lower mortgage debt obligation for the borrower and a decreased probability of default. In addition, the initial interest rate on ARMs is typically lower than the interest rate of fixed rate mortgages; therefore, some borrowers tend to select an ARM to achieve a better qualifying debt ratio;

- *Combined Loan-to-Value:* Mortgages supported by a lower equity investment by the borrower are subject to greater risk of default due to the increased likelihood of a future negative equity position caused by a future negative home price shock. In addition, a lower initial equity investment by the borrower may indicate either a lack of financial resources by the borrower for a larger down payment or potentially an investor in the property trying to limit their initial exposure. Consequently, mortgages with a higher CLTV should be associated with a higher default rate. For this analysis Milliman combined loans into CLTV segments, in combination with other underwriting variables, to categorize the loans into insured and uninsured cohorts as explained below;

- *Documentation Type (Reference Level = Full, Other Levels = Low):* Mortgages made with reduced documentation are more likely to default than those with full documentation provided at closing. Additionally, mortgages with no documentation (i.e., no income or asset verification) have a significantly greater chance of defaulting when compared to a full documentation mortgage;

- *FICO score (Reference Level = 780-850, Other Levels = 350-579, 580-599, 600-619, 620-659, 660-689, 690-719, 720-749, 750-779)*: Borrowers with low FICO scores are deemed to present a greater credit risk, and therefore, a borrower with a low FICO score should be associated with a higher default frequency. The relationship between FICO score and default rates is a non-linear

relationship. Therefore, Milliman treated this variable as a categorical variable as opposed to a continuous variable for the model;

- *Insured versus Uninsured:* Milliman separated the loans into insured and uninsured loans. This segmentation was used, in combination with other underwriting variables, to categorize the loans into the groups explained below. The intent of the present analysis is to determine if the presence of mortgage insurance at origination lowers default incidence;

- *Interest Only/Negative Amortization (Reference Level = No, Other Levels = Yes):* It is believed that borrowers with mortgages that have payment options such as only paying interest (as opposed to paying principal and interest) or less than the required interest payment (negative amortization mortgages) present a greater credit risk; thus, these types of mortgages should exhibit higher default rates than comparable fully amortizing mortgages;

- *Investor type:* For certain parts of the analysis, Milliman separated the loans into GSE and Private (i.e. not GSE) investor groups. Milliman does not have an a priori view of the relative default frequency by investor type;

- *Loan purpose (Reference Level = Purchase, Other Levels = C/O Refi, R/T Refi)*: Cash-out refinance loans can be indicative of financial stress on the borrower; therefore, these loans should be associated with a higher default frequency. Rate/term refinance loans should lower the debt service obligation of the borrower through better terms on the mortgage; therefore, these loans should be associated with a lower default frequency;

- *Occupancy type (Reference Level = O[wner], Other Levels = I[nvestor], S[econd], U[nknown]):* In the Corelogic data, properties are categorized as being occupied either by the owner of the property, owned as a second or vacation home, owned as an investment property, or the occupancy type is

unknown. In Milliman's experience, investor properties tend to have higher default rates than owner occupied properties and second homes;

- *Property type (Reference Level = SFR [Single Family Residence] , Other Levels = 2-4 U[nits], Condo):* Loans for 2-4 family homes and condos have exhibited a greater propensity for default when compared to single-family residences based on Milliman's experience; therefore, these loans should be associated with a higher default frequency;

- *Property value size (Reference Level = 2, Other Levels = 0, 1, 3, 4):* Each loan was assigned to a relative original property value size category based on the distribution of original property value sizes for each CBSA and origination year. To develop the original property value size categories Milliman looked at all loan originations in the Corelogic Data for origination years 2002 through 2006 by CBSA and origination year; Milliman determined original property value size quintiles for each geographic location by origination year. Milliman then assigned each loan to a quintile depending upon the size of the original property value of the loan, the location of the loan, and the origination year of the loan. The relationship between the relative original property value size and default rates tends to vary depending upon the loan's HPA environment;

- *Term (Reference Level = 360, Other Levels = <360, >360 ):* Mortgages with an original term less than 30 years can be representative of borrowers with greater financial resources and willingness to repay a mortgage over a shorter period than longer duration mortgages and consequently may be associated with lower default rates relative to 30 year mortgages. Similarly, mortgages with an original term greater than 30 years can be representative of borrowers with less financial resources to repay a mortgage over a shorter duration and consequently may be associated with higher default rates relative to 30 year mortgages; and

- *Source (Reference Level = Non-Retail, Other Levels = Retail, Correspond[ence], Other):* The origination source of a loan tends be a statistically significant variable in explaining loan default frequencies. Milliman categorized the origination source into four categories: retail, non-retail, correspondence, and other. A retail lender is a lender who originates loans (i.e. works with the potential borrowers to work out financing terms), underwrites the loan, and provides the funding for the mortgage. A non-retail lender is a lender classified as either a mortgage broker or wholesale lender. A mortgage broker works independently from lenders to connect borrowers with potential lenders. Once the broker connects a borrower with a potential lender, the lender may provide financing for the loan or may decide it does not want to accept the risk. A wholesale lender is a lender that works with mortgage brokers and other loans officers to originate loans; underwriting and processing are completed by the wholesale lender to determine if the borrower meets certain underwriting criteria. If underwriting criteria is met, the wholesale lender will provide funding; loans are typically sold to the secondary market shortly after origination. Finally, correspondence lenders are lenders that originate and fund loans for the purpose of selling the mortgages to a larger lender (known as the "sponsor"). Underwriting typically must follow the guidelines of the sponsor, and a single correspondent lender may have more than one sponsor. In Milliman's experience correspondence loans are associated with the highest default frequency.

Milliman created a field using the combined LTV ratio at origination and the insurance type fields. This single variable contains 7 distinct possibilities as shown below:

**Table 9**
**Combined LTV and Insurance Type Variable List**

| | LTV | Insured (Yes or No) |
|---|---|---|
| 1. 80 Uninsured | 80% | No |
| 2. 90 Uninsured | 80%<CLTV≤90% | No |
| 3. 90 Insured | 80%<CLTV≤90% | Yes |
| 4. 95 Uninsured | 90%<CLTV≤95% | No |
| 5. 95 Insured | 90%<CLTV≤95% | Yes |
| 6. GT95 Uninsured | 95%<CLTV≤105% | No |
| 7. GT95 Insured | 95%<CLTV≤105% | Yes |

The CLTV and insurance (CLTV_Insured) variables were grouped together in this manner to allow for different interactions between CLTV and insurance presence, so Milliman could specifically evaluate the impact of mortgage insurance for comparable CLTV and HPA categories.

Milliman fit the logistic regressions to three separate independent response variables to assess the impact of the presence of mortgage insurance of loan default rates. The first regression was for the response variable of default where default is defined as a loan ever reaching 90 days delinquent or worse. In this regression Milliman analyzed the relative frequency of default for loans with mortgage insurance compared to similar loans without mortgage insurance, while controlling for underwriting and economic variables.

The second regression Milliman performed was on the response variable of a loan cure given a loan has reached 90 days delinquent or worse. A loan cure is defined as the loan ever reaching the current status subsequent to the loan becoming 90 days delinquent or worse. In this regression Milliman analyzed the relative frequency of loan cures for loans with mortgage insurance compared to similar loans without mortgage insurance, while controlling for underwriting and economic variables.

The final regression Milliman performed was for the response variable loan default with consideration of both loans cures and re-defaults. In this regression a loan default was defined as any loan that reached a 90 days delinquency status or worse and subsequently did not cure from the default. If a loan did cure, Milliman determined whether the loan re-defaulted; if the loan re-defaulted after the cure the loan was categorized as a default. The intent of this regression is to determine the impact of mortgage insurance on final loan defaults with consideration of default mitigation activities of the mortgage insurance companies. In this regression equation Milliman analyzed the relative frequency of loan defaults with consideration of loan cures and re-defaults for loans with mortgage insurance compared to similar loans without mortgage insurance, while controlling for underwriting and economic variables.

## RESULTS OF ANALYSIS

Table 10 below provides a summary, in terms of loan counts, of the data used to calibrate the models described above for Population (1) using all loans (i.e. including active and terminated loans after 20 quarters of development) for loans with an original CLTV of 90. Exhibit 1 provides this information for each of the five loan populations for every CLTV for both all loan originations (i.e. terminated and active loans) and terminated loans only.

**Table 10**
**Population 1 : All loans in the Filtered Database**
**CLTV 90**
**Terminated and Active Loans**

| | Uninsured | | | Insured | | |
|---|---|---|---|---|---|---|
| | Default 90 | Cure Given Default 90 | Default_NC | Default 90 | Cure Given Default 90 | Default_NC |
| **HPA Range** | **Observed Loan Count** | | | **Observed Loan Count** | | |
| HPA<=-20% | 80,539 | 38,415 | 80,539 | 47,743 | 15,344 | 47,743 |
| -20%<HPA<=0% | 90,231 | 19,359 | 90,231 | 123,527 | 17,938 | 123,527 |
| 0%<HPA<=20% | 92,784 | 8,883 | 92,784 | 308,605 | 23,053 | 308,605 |
| 20%<HPA | 60,436 | 2,811 | 60,436 | 341,716 | 14,351 | 341,716 |
| **HPA Range** | **Number of Responses** | | | **Number of Responses** | | |
| HPA<=-20% | 38,415 | 4,824 | 36,246 | 15,344 | 2,703 | 13,838 |
| -20%<HPA<=0% | 19,359 | 4,187 | 17,320 | 17,938 | 5,548 | 14,691 |
| 0%<HPA<=20% | 8,883 | 3,254 | 7,194 | 23,053 | 9,208 | 17,487 |
| 20%<HPA | 2,811 | 1,663 | 1,818 | 14,351 | 7,902 | 9,119 |
| **HPA Range** | **Response Rate** | | | **Response Rate** | | |
| HPA<=-20% | 47.7% | 12.6% | 45.0% | 32.1% | 17.6% | 29.0% |
| -20%<HPA<=0% | 21.5% | 21.6% | 19.2% | 14.5% | 30.9% | 11.9% |
| 0%<HPA<=20% | 9.6% | 36.6% | 7.8% | 7.5% | 39.9% | 5.7% |
| 20%<HPA | 4.7% | 59.2% | 3.0% | 4.2% | 55.1% | 2.7% |
| **HPA Range** | **Ratio of Uninsured to Insured Rate** | | | | | |
| HPA<=-20% | 1.48 | 0.71 | 1.55 | | | |
| -20%<HPA<=0% | 1.48 | 0.70 | 1.61 | | | |
| 0%<HPA<=20% | 1.28 | 0.92 | 1.37 | | | |
| 20%<HPA | 1.11 | 1.07 | 1.13 | | | |

The table and exhibits provide the total loan count, the response variable count (i.e. Default 90, Cure Given Default 90, or Default_NC), the rate for the response variable, and the empirical relativity of uninsured loans against insured loans for each HPA category. The loan cohorts include loans originated in years 2002 Q1 through 2006 Q1 as loans originated in 2006 Q2 or later do not have 20 quarters of

development. For example, looking to the third data column for the variable Default_NC for the HPA category "HPA<=-20%" for uninsured loans, there were 80,539 loans in the 90 CLTV cohort with cumulative home price appreciation of less than or equal to -20% at 20 quarters of development. Of these loans:

- 38,415 ever reached a 90 days delinquency status or worse (Default_90);
- 36,246 reached a 90 days delinquency status or worse and subsequently did not cure from the default (Default_NC);
- 4,824 of the loans that were ever 90 days delinquent or worse subsequently cured (Cure Given Default 90); and
- 2,655 of these loans cures re-defaulted (36,246 – (38,415 – 4,824)) [Not shown in table].

The response rate for each variable varies considerably across the four HPA ranges. Specifically, for the loan population in Table 10, the Default_NC response variable for uninsured loans ranges from a 45.0% default rate in the lowest HPA range "HPA<=-20%" (45.0% = 36,246 / 80,539) to a 3.0% default rate in the highest HPA range "20%<HPA" (3.0% = 1,818 / 60,436). The Default_NC response variable for insured loans similarly ranges from a high of 29.0% (29.0% = 13,838 / 47,743) to a low of 2.7% (2.7% = 9,119 / 341,716) for the lowest and highest HPA ranges, respectively. The substantial range in default rates by HPA environment supports our conjecture that the HPA environment of a loan is significantly influential on the resulting default and cure rates.

Table 11 below shows the estimated model parameters for the CLTV_Insured variable and their associated significance for all originated loans in the filtered database in Population (1) for the Default_NC response variable. In a logistic regression, a parameter estimate is created for each category within a variable relative to the reference category. For the CLTV_Insured variable, the reference category for all models discussed in this paper is "80 Uninsured" referring to loans with an original CLTV of 80% without mortgage insurance.

| Table 11<br>Population 1 : All loans in the Filtered Database<br>CLTV 90<br>Terminated and Active Loans<br>Default_NC Model Parameter Estimates | | | | | | |
|---|---|---|---|---|---|---|
| | **90 Insured** | **90 Uninsured** | **95 Insured** | **95 Uninsured** | **GT95 Insured** | **GT95 Uninsured** |
| **HPA Range** | **Parameter Estimates** | | | | | |
| HPA<=-20% | 0.5587 | 0.7371 | 0.7719 | 0.9951 | 0.7197 | 1.3309 |
| -20%<HPA<=0% | 0.5123 | 0.7944 | 0.6905 | 1.0010 | 0.7581 | 1.5573 |
| 0%<HPA<=20% | 0.5570 | 0.9001 | 0.6951 | 1.0949 | 0.8877 | 1.7937 |
| 20%<HPA | 0.6111 | 0.9701 | 0.7872 | 1.0694 | 0.9780 | 1.8029 |
| **HPA Range** | **Odds Ratio (Relative to 80 Uninsured)** | | | | | |
| HPA<=-20% | 1.748 | 2.090 | 2.164 | 2.705 | 2.054 | 3.784 |
| -20%<HPA<=0% | 1.669 | 2.213 | 1.995 | 2.721 | 2.134 | 4.746 |
| 0%<HPA<=20% | 1.745 | 2.460 | 2.004 | 2.989 | 2.430 | 6.012 |
| 20%<HPA | 1.842 | 2.638 | 2.197 | 2.914 | 2.659 | 6.067 |
| **HPA Range** | **Significance (ProbChiSq)** | | | | | |
| HPA<=-20% | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| -20%<HPA<=0% | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| 0%<HPA<=20% | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| 20%<HPA | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

In Table 11, the values under the “Parameter Estimates” label contain the maximum likelihood parameter estimate for the “CLTV_Insured” variable and the values below the “Parameter Estimates” label shows the Chi-square p-value associated with each the respective “CLTV_Insured” parameter estimate, all determined in SAS. As mentioned above because the variables are categorical (as are all of the variables in each model), the coefficients are relative to the reference level of the variable. A coefficient of zero implies the level is exactly the same as the reference level, whereas a negative coefficient implies a lower probability of the response than the reference level and a positive coefficient implies a higher probability of the response than the reference level.

Odds ratios for each coefficient are produced as part of the standard SAS output for logistic regression; Table 11 above provides the odds ratio for each CLTV_Insured level. An odds ratio for a particular level of a variable can be derived from its coefficient and is equal to e (base of the natural logarithm) raised to the coefficient for that level, and is the odds for the level as compared to the reference level. Using the results shown in Table 11, the odds ratio for a “90 Uninsured” loan in the “HPA<=-20%” HPA environment

against an otherwise identical loan that is classified as an “80 Uninsured” loan for the CLTV_Insured variable is about 2.090 ($2.090 = e^{(0.7371)}$). This can be stated that the odds that a “90 Insured” loan defaults is approximately 2.090 times that of an “80 Uninsured” loan in an “HPA<=-20%” HPA environment.

Exhibit 2 Pages 1 through 30 show the parameter estimates and their associated significance p-values for each of the 120 models created using the five populations, two data sets (all loans and terminated loans only), three response variables (Default 90, Cure, and Default_NC), and four HPA ranges. Note, not every model has an estimate for every possible variable in each model due to the stepwise variable selection process; if a variable was not included in the model per the stepwise selection process, Exhibit 2 shows “NA” for the parameter estimate. The stepwise algorithm to include or exclude a variable looks at threshold p-values that are based on inclusion or exclusion of the entire variable. In general, variable significance and the signs of and relationships between coefficients within any given model conformed to Milliman’s expectations, which will be discussed in more detail below.

The p-value, shown in both Table 11 and Exhibit 2 Pages 1 through 30, for each coefficient is based on a test of the null hypothesis that the coefficient for that level is the same as the coefficient for the reference category, all else equal. The p-value for the stepwise regression is a different p-value than the Chi-square p-value associated with each parameter estimate. The threshold decision to include or exclude a variable is based on the hypothesis test that all the level coefficients are zero, or every level is the same as the reference level. A variable passes the test for inclusion if at least one of its levels is statistically different than the reference category. A variable can be statistically significant in the regression and have some of the category levels that are not statistically different from the reference level. For example on Exhibit 2 Page 1, the parameter estimate for the Quintile_String (Quintile_String represents the property value quintile) category “3” is -0.0119 with a Chi-square p-value of 0.2570, which is greater than the 10% requirement used in the stepwise selection. However, other levels of this variable are significant with a p-value of <0.0001, so the p-value for the entire variable is significant and the entire variable is included in the final model.

Exhibit 2 Page 1 provides the entire set of parameter estimates for Population (1) for the Default_NC response variable. In the less than negative 20% HPA range, assume a loan cohort has the following characteristics:

- 95 CLTV;
- 660-689 FICO (parameter estimate = 1.0671);
- SFR (parameter estimate = 0);
- ARM loan (parameter estimate = -0.1113);
- Non-Retail (parameter estimate = 0);
- C/O Refi (cash out refinance) (parameter estimate = 0.0948);
- Full documentation (parameter estimate = 0);
- Not an interest only loan (parameter estimate = 0);
- Not a negative amortization loan (parameter estimate = 0);
- 360 month term (parameter estimate = 0);
- 3 quintile of property values (parameter estimate = -0.0119);
- Second home (parameter estimate = 0.0728).

If the loans all had mortgage insurance at origination (i.e., 95 Insured), the logistic regression indicates the expected default rate for the loan cohort is:

$P_i = e^{\sum \beta i Xi} / (1 + e^{\sum \beta i Xi}) = e^{-0.9733} / (1 + e^{-0.9733}) = 27.4\%$

$\sum \beta iXi = (-2.8567+0.7719+1.0671+0-0.1113+0+0.0948+0+0+0+0-0.0119+0.0728) = -0.9733$

If none of the loans had mortgage insurance at origination (i.e. 95 Uninsured), the logistic regression indicates the expected default rate for the loan cohort is:

$P_i = e^{\sum \beta i Xi} / (1 + e^{\sum \beta i Xi}) = e^{-0.7501} / (1 + e^{-0.7501}) = 32.1\%$

$\sum \beta iXi = (-2.8567+0.9951+1.0671+0-0.1113+0+0.0948+0+0+0+0-0.0119+0.0728) = -0.7501$

As a result of the stepwise selection process, all variables included in any given model are significant at the 10% level. Because Milliman fit multiple models, the parameter estimates and each parameter's significance vary amongst models. One trend of interest is any level's coefficient that changes sign under the different models for each HPA bucket. This suggests the presence of a particular characteristic can have opposing effects depending on the HPA environment and supports Milliman's approach of using separate models for various HPA environments to study the relations between underwriting characteristics and performance. For example, in Exhibit 2 Page 1, the loan purpose R/T REFI (rate or term refinance) has a higher expected default rate under negative HPA environments and a lower expected default rate under positive HPA environments, all relative to the reference level of Purchase. This type of interaction can be challenging to capture when HPA is variable in the data. Similarly, coefficients that vary substantially in magnitude across the HPA categories also suggest the effect of the underwriting characteristic is not constant over broader HPA ranges. Alternatively, consistency in coefficients across HPA buckets suggests the effect of the characteristic is constant and segmenting the data is inconsequential to the results for that variable.

A general discussion for the Default_NC response variable model results for each explanatory variable in the Population (1) models is summarized below; the relevant parameter estimates can be viewed on Exhibit 2 Pages 1 and 4 for the all loans and terminated only loans models, respectively:

- *Amortization (Reference Level = Fixed, Other Levels = ARM)*: Contrary to expectations, ARM mortgages have a negative coefficient across all HPA environments although the coefficient is relatively small compared to other variables in the model. This observation holds when calibrating the models to both all loans (i.e., active and terminated loans) and terminated loans only. A possible explanation for this could be that the general trend of interest rates has been decreasing since late 2007 as the housing market collapsed potentially resulting in reduced monthly payments for ARM borrowers. Therefore, when controlling for other influential factors in the model, ARM defaulted less frequently than comparable fixed rate mortgages over the time period used for this analysis;

- *Combined Loan-to-Value (CLTV)*: In line with expectations, the coefficients for similar CLTV categories (e.g., 95 uninsured relative to 90 uninsured and 95 insured relative to 90 insured) increase as the CLTV category increases. This result supports to our opinion that default rates have an inverse relationship with borrower equity; that is, as borrower equity increases, mortgage defaults decrease;

- *Documentation Type (Reference Level = Full, Other Levels = Low):* Loans categorized as either low or no documentation loans relative to full documentation loans have a large, positive coefficient for all HPA categories using both all loans and terminated only loans. These results support the opinion that the amount of documentation at loan origination has a large influence on the default likelihood of a mortgage;

- *FICO score (Reference Level = 780-850, Other Levels = 350-579, 580-599, 600-619, 620-659, 660-689, 690-719, 720-749, 750-779)*: For all HPA categories and for both all loans and the terminated only loan model calibrations, the pattern between FICO score and the default rate follows the expected inverse relationship where lower FICO scores are associated with higher default rates and higher FICO scores are associated with lower default rates. One interesting observation is that the value of the coefficient for low FICO scores (e.g., FICO scores less than 660) increases as the HPA range increases from negative HPA environments to positive HPA environments. This suggests that the distinguishing effect of FICO score at origination is more diluted in negative HPA environments than in positive HPA environments;

- *Insured versus Uninsured:* For Population (1), the model coefficients support the empirical observation that the default rate for insured loans is less than the default rate for uninsured loans. That is, the coefficient for uninsured loans is larger than the coefficient for insured loans in the same CLTV cohort. More detail on comparisons between the relative performance of uninsured loans and insured loans is presented in a later section of this report;

- *Interest Only/Negative Amortization (Reference Level = No, Other Levels = Yes):* In line with expectations the coefficients associated with interest only flags and negative amortization flags are large and positive. The coefficient for loans categorized as interest only is generally larger than the coefficient for negative amortization flags. In addition, for the HPA category "20%>HPA", the negative amortization coefficient is relatively small for the all loans model and is not significant for the terminated only loans model;

- *Investor type:* For certain parts of the analysis, Milliman separated the loans into GSE and Private (i.e. not GSE) investor groups. This variable was not used as an explanatory variable in the regression models;

- *Loan purpose (Reference Level = Purchase, Other Levels = C/O Refi, R/T Refi)*: The relationship between loan purpose and default frequency varies depending upon the HPA environment. For negative HPA environments, cash out refinance loans and rate/term refinance loans have a positive coefficient indicating an increased likelihood of default relative to purchase loans; for largely positive HPA environments (i.e. 20%<HPA), cash out refinance loans and rate/term refinance loans have negative coefficients indicating a decreased likelihood of default although the absolute magnitude of default rates in high HPA environments is relatively small;

- *Occupancy type (Reference Level = O[wner], Other Levels = I[nvestor], S[econd], U[nknown]):* In line with expectations, mortgages on investor properties have a positive coefficient for both the terminated and active loans dataset and the terminated only loans dataset. The coefficient on second home mortgages is mixed in magnitude with positive coefficients for all HPA environments with the exception of the 20%>HPA environment where the coefficient is negative. The results for unknown occupancy types vary in magnitude and sign across models;

- *Property type (Reference Level = SFR [Single Family Residence] , Other Levels = 2-4 U[nits], Condo):* The coefficient on 2-4 properties is positive for all HPA environments and for both the all loans dataset and the terminated only loans dataset, and the coefficients vary in magnitude across HPA environments. Positive coefficients for 2-4 Units are in line with expectations. The coefficient for condo varies in sign and magnitude across HPA environments;

- *Property value size (Reference Level = 2, Other Levels = 0, 1, 3, 4):* Each loan was assigned to a relative original property value size category based on the distribution of original property value sizes for each CBSA and origination year. To develop the original property value size categories Milliman looked at all loan originations in the Corelogic Data for origination years 2002 through 2007 by CBSA and origination year; Milliman determined original property value size quintiles for each geographic location by origination year. Milliman then assigned each loan to a quintile depending upon the size of the original property value of the loan, the location of the loan, and the origination year of the loan. The relationship between the relative original property value size and default rates tends to vary depending upon the loan's HPA environment; and

- *Term (Reference Level = 360, Other Levels = <360, >360 ):* Mortgages with an original term more than 30 years had positive coefficients in all HPA environments, consistent with expectations. Mortgages with terms less than 30 years generally had negative coefficients, consistent with expectations, except for in the most positive HPA environment '20%<HPA'.

- *Source (Reference Level = Non-Retail, Other Levels = Retail, Correspond[ence], Other) :* Correspondence loans had positive coefficients, consistent with Milliman's expectations. Other and Retail generally showed negative coefficients, but varied by HPA environment.

Exhibit 2 Pages 2 and 5 provide the parameter estimates for the Default_90 response variable on loans that have terminated by 20 quarters of development; the results generally mirror those for the Default_NC

response variable. Exhibit 2 Pages 3 and 6 provide the parameter estimates for the cure response variable on loans that have terminated by 20 quarters of development; a large portion of the variables in the model are not significant at the 10% level due to the generally low volume in the response variable by 20 quarters of development. The volume of loan cures and subsequent terminations within the valuation period is minimal and results are inconsistent between models. The parameter estimates of these models are questionable, and the reader should be careful in trying to interpret these results.

The parameter estimates for each default model (i.e. for each of the five loan populations using both all loans and terminated only loans) and default response variable (i.e. either Default 90 or Default NC) are generally in line with expectations. This observation reinforces the reasonableness of the approach and findings in this study and provides support for the uninsured/insured results presented below.

***Comparison of Uninsured Loan Default Rates to Insured Loan Default Rates***

To statistically assess whether loans with insurance perform differently than loans without insurance, Milliman computed Odds Relativities of comparable cohorts and performed contrasts to assess the significance level of each comparison. For this study, Milliman computed the ratio of pairs of odds ratios, which we called the Odds Relativity. Within a given model, Milliman compared the odds ratios for uninsured loan cohorts relative to insured loan cohorts for a given CLTV cohort. Table 12 below provides the Odds Relativity and results of the contrast for Population (1) estimated using both terminated and active loans at 20 quarters of development.

| Table 12<br>Population 1 : All loans in the Filtered Database<br>CLTV 90<br>Terminated and Active Loans<br>Default_NC Odds Relativity (Uninsured to Insured) | | | |
|---|---|---|---|
| | **90 CLTV** | **95 CLTV** | **GT95 CLTV** |
| **HPA Range** | **Odds Relativity** | | |
| HPA<=-20% | 1.195 | 1.250 | 1.843 |
| -20%<HPA<=0% | 1.326 | 1.364 | 2.224 |
| 0%<HPA<=20% | 1.409 | 1.491 | 2.474 |
| 20%<HPA | 1.432 | 1.326 | 2.282 |
| **HPA Range** | **Significance (ProbChiSq)** | | |
| HPA<=-20% | <0.0001 | <0.0001 | <0.0001 |
| -20%<HPA<=0% | <0.0001 | <0.0001 | <0.0001 |
| 0%<HPA<=20% | <0.0001 | <0.0001 | <0.0001 |
| 20%<HPA | <0.0001 | <0.0001 | <0.0001 |

For example, within the 90 CLTV cohort, Milliman compared the odds ratio of the "90 Uninsured" cohort relative to the "90 Insured" cohort. "90 Uninsured" represents loans with an initial CLTV of 90 and no mortgage insurance; "90 Insured" represents loans with an initial CLTV of 90 and mortgage insurance. The Odds Relativity for the 90 CLTV cohort in the "HPA<=-20%" HPA environment is 1.195 ($1.195 = e^{(0.7371)} / e^{(0.5587)}$ where 0.7371 and 0.5587 are the parameter estimates shown in Table 11) . This type of comparison follows the same principles as computing contrasts in ANOVA or linear regression, and one can equivalently look at the arithmetic difference in the coefficients or the ratio of odds ratios. The Odds Relativity for the 90 CLTV cohort indicates that the odds of an uninsured loan in the 90 CLTV category defaulting is approximately 1.2 times as great as the odds of an insured loan in the 90 CLTV category defaulting assuming all other underwriting and HPA performance are similar. The Odds Relativity comparisons for all loan populations and response variables are shown in Exhibit 3. For completeness, these exhibits also provide the loan counts and empirical default relativities within each cohort.

For each model described in this paper, Milliman compared the odds ratios of uninsured loan cohorts relative to the odds ratios for insured loan cohorts as follows:

- 90 combined LTV;
- 95 combined LTV; and
- Greater than 95 combined LTV.

An Odds Relativity greater than one occurs when the odds ratio for the uninsured loan cohort is larger than the odds ratio for the insured loan cohort, all else equal. Note that an Odds Relativity of greater than one for the default variables (Default_NC and Default_90) indicates the probability of default for the uninsured loan cohort is higher than the probability of default for the insured loan cohort. An Odds Relativity of less than one for the cure variable indicates the probability of cure for the uninsured loan cohort is lower than the probability of cure for the insured cohort. In both cases we would conclude based on the odds ratio point estimates and Odds Relativities that the cohort of loans with insurance performed better, either from defaulting less or curing more.

In Table 11, the p-values of each parameter estimate are all significant at the 0.0001 level. The p-value shown in Table 11 is a test of whether or not each category in Table 11 is statistically different from the reference category of "80 Uninsured." Similarly, Milliman performed contrasts to determine whether or not the insured/uninsured coefficients are statistically different from each other.. The p-values shown in Table 12 and on the Odds Relativity exhibits are calculated using the contrast statement in SAS; the contrast statement tests for a statistical difference between the given pair of coefficients, namely uninsured versus insured loans. Mechanistically for the contrast, all other variables are set to their reference levels. The p-values represent the likelihood of observing the actual data given that the difference between the two true coefficients is zero, or that the two true coefficients are equal. Lower p-values indicate it is less likely to have observed the data given the two coefficients are equal. The p-values in Table 12 are the p-values of the contrast statement for Population (1) estimated using both terminated and active loans at 20 quarters of development. Table 12 indicates the Odds Relativities are significant at the 0.0001 level for every CLTV cohort. In other words, in any particular CLTV cohort, the probability of observing the actual data assuming there is no difference between the performance of insured and uninsured loans is 0.01%.

Exhibit 4 provides a visual summary of the Odds Relativities for the Default_NC variable for each of the models discussed in this report. In Exhibit 4, if the Odds Relativity is not significant at the 10% level, the Odds Relativity is not shown.

***General Conclusions***

In most of the CLTV cohorts and HPA environments for both Default_90 and Default_NC, the Odds Relativity is greater than one, which indicates the default frequency of uninsured loans is greater than the default frequency of insured loans after adjusting for underwriting characteristics and home price appreciation. This trend is most consistent in the models for large home price depreciation environments (appreciation of -20% or less). In general, the Odds Relativities are larger and have smaller p-values in the models with less favorable home price appreciation environments (e.g., HPA less than -20%).

The cure models based on all loans generally produce more reasonable results than in the terminated loans only models, at least in part because there are more observations to calibrate the models. We note that there are a nontrivial number of cells with very thin data, and those models should not be relied on for any inferences. Notwithstanding, the majority of the Odds Relativities are less than one in the cure models using all loans and concentrating on home price depreciation environments. An Odds Relativity of less than one in the cure models indicates uninsured loans are less likely to cure than insured loans. The p-values show a broad range across the models and CLTV cohorts, which is similar to the p-values in the default models. Many of the p-values are quite small, indicating a relatively low probability the coefficients are the same, but we note there are some p-values that are large with no evidence suggesting a difference in the coefficients.

## OTHER CONSIDERATIONS

### *Cure Models and All Loans vs. Terminated Only*

The cure models necessarily are calibrated with less data than the default models since a cure model is conditional on a loan default. That is, a loan must have defaulted prior to be considered for a cure model, and the cure model population is a subset of the loans used for the default models. Similarly, the models calibrated to the terminated loans only data are calibrated with less data than the models that use all loans. This is not only a data volume consideration but also a fundamental difference in the dependent variables of the models. In the all loans dataset (i.e. active and terminated loans) the dependent variable is the default probability for all loans originated as of the defined development period whereas the terminated only dataset is the default probability for loans that have terminated as of the defined development period. Although each tries to approximate the same response of interest, default probability, the difference between the two is more than their respective counts, and each approach has strengths and weaknesses.

### *Contrast P-Values*

The p-values enhance the Odds Relativity statistic by encasing it in a probabilistic framework. However, we should be very clear about what the p-values for the contrasts mean. The contrast sets all other variables to the reference category and compares the requested point estimates for the given model in a two-sided test. This comparison is directly affected by the uncertainty associated with each point estimate, and uncertainty is influenced by both the true population characteristics and the sample size. Point estimates known with more certainty, i.e. which have less spread in their probability distribution, will be easier to discern statistical differences between than point estimates with less certainty. Importantly, these contrasts do not test for differences between the coefficients at levels other than the reference level for the other variables in the model. The p-values then are the probability the true coefficients are the same (the relative incidence is the same) for uninsured and insured loans, within a given model at the reference level for all other characteristics. This is also known as the probability of a Type I error, the probability of rejecting that the coefficients are equal when they are in fact the same. This tolerance level is subjective.

## QUALIFICATIONS, LIMITATIONS AND DISCLOSURES

In performing this analysis, we have relied on data and other information available to us through Corelogic's LoanPerformance databases. We have not audited or verified this data and information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete.

We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Any study of future operating results involves estimates of future contingencies. While our analysis represents our best professional judgment, arrived at after careful analysis of the available information, it is important to note that a significant degree of variation from our analysis is not only possible, but is in fact probable. The sources of this variation are numerous: future national or regional economic conditions, mortgage prepayment speeds, the time period used to calibrate the regression models, and legislative changes affecting the mortgage business are examples.

The uncertainty associated with our estimates is also magnified by the nature of mortgage performance. Mortgage defaults and prepayments are sensitive to economic factors such as unemployment, housing market conditions, interest rate levels, etc. Past experience may not be indicative of future conditions. A loan originated in a given year is generally active over several calendar years. Therefore, adverse economic conditions in a given calendar year could affect results not only for the current origination year, but also for prior origination years. Future economic developments that give rise to additional delinquencies and losses will impact ultimate defaults. Mortgage forecasts are significantly more uncertain given the current economic deterioration, elevated default rates, and adverse house price trends.

Continuing volatility in the housing and mortgage markets, as well as the overall economy, make it difficult to model mortgage performance. The unsettled economic environment may worsen, causing more future defaults than currently observed in this analysis. Potentially offsetting the economic factors are government- and private-led initiatives that could have a stabilizing impact on the key variables typically driving the level of future defaults.

The analysis and any conclusions provided in Milliman's deliverables are based on data provided to Milliman by third-party sources. Milliman does not warrant the accuracy or completeness of any third-party data, and disclaims any and all liability in connection with such third-party data. Any errors in the data provided may affect the results of our analysis. Milliman shall not be liable for the results of its analysis to the extent that errors are contained in third-party data sources.

**Disclosures**

Actuarial standards require us to disclose the following:

*Purpose*

The purpose of this analysis is to independently estimate the impact of mortgage insurance of mortgage default rates. Performance data used in our analysis was evaluated as of March 31, 2011.

*Constraints*

There have been no constraints on this project (such as time, availability of data, or access to staff) that materially impacted our ability to provide this analysis to the Mortgage Insurance Companies of America (MICA).

*Scope*

Our estimates of each cohort's parameters under this analysis are characterized as statistically-defined estimates (mean, median, nth percentile) using maximum likelihood estimation.

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♦ ♦ ♦ ♦ ♦

If you should have any questions with regard to this analysis or would like to have us consider additional information, please do not hesitate to contact us. We appreciate the opportunity to work with the Mortgage Insurance Companies of America on this assignment.

Respectfully submitted,

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July 28, 2011

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Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 1: All loans in the filtered dataset
CLTV Cohort: 80

Terminated and Active Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 288,697 | 61,019 | 288,697 | 0 | 0 | 0 |
| -20%<HPA<=0% | 536,891 | 36,160 | 536,891 | 0 | 0 | 0 |
| 0%<HPA<=20% | 917,340 | 25,131 | 917,340 | 0 | 0 | 0 |
| 20%<HPA | 1,028,961 | 14,151 | 1,028,961 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 61,019 | 8,215 | 56,219 | 0 | 0 | 0 |
| -20%<HPA<=0% | 36,160 | 8,159 | 31,264 | 0 | 0 | 0 |
| 0%<HPA<=20% | 25,131 | 8,271 | 19,804 | 0 | 0 | 0 |
| 20%<HPA | 14,151 | 6,386 | 9,506 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 21.1% | 13.5% | 19.5% | NA | NA | NA |
| -20%<HPA<=0% | 6.7% | 22.6% | 5.8% | NA | NA | NA |
| 0%<HPA<=20% | 2.7% | 32.9% | 2.2% | NA | NA | NA |
| 20%<HPA | 1.4% | 45.1% | 0.9% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Terminated Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 155,940 | 29,091 | 155,940 | 0 | 0 | 0 |
| -20%<HPA<=0% | 318,568 | 15,311 | 318,568 | 0 | 0 | 0 |
| 0%<HPA<=20% | 574,489 | 13,024 | 574,489 | 0 | 0 | 0 |
| 20%<HPA | 710,353 | 9,132 | 710,353 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 29,091 | 1,439 | 28,636 | 0 | 0 | 0 |
| -20%<HPA<=0% | 15,311 | 1,638 | 14,606 | 0 | 0 | 0 |
| 0%<HPA<=20% | 13,024 | 2,704 | 11,359 | 0 | 0 | 0 |
| 20%<HPA | 9,132 | 3,056 | 6,936 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 18.7% | 4.9% | 18.4% | NA | NA | NA |
| -20%<HPA<=0% | 4.8% | 10.7% | 4.6% | NA | NA | NA |
| 0%<HPA<=20% | 2.3% | 20.8% | 2.0% | NA | NA | NA |
| 20%<HPA | 1.3% | 33.5% | 1.0% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 1: All loans in the filtered dataset
CLTV Cohort: 90

Terminated and Active Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 80,539 | 38,415 | 80,539 | 47,743 | 15,344 | 47,743 |
| -20%<HPA<=0% | 90,231 | 19,359 | 90,231 | 123,527 | 17,938 | 123,527 |
| 0%<HPA<=20% | 92,784 | 8,883 | 92,784 | 308,605 | 23,053 | 308,605 |
| 20%<HPA | 60,436 | 2,811 | 60,436 | 341,716 | 14,351 | 341,716 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 38,415 | 4,824 | 36,246 | 15,344 | 2,703 | 13,838 |
| -20%<HPA<=0% | 19,359 | 4,187 | 17,320 | 17,938 | 5,548 | 14,691 |
| 0%<HPA<=20% | 8,883 | 3,254 | 7,194 | 23,053 | 9,208 | 17,487 |
| 20%<HPA | 2,811 | 1,663 | 1,818 | 14,351 | 7,902 | 9,119 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 47.7% | 12.6% | 45.0% | 32.1% | 17.6% | 29.0% |
| -20%<HPA<=0% | 21.5% | 21.6% | 19.2% | 14.5% | 30.9% | 11.9% |
| 0%<HPA<=20% | 9.6% | 36.6% | 7.8% | 7.5% | 39.9% | 5.7% |
| 20%<HPA | 4.7% | 59.2% | 3.0% | 4.2% | 55.1% | 2.7% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.484 | 0.713 | 1.553 |
| -20%<HPA<=0% | 1.477 | 0.699 | 1.614 |
| 0%<HPA<=20% | 1.282 | 0.917 | 1.368 |
| 20%<HPA | 1.108 | 1.074 | 1.127 |

Terminated Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 33,361 | 18,040 | 33,361 | 21,721 | 6,792 | 21,721 |
| -20%<HPA<=0% | 33,881 | 6,778 | 33,881 | 56,257 | 6,480 | 56,257 |
| 0%<HPA<=20% | 31,769 | 2,929 | 31,769 | 154,422 | 10,082 | 154,422 |
| 20%<HPA | 13,882 | 704 | 13,882 | 199,332 | 7,114 | 199,332 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 18,040 | 861 | 17,953 | 6,792 | 511 | 6,600 |
| -20%<HPA<=0% | 6,778 | 564 | 6,661 | 6,480 | 870 | 6,132 |
| 0%<HPA<=20% | 2,929 | 524 | 2,732 | 10,082 | 2,142 | 8,995 |
| 20%<HPA | 704 | 285 | 531 | 7,114 | 2,681 | 5,396 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 54.1% | 4.8% | 53.8% | 31.3% | 7.5% | 30.4% |
| -20%<HPA<=0% | 20.0% | 8.3% | 19.7% | 11.5% | 13.4% | 10.9% |
| 0%<HPA<=20% | 9.2% | 17.9% | 8.6% | 6.5% | 21.2% | 5.8% |
| 20%<HPA | 5.1% | 40.5% | 3.8% | 3.6% | 37.7% | 2.7% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.729 | 0.634 | 1.771 |
| -20%<HPA<=0% | 1.737 | 0.620 | 1.804 |
| 0%<HPA<=20% | 1.412 | 0.842 | 1.476 |
| 20%<HPA | 1.421 | 1.074 | 1.413 |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 1: All loans in the filtered dataset
CLTV Cohort: 95

Terminated and Active Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 21,854 | 9,976 | 21,854 | 20,912 | 7,077 | 20,912 |
| -20%<HPA<=0% | 44,092 | 8,358 | 44,092 | 61,640 | 9,119 | 61,640 |
| 0%<HPA<=20% | 63,349 | 5,535 | 63,349 | 196,782 | 15,587 | 196,782 |
| 20%<HPA | 37,426 | 1,882 | 37,426 | 225,957 | 11,695 | 225,957 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 9,976 | 1,124 | 9,496 | 7,077 | 1,222 | 6,443 |
| -20%<HPA<=0% | 8,358 | 1,986 | 7,392 | 9,119 | 3,040 | 7,468 |
| 0%<HPA<=20% | 5,535 | 2,026 | 4,491 | 15,587 | 6,978 | 11,597 |
| 20%<HPA | 1,882 | 1,125 | 1,248 | 11,695 | 6,604 | 7,483 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 45.6% | 11.3% | 43.5% | 33.8% | 17.3% | 30.8% |
| -20%<HPA<=0% | 19.0% | 23.8% | 16.8% | 14.8% | 33.3% | 12.1% |
| 0%<HPA<=20% | 8.7% | 36.6% | 7.1% | 7.9% | 44.8% | 5.9% |
| 20%<HPA | 5.0% | 59.8% | 3.3% | 5.2% | 56.5% | 3.3% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.349 | 0.653 | 1.410 |
| -20%<HPA<=0% | 1.281 | 0.713 | 1.384 |
| 0%<HPA<=20% | 1.103 | 0.818 | 1.203 |
| 20%<HPA | 0.972 | 1.059 | 1.007 |

Terminated Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 8,105 | 4,843 | 8,105 | 9,072 | 3,106 | 9,072 |
| -20%<HPA<=0% | 16,143 | 3,010 | 16,143 | 26,977 | 3,120 | 26,977 |
| 0%<HPA<=20% | 23,205 | 1,971 | 23,205 | 95,859 | 6,565 | 95,859 |
| 20%<HPA | 10,140 | 481 | 10,140 | 126,861 | 5,608 | 126,861 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 4,843 | 234 | 4,821 | 3,106 | 237 | 3,041 |
| -20%<HPA<=0% | 3,010 | 252 | 2,971 | 3,120 | 509 | 2,940 |
| 0%<HPA<=20% | 1,971 | 315 | 1,868 | 6,565 | 1,579 | 5,803 |
| 20%<HPA | 481 | 178 | 391 | 5,608 | 2,105 | 4,331 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 59.8% | 4.8% | 59.5% | 34.2% | 7.6% | 33.5% |
| -20%<HPA<=0% | 18.6% | 8.4% | 18.4% | 11.6% | 16.3% | 10.9% |
| 0%<HPA<=20% | 8.5% | 16.0% | 8.0% | 6.8% | 24.1% | 6.1% |
| 20%<HPA | 4.7% | 37.0% | 3.9% | 4.4% | 37.5% | 3.4% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.745 | 0.633 | 1.774 |
| -20%<HPA<=0% | 1.612 | 0.513 | 1.689 |
| 0%<HPA<=20% | 1.240 | 0.664 | 1.330 |
| 20%<HPA | 1.073 | 0.986 | 1.129 |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 1: All loans in the filtered dataset
CLTV Cohort: GT95

Terminated and Active Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 35,323 | 19,923 | 35,323 | 28,024 | 8,592 | 28,024 |
| -20%<HPA<=0% | 68,218 | 21,619 | 68,218 | 131,023 | 23,491 | 131,023 |
| 0%<HPA<=20% | 116,952 | 26,902 | 116,952 | 490,179 | 61,156 | 490,179 |
| 20%<HPA | 63,413 | 12,779 | 63,413 | 523,286 | 45,205 | 523,286 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 19,923 | 2,695 | 18,774 | 8,592 | 2,116 | 7,597 |
| -20%<HPA<=0% | 21,619 | 6,587 | 19,038 | 23,491 | 9,195 | 18,857 |
| 0%<HPA<=20% | 26,902 | 13,217 | 21,605 | 61,156 | 28,213 | 46,409 |
| 20%<HPA | 12,779 | 8,376 | 8,734 | 45,205 | 23,093 | 32,236 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 56.4% | 13.5% | 53.1% | 30.7% | 24.6% | 27.1% |
| -20%<HPA<=0% | 31.7% | 30.5% | 27.9% | 17.9% | 39.1% | 14.4% |
| 0%<HPA<=20% | 23.0% | 49.1% | 18.5% | 12.5% | 46.1% | 9.5% |
| 20%<HPA | 20.2% | 65.5% | 13.8% | 8.6% | 51.1% | 6.2% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.840 | 0.549 | 1.961 | | | |
| -20%<HPA<=0% | 1.768 | 0.778 | 1.939 | | | |
| 0%<HPA<=20% | 1.844 | 1.065 | 1.951 | | | |
| 20%<HPA | 2.333 | 1.283 | 2.236 | | | |

Terminated Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 15,675 | 10,733 | 15,675 | 14,576 | 4,647 | 14,576 |
| -20%<HPA<=0% | 23,624 | 7,425 | 23,624 | 63,674 | 11,366 | 63,674 |
| 0%<HPA<=20% | 37,154 | 7,352 | 37,154 | 245,040 | 31,500 | 245,040 |
| 20%<HPA | 15,031 | 2,874 | 15,031 | 330,249 | 26,905 | 330,249 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 10,733 | 570 | 10,695 | 4,647 | 685 | 4,421 |
| -20%<HPA<=0% | 7,425 | 894 | 7,309 | 11,366 | 2,266 | 10,611 |
| 0%<HPA<=20% | 7,352 | 1,872 | 6,977 | 31,500 | 7,384 | 28,573 |
| 20%<HPA | 2,874 | 1,366 | 2,327 | 26,905 | 8,918 | 22,211 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 68.5% | 5.3% | 68.2% | 31.9% | 14.7% | 30.3% |
| -20%<HPA<=0% | 31.4% | 12.0% | 30.9% | 17.9% | 19.9% | 16.7% |
| 0%<HPA<=20% | 19.8% | 25.5% | 18.8% | 12.9% | 23.4% | 11.7% |
| 20%<HPA | 19.1% | 47.5% | 15.5% | 8.1% | 33.1% | 6.7% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 2.148 | 0.360 | 2.250 | | | |
| -20%<HPA<=0% | 1.761 | 0.604 | 1.857 | | | |
| 0%<HPA<=20% | 1.539 | 1.086 | 1.610 | | | |
| 20%<HPA | 2.347 | 1.434 | 2.302 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 2: All loans excluding FHA and GT95 CLTV
CLTV Cohort: 80

Terminated and Active Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 288,697 | 61,019 | 288,697 | 0 | 0 | 0 |
| -20%<HPA<=0% | 536,891 | 36,160 | 536,891 | 0 | 0 | 0 |
| 0%<HPA<=20% | 917,340 | 25,131 | 917,340 | 0 | 0 | 0 |
| 20%<HPA | 1,028,961 | 14,151 | 1,028,961 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 61,019 | 8,215 | 56,219 | 0 | 0 | 0 |
| -20%<HPA<=0% | 36,160 | 8,159 | 31,264 | 0 | 0 | 0 |
| 0%<HPA<=20% | 25,131 | 8,271 | 19,804 | 0 | 0 | 0 |
| 20%<HPA | 14,151 | 6,386 | 9,506 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 21.1% | 13.5% | 19.5% | NA | NA | NA |
| -20%<HPA<=0% | 6.7% | 22.6% | 5.8% | NA | NA | NA |
| 0%<HPA<=20% | 2.7% | 32.9% | 2.2% | NA | NA | NA |
| 20%<HPA | 1.4% | 45.1% | 0.9% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Terminated Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 155,940 | 29,091 | 155,940 | 0 | 0 | 0 |
| -20%<HPA<=0% | 318,568 | 15,311 | 318,568 | 0 | 0 | 0 |
| 0%<HPA<=20% | 574,489 | 13,024 | 574,489 | 0 | 0 | 0 |
| 20%<HPA | 710,353 | 9,132 | 710,353 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 29,091 | 1,439 | 28,636 | 0 | 0 | 0 |
| -20%<HPA<=0% | 15,311 | 1,638 | 14,606 | 0 | 0 | 0 |
| 0%<HPA<=20% | 13,024 | 2,704 | 11,359 | 0 | 0 | 0 |
| 20%<HPA | 9,132 | 3,056 | 6,936 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 18.7% | 4.9% | 18.4% | NA | NA | NA |
| -20%<HPA<=0% | 4.8% | 10.7% | 4.6% | NA | NA | NA |
| 0%<HPA<=20% | 2.3% | 20.8% | 2.0% | NA | NA | NA |
| 20%<HPA | 1.3% | 33.5% | 1.0% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 2: All loans excluding FHA and GT95 CLTV
CLTV Cohort: 90

| | Terminated and Active Loans | | | | | | Terminated Loans | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 90 Uninsured | | | 90 Insured | | | 90 Uninsured | | | 90 Insured | | |
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 80,539 | 38,415 | 80,539 | 44,408 | 14,876 | 44,408 | 33,361 | 18,040 | 33,361 | 19,815 | 6,575 | 19,815 |
| -20%<HPA<=0% | 90,231 | 19,359 | 90,231 | 109,852 | 16,567 | 109,852 | 33,881 | 6,778 | 33,881 | 48,479 | 5,891 | 48,479 |
| 0%<HPA<=20% | 92,784 | 8,883 | 92,784 | 267,317 | 19,664 | 267,317 | 31,769 | 2,929 | 31,769 | 131,518 | 8,358 | 131,518 |
| 20%<HPA | 60,436 | 2,811 | 60,436 | 278,755 | 10,519 | 278,755 | 13,882 | 704 | 13,882 | 157,011 | 4,683 | 157,011 |
| HPA Range | Number of Responses | | | Number of Responses | | | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 38,415 | 4,824 | 36,246 | 14,876 | 2,515 | 13,480 | 18,040 | 861 | 17,953 | 6,575 | 470 | 6,399 |
| -20%<HPA<=0% | 19,359 | 4,187 | 17,320 | 16,567 | 4,854 | 13,770 | 6,778 | 564 | 6,661 | 5,891 | 727 | 5,620 |
| 0%<HPA<=20% | 8,883 | 3,254 | 7,194 | 19,664 | 7,423 | 15,215 | 2,929 | 524 | 2,732 | 8,358 | 1,608 | 7,565 |
| 20%<HPA | 2,811 | 1,663 | 1,818 | 10,519 | 5,819 | 6,599 | 704 | 285 | 531 | 4,683 | 1,709 | 3,550 |
| HPA Range | Response Rate | | | Response Rate | | | Response Rate | | | Response Rate | | |
| HPA<=-20% | 47.7% | 12.6% | 45.0% | 33.5% | 16.9% | 30.4% | 54.1% | 4.8% | 53.8% | 33.2% | 7.1% | 32.3% |
| -20%<HPA<=0% | 21.5% | 21.6% | 19.2% | 15.1% | 29.3% | 12.5% | 20.0% | 8.3% | 19.7% | 12.2% | 12.3% | 11.6% |
| 0%<HPA<=20% | 9.6% | 36.6% | 7.8% | 7.4% | 37.7% | 5.7% | 9.2% | 17.9% | 8.6% | 6.4% | 19.2% | 5.8% |
| 20%<HPA | 4.7% | 59.2% | 3.0% | 3.8% | 55.3% | 2.4% | 5.1% | 40.5% | 3.8% | 3.0% | 36.5% | 2.3% |

| HPA Range | Ratio of Uninsured to Insured Rate | | | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|---|---|---|
| HPA<=-20% | 1.424 | 0.743 | 1.483 | 1.630 | 0.668 | 1.666 |
| -20%<HPA<=0% | 1.423 | 0.738 | 1.531 | 1.646 | 0.674 | 1.696 |
| 0%<HPA<=20% | 1.301 | 0.970 | 1.362 | 1.451 | 0.930 | 1.495 |
| 20%<HPA | 1.233 | 1.069 | 1.271 | 1.700 | 1.109 | 1.692 |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 2: All loans excluding FHA and GT95 CLTV
CLTV Cohort: 95

Terminated and Active Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 21,854 | 9,976 | 21,854 | 19,414 | 6,828 | 19,414 |
| -20%<HPA<=0% | 44,092 | 8,358 | 44,092 | 53,427 | 8,225 | 53,427 |
| 0%<HPA<=20% | 63,349 | 5,535 | 63,349 | 163,582 | 12,360 | 163,582 |
| 20%<HPA | 37,426 | 1,882 | 37,426 | 181,614 | 8,449 | 181,614 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 9,976 | 1,124 | 9,496 | 6,828 | 1,139 | 6,239 |
| -20%<HPA<=0% | 8,358 | 1,986 | 7,392 | 8,225 | 2,596 | 6,836 |
| 0%<HPA<=20% | 5,535 | 2,026 | 4,491 | 12,360 | 5,353 | 9,323 |
| 20%<HPA | 1,882 | 1,125 | 1,248 | 8,449 | 4,914 | 5,244 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 45.6% | 11.3% | 43.5% | 35.2% | 16.7% | 32.1% |
| -20%<HPA<=0% | 19.0% | 23.8% | 16.8% | 15.4% | 31.6% | 12.8% |
| 0%<HPA<=20% | 8.7% | 36.6% | 7.1% | 7.6% | 43.3% | 5.7% |
| 20%<HPA | 5.0% | 59.8% | 3.3% | 4.7% | 58.2% | 2.9% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.298 | 0.675 | 1.352 | | | |
| -20%<HPA<=0% | 1.231 | 0.753 | 1.310 | | | |
| 0%<HPA<=20% | 1.156 | 0.845 | 1.244 | | | |
| 20%<HPA | 1.081 | 1.028 | 1.155 | | | |

Terminated Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 8,105 | 4,843 | 8,105 | 8,283 | 2,970 | 8,283 |
| -20%<HPA<=0% | 16,143 | 3,010 | 16,143 | 22,896 | 2,743 | 22,896 |
| 0%<HPA<=20% | 23,205 | 1,971 | 23,205 | 79,008 | 4,922 | 79,008 |
| 20%<HPA | 10,140 | 481 | 10,140 | 98,521 | 3,589 | 98,521 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 4,843 | 234 | 4,821 | 2,970 | 216 | 2,914 |
| -20%<HPA<=0% | 3,010 | 252 | 2,971 | 2,743 | 413 | 2,604 |
| 0%<HPA<=20% | 1,971 | 315 | 1,868 | 4,922 | 1,117 | 4,389 |
| 20%<HPA | 481 | 178 | 391 | 3,589 | 1,363 | 2,730 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 59.8% | 4.8% | 59.5% | 35.9% | 7.3% | 35.2% |
| -20%<HPA<=0% | 18.6% | 8.4% | 18.4% | 12.0% | 15.1% | 11.4% |
| 0%<HPA<=20% | 8.5% | 16.0% | 8.0% | 6.2% | 22.7% | 5.6% |
| 20%<HPA | 4.7% | 37.0% | 3.9% | 3.6% | 38.0% | 2.8% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.666 | 0.664 | 1.691 | | | |
| -20%<HPA<=0% | 1.556 | 0.556 | 1.618 | | | |
| 0%<HPA<=20% | 1.363 | 0.704 | 1.449 | | | |
| 20%<HPA | 1.302 | 0.974 | 1.392 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 2: All loans excluding FHA and GT95 CLTV
CLTV Cohort: GT95

Terminated and Active Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Terminated Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
CLTV Cohort: 80

Terminated and Active Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 36,093 | 3,571 | 36,093 | 0 | 0 | 0 |
| -20%<HPA<=0% | 113,787 | 2,840 | 113,787 | 0 | 0 | 0 |
| 0%<HPA<=20% | 255,035 | 2,784 | 255,035 | 0 | 0 | 0 |
| 20%<HPA | 322,005 | 1,906 | 322,005 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 3,571 | 489 | 3,196 | 0 | 0 | 0 |
| -20%<HPA<=0% | 2,840 | 666 | 2,362 | 0 | 0 | 0 |
| 0%<HPA<=20% | 2,784 | 915 | 2,130 | 0 | 0 | 0 |
| 20%<HPA | 1,906 | 883 | 1,223 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 9.9% | 13.7% | 8.9% | NA | NA | NA |
| -20%<HPA<=0% | 2.5% | 23.5% | 2.1% | NA | NA | NA |
| 0%<HPA<=20% | 1.1% | 32.9% | 0.8% | NA | NA | NA |
| 20%<HPA | 0.6% | 46.3% | 0.4% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Terminated Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 15,935 | 1,382 | 15,935 | 0 | 0 | 0 |
| -20%<HPA<=0% | 60,412 | 962 | 60,412 | 0 | 0 | 0 |
| 0%<HPA<=20% | 147,253 | 1,389 | 147,253 | 0 | 0 | 0 |
| 20%<HPA | 206,196 | 1,116 | 206,196 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 1,382 | 62 | 1,345 | 0 | 0 | 0 |
| -20%<HPA<=0% | 962 | 105 | 901 | 0 | 0 | 0 |
| 0%<HPA<=20% | 1,389 | 292 | 1,188 | 0 | 0 | 0 |
| 20%<HPA | 1,116 | 365 | 842 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 8.7% | 4.5% | 8.4% | NA | NA | NA |
| -20%<HPA<=0% | 1.6% | 10.9% | 1.5% | NA | NA | NA |
| 0%<HPA<=20% | 0.9% | 21.0% | 0.8% | NA | NA | NA |
| 20%<HPA | 0.5% | 32.7% | 0.4% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
CLTV Cohort: 90

Terminated and Active Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 3,145 | 582 | 3,145 | 6,006 | 1,175 | 6,006 |
| -20%<HPA<=0% | 8,817 | 536 | 8,817 | 20,819 | 1,431 | 20,819 |
| 0%<HPA<=20% | 14,544 | 344 | 14,544 | 67,874 | 1,740 | 67,874 |
| 20%<HPA | 12,697 | 133 | 12,697 | 90,049 | 1,296 | 90,049 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 582 | 87 | 519 | 1,175 | 164 | 1,053 |
| -20%<HPA<=0% | 536 | 129 | 454 | 1,431 | 351 | 1,200 |
| 0%<HPA<=20% | 344 | 114 | 261 | 1,740 | 596 | 1,317 |
| 20%<HPA | 133 | 78 | 78 | 1,296 | 649 | 796 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 18.5% | 14.9% | 16.5% | 19.6% | 14.0% | 17.5% |
| -20%<HPA<=0% | 6.1% | 24.1% | 5.1% | 6.9% | 24.5% | 5.8% |
| 0%<HPA<=20% | 2.4% | 33.1% | 1.8% | 2.6% | 34.3% | 1.9% |
| 20%<HPA | 1.0% | 58.6% | 0.6% | 1.4% | 50.1% | 0.9% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 0.946 | 1.071 | 0.941 | | | |
| -20%<HPA<=0% | 0.884 | 0.981 | 0.893 | | | |
| 0%<HPA<=20% | 0.923 | 0.967 | 0.925 | | | |
| 20%<HPA | 0.728 | 1.171 | 0.695 | | | |

Terminated Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 575 | 193 | 575 | 1,988 | 408 | 1,988 |
| -20%<HPA<=0% | 2,626 | 159 | 2,626 | 8,532 | 424 | 8,532 |
| 0%<HPA<=20% | 3,531 | 108 | 3,531 | 37,251 | 720 | 37,251 |
| 20%<HPA | 1,198 | 21 | 1,198 | 56,881 | 685 | 56,881 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 193 | 4 | 192 | 408 | 21 | 400 |
| -20%<HPA<=0% | 159 | 10 | 157 | 424 | 46 | 403 |
| 0%<HPA<=20% | 108 | 17 | 98 | 720 | 126 | 640 |
| 20%<HPA | 21 | 9 | 16 | 685 | 221 | 517 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 33.6% | 2.1% | 33.4% | 20.5% | 5.1% | 20.1% |
| -20%<HPA<=0% | 6.1% | 6.3% | 6.0% | 5.0% | 10.8% | 4.7% |
| 0%<HPA<=20% | 3.1% | 15.7% | 2.8% | 1.9% | 17.5% | 1.7% |
| 20%<HPA | 1.8% | 42.9% | 1.3% | 1.2% | 32.3% | 0.9% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.635 | 0.403 | 1.660 | | | |
| -20%<HPA<=0% | 1.218 | 0.580 | 1.266 | | | |
| 0%<HPA<=20% | 1.582 | 0.899 | 1.615 | | | |
| 20%<HPA | 1.456 | 1.328 | 1.469 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
CLTV Cohort: 95

Terminated and Active Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 2,269 | 482 | 2,269 | 3,187 | 672 | 3,187 |
| -20%<HPA<=0% | 7,967 | 555 | 7,967 | 11,795 | 787 | 11,795 |
| 0%<HPA<=20% | 14,238 | 360 | 14,238 | 47,684 | 1,164 | 47,684 |
| 20%<HPA | 9,254 | 121 | 9,254 | 62,894 | 1,028 | 62,894 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 482 | 66 | 436 | 672 | 84 | 609 |
| -20%<HPA<=0% | 555 | 133 | 467 | 787 | 199 | 650 |
| 0%<HPA<=20% | 360 | 124 | 279 | 1,164 | 437 | 844 |
| 20%<HPA | 121 | 59 | 77 | 1,028 | 539 | 649 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 21.2% | 13.7% | 19.2% | 21.1% | 12.5% | 19.1% |
| -20%<HPA<=0% | 7.0% | 24.0% | 5.9% | 6.7% | 25.3% | 5.5% |
| 0%<HPA<=20% | 2.5% | 34.4% | 2.0% | 2.4% | 37.5% | 1.8% |
| 20%<HPA | 1.3% | 48.8% | 0.8% | 1.6% | 52.4% | 1.0% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.007 | 1.095 | 1.006 |
| -20%<HPA<=0% | 1.044 | 0.948 | 1.064 |
| 0%<HPA<=20% | 1.036 | 0.917 | 1.107 |
| 20%<HPA | 0.800 | 0.930 | 0.806 |

Terminated Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 460 | 190 | 460 | 1,016 | 217 | 1,016 |
| -20%<HPA<=0% | 2,426 | 152 | 2,426 | 4,621 | 235 | 4,621 |
| 0%<HPA<=20% | 4,175 | 124 | 4,175 | 24,426 | 467 | 24,426 |
| 20%<HPA | 1,459 | 27 | 1,459 | 37,396 | 545 | 37,396 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 190 | 8 | 188 | 217 | 9 | 214 |
| -20%<HPA<=0% | 152 | 6 | 151 | 235 | 14 | 227 |
| 0%<HPA<=20% | 124 | 17 | 117 | 467 | 96 | 402 |
| 20%<HPA | 27 | 7 | 21 | 545 | 186 | 419 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 41.3% | 4.2% | 40.9% | 21.4% | 4.1% | 21.1% |
| -20%<HPA<=0% | 6.3% | 3.9% | 6.2% | 5.1% | 6.0% | 4.9% |
| 0%<HPA<=20% | 3.0% | 13.7% | 2.8% | 1.9% | 20.6% | 1.6% |
| 20%<HPA | 1.9% | 25.9% | 1.4% | 1.5% | 34.1% | 1.1% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.934 | 1.015 | 1.940 |
| -20%<HPA<=0% | 1.232 | 0.663 | 1.267 |
| 0%<HPA<=20% | 1.553 | 0.667 | 1.703 |
| 20%<HPA | 1.270 | 0.760 | 1.285 |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
CLTV Cohort: GT95

Terminated and Active Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Terminated Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 80

Terminated and Active Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 169,920 | 39,881 | 169,920 | 0 | 0 | 0 |
| -20%<HPA<=0% | 249,563 | 20,113 | 249,563 | 0 | 0 | 0 |
| 0%<HPA<=20% | 310,014 | 9,423 | 310,014 | 0 | 0 | 0 |
| 20%<HPA | 267,988 | 3,513 | 267,988 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 39,881 | 5,090 | 37,169 | 0 | 0 | 0 |
| -20%<HPA<=0% | 20,113 | 3,778 | 18,052 | 0 | 0 | 0 |
| 0%<HPA<=20% | 9,423 | 2,598 | 7,857 | 0 | 0 | 0 |
| 20%<HPA | 3,513 | 1,409 | 2,527 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 23.5% | 12.8% | 21.9% | NA | NA | NA |
| -20%<HPA<=0% | 8.1% | 18.8% | 7.2% | NA | NA | NA |
| 0%<HPA<=20% | 3.0% | 27.6% | 2.5% | NA | NA | NA |
| 20%<HPA | 1.3% | 40.1% | 0.9% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Terminated Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 102,863 | 19,633 | 102,863 | 0 | 0 | 0 |
| -20%<HPA<=0% | 169,923 | 9,297 | 169,923 | 0 | 0 | 0 |
| 0%<HPA<=20% | 239,254 | 5,584 | 239,254 | 0 | 0 | 0 |
| 20%<HPA | 215,525 | 2,554 | 215,525 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 19,633 | 974 | 19,334 | 0 | 0 | 0 |
| -20%<HPA<=0% | 9,297 | 865 | 8,930 | 0 | 0 | 0 |
| 0%<HPA<=20% | 5,584 | 1,083 | 4,925 | 0 | 0 | 0 |
| 20%<HPA | 2,554 | 856 | 1,953 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 19.1% | 5.0% | 18.8% | NA | NA | NA |
| -20%<HPA<=0% | 5.5% | 9.3% | 5.3% | NA | NA | NA |
| 0%<HPA<=20% | 2.3% | 19.4% | 2.1% | NA | NA | NA |
| 20%<HPA | 1.2% | 33.5% | 0.9% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 90

Terminated and Active Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 59,350 | 30,531 | 59,350 | 16,736 | 6,067 | 16,736 |
| -20%<HPA<=0% | 51,992 | 14,247 | 51,992 | 31,107 | 4,615 | 31,107 |
| 0%<HPA<=20% | 39,084 | 5,675 | 39,084 | 64,135 | 4,713 | 64,135 |
| 20%<HPA | 22,787 | 1,702 | 22,787 | 59,026 | 2,464 | 59,026 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 30,531 | 3,849 | 28,946 | 6,067 | 961 | 5,624 |
| -20%<HPA<=0% | 14,247 | 2,986 | 12,936 | 4,615 | 1,212 | 4,017 |
| 0%<HPA<=20% | 5,675 | 2,156 | 4,652 | 4,713 | 1,562 | 3,874 |
| 20%<HPA | 1,702 | 1,070 | 1,122 | 2,464 | 1,058 | 1,792 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 51.4% | 12.6% | 48.8% | 36.3% | 15.8% | 33.6% |
| -20%<HPA<=0% | 27.4% | 21.0% | 24.9% | 14.8% | 26.3% | 12.9% |
| 0%<HPA<=20% | 14.5% | 38.0% | 11.9% | 7.3% | 33.1% | 6.0% |
| 20%<HPA | 7.5% | 62.9% | 4.9% | 4.2% | 42.9% | 3.0% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.419 | 0.796 | 1.451 | | | |
| -20%<HPA<=0% | 1.847 | 0.798 | 1.927 | | | |
| 0%<HPA<=20% | 1.976 | 1.146 | 1.970 | | | |
| 20%<HPA | 1.789 | 1.464 | 1.622 | | | |

Terminated Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 25,776 | 14,062 | 25,776 | 9,266 | 2,749 | 9,266 |
| -20%<HPA<=0% | 19,599 | 4,919 | 19,599 | 18,454 | 1,712 | 18,454 |
| 0%<HPA<=20% | 12,737 | 1,714 | 12,737 | 44,173 | 2,541 | 44,173 |
| 20%<HPA | 3,685 | 326 | 3,685 | 46,307 | 1,674 | 46,307 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 14,062 | 730 | 13,994 | 2,749 | 173 | 2,698 |
| -20%<HPA<=0% | 4,919 | 414 | 4,839 | 1,712 | 196 | 1,647 |
| 0%<HPA<=20% | 1,714 | 331 | 1,599 | 2,541 | 487 | 2,308 |
| 20%<HPA | 326 | 149 | 250 | 1,674 | 539 | 1,318 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 54.6% | 5.2% | 54.3% | 29.7% | 6.3% | 29.1% |
| -20%<HPA<=0% | 25.1% | 8.4% | 24.7% | 9.3% | 11.4% | 8.9% |
| 0%<HPA<=20% | 13.5% | 19.3% | 12.6% | 5.8% | 19.2% | 5.2% |
| 20%<HPA | 8.8% | 45.7% | 6.8% | 3.6% | 32.2% | 2.8% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.839 | 0.825 | 1.865 | | | |
| -20%<HPA<=0% | 2.705 | 0.735 | 2.766 | | | |
| 0%<HPA<=20% | 2.339 | 1.008 | 2.403 | | | |
| 20%<HPA | 2.447 | 1.419 | 2.384 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 95

Terminated and Active Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 12,775 | 6,897 | 12,775 | 7,163 | 2,782 | 7,163 |
| -20%<HPA<=0% | 18,620 | 4,932 | 18,620 | 15,402 | 2,482 | 15,402 |
| 0%<HPA<=20% | 20,938 | 3,220 | 20,938 | 38,098 | 2,978 | 38,098 |
| 20%<HPA | 11,084 | 1,238 | 11,084 | 34,570 | 1,609 | 34,570 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 6,897 | 774 | 6,624 | 2,782 | 443 | 2,589 |
| -20%<HPA<=0% | 4,932 | 1,247 | 4,397 | 2,482 | 739 | 2,112 |
| 0%<HPA<=20% | 3,220 | 1,297 | 2,622 | 2,978 | 1,099 | 2,435 |
| 20%<HPA | 1,238 | 782 | 833 | 1,609 | 741 | 1,161 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 54.0% | 11.2% | 51.9% | 38.8% | 15.9% | 36.1% |
| -20%<HPA<=0% | 26.5% | 25.3% | 23.6% | 16.1% | 29.8% | 13.7% |
| 0%<HPA<=20% | 15.4% | 40.3% | 12.5% | 7.8% | 36.9% | 6.4% |
| 20%<HPA | 11.2% | 63.2% | 7.5% | 4.7% | 46.1% | 3.4% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 1.390 | 0.705 | 1.435 |
| -20%<HPA<=0% | 1.644 | 0.849 | 1.722 |
| 0%<HPA<=20% | 1.967 | 1.091 | 1.959 |
| 20%<HPA | 2.400 | 1.372 | 2.238 |

Terminated Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 5,229 | 3,305 | 5,229 | 3,878 | 1,198 | 3,878 |
| -20%<HPA<=0% | 6,884 | 1,685 | 6,884 | 9,085 | 873 | 9,085 |
| 0%<HPA<=20% | 7,833 | 991 | 7,833 | 27,837 | 1,491 | 27,837 |
| 20%<HPA | 2,368 | 245 | 2,368 | 27,497 | 1,011 | 27,497 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 3,305 | 179 | 3,287 | 1,198 | 79 | 1,181 |
| -20%<HPA<=0% | 1,685 | 163 | 1,669 | 873 | 117 | 838 |
| 0%<HPA<=20% | 991 | 192 | 940 | 1,491 | 329 | 1,330 |
| 20%<HPA | 245 | 91 | 207 | 1,011 | 329 | 799 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 63.2% | 5.4% | 62.9% | 30.9% | 6.6% | 30.5% |
| -20%<HPA<=0% | 24.5% | 9.7% | 24.2% | 9.6% | 13.4% | 9.2% |
| 0%<HPA<=20% | 12.7% | 19.4% | 12.0% | 5.4% | 22.1% | 4.8% |
| 20%<HPA | 10.3% | 37.1% | 8.7% | 3.7% | 32.5% | 2.9% |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | 2.046 | 0.821 | 2.064 |
| -20%<HPA<=0% | 2.547 | 0.722 | 2.628 |
| 0%<HPA<=20% | 2.362 | 0.878 | 2.512 |
| 20%<HPA | 2.814 | 1.141 | 3.008 |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: GT95

| | Terminated and Active Loans | | | | | | Terminated Loans | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GT95 Uninsured | | | GT95 Insured | | | GT95 Uninsured | | | GT95 Insured | | |
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|---|---|---|
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 80

Terminated and Active Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 13,865 | 921 | 13,865 | 0 | 0 | 0 |
| -20%<HPA<=0% | 38,357 | 727 | 38,357 | 0 | 0 | 0 |
| 0%<HPA<=20% | 69,438 | 712 | 69,438 | 0 | 0 | 0 |
| 20%<HPA | 77,641 | 469 | 77,641 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 921 | 141 | 814 | 0 | 0 | 0 |
| -20%<HPA<=0% | 727 | 160 | 612 | 0 | 0 | 0 |
| 0%<HPA<=20% | 712 | 187 | 577 | 0 | 0 | 0 |
| 20%<HPA | 469 | 181 | 327 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 6.6% | 15.3% | 5.9% | NA | NA | NA |
| -20%<HPA<=0% | 1.9% | 22.0% | 1.6% | NA | NA | NA |
| 0%<HPA<=20% | 1.0% | 26.3% | 0.8% | NA | NA | NA |
| 20%<HPA | 0.6% | 38.6% | 0.4% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Terminated Loans

| | 80 Uninsured | | | 80 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 8,308 | 358 | 8,308 | 0 | 0 | 0 |
| -20%<HPA<=0% | 26,997 | 312 | 26,997 | 0 | 0 | 0 |
| 0%<HPA<=20% | 55,641 | 513 | 55,641 | 0 | 0 | 0 |
| 20%<HPA | 61,382 | 374 | 61,382 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 358 | 21 | 342 | 0 | 0 | 0 |
| -20%<HPA<=0% | 312 | 36 | 288 | 0 | 0 | 0 |
| 0%<HPA<=20% | 513 | 107 | 430 | 0 | 0 | 0 |
| 20%<HPA | 374 | 120 | 278 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 4.3% | 5.9% | 4.1% | NA | NA | NA |
| -20%<HPA<=0% | 1.2% | 11.5% | 1.1% | NA | NA | NA |
| 0%<HPA<=20% | 0.9% | 20.9% | 0.8% | NA | NA | NA |
| 20%<HPA | 0.6% | 32.1% | 0.5% | NA | NA | NA |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | NA | NA | NA | | | |
| -20%<HPA<=0% | NA | NA | NA | | | |
| 0%<HPA<=20% | NA | NA | NA | | | |
| 20%<HPA | NA | NA | NA | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 90

Terminated and Active Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 1,182 | 240 | 1,182 | 1,549 | 272 | 1,549 |
| -20%<HPA<=0% | 2,905 | 202 | 2,905 | 5,217 | 278 | 5,217 |
| 0%<HPA<=20% | 5,531 | 161 | 5,531 | 14,374 | 334 | 14,374 |
| 20%<HPA | 6,209 | 61 | 6,209 | 16,634 | 393 | 16,634 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 240 | 39 | 213 | 272 | 32 | 249 |
| -20%<HPA<=0% | 202 | 48 | 169 | 278 | 53 | 244 |
| 0%<HPA<=20% | 161 | 54 | 121 | 334 | 102 | 269 |
| 20%<HPA | 61 | 40 | 35 | 393 | 135 | 289 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 20.3% | 16.3% | 18.0% | 17.6% | 11.8% | 16.1% |
| -20%<HPA<=0% | 7.0% | 23.8% | 5.8% | 5.3% | 19.1% | 4.7% |
| 0%<HPA<=20% | 2.9% | 33.5% | 2.2% | 2.3% | 30.5% | 1.9% |
| 20%<HPA | 1.0% | 65.6% | 0.6% | 2.4% | 34.4% | 1.7% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.156 | 1.381 | 1.121 | | | |
| -20%<HPA<=0% | 1.305 | 1.246 | 1.244 | | | |
| 0%<HPA<=20% | 1.253 | 1.098 | 1.169 | | | |
| 20%<HPA | 0.416 | 1.909 | 0.324 | | | |

Terminated Loans

| | 90 Uninsured | | | 90 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 256 | 79 | 256 | 835 | 106 | 835 |
| -20%<HPA<=0% | 881 | 52 | 881 | 3,606 | 97 | 3,606 |
| 0%<HPA<=20% | 1,123 | 37 | 1,123 | 11,721 | 214 | 11,721 |
| 20%<HPA | 322 | 4 | 322 | 14,212 | 338 | 14,212 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 79 | 2 | 78 | 106 | 7 | 102 |
| -20%<HPA<=0% | 52 | 3 | 50 | 97 | 8 | 92 |
| 0%<HPA<=20% | 37 | 4 | 33 | 214 | 41 | 191 |
| 20%<HPA | 4 | 2 | 3 | 338 | 103 | 265 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 30.9% | 2.5% | 30.5% | 12.7% | 6.6% | 12.2% |
| -20%<HPA<=0% | 5.9% | 5.8% | 5.7% | 2.7% | 8.2% | 2.6% |
| 0%<HPA<=20% | 3.3% | 10.8% | 2.9% | 1.8% | 19.2% | 1.6% |
| 20%<HPA | 1.2% | 50.0% | 0.9% | 2.4% | 30.5% | 1.9% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 2.431 | 0.383 | 2.494 | | | |
| -20%<HPA<=0% | 2.194 | 0.700 | 2.224 | | | |
| 0%<HPA<=20% | 1.805 | 0.564 | 1.803 | | | |
| 20%<HPA | 0.522 | 1.641 | 0.500 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: 95

Terminated and Active Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 582 | 157 | 582 | 708 | 128 | 708 |
| -20%<HPA<=0% | 1,944 | 184 | 1,944 | 2,725 | 146 | 2,725 |
| 0%<HPA<=20% | 3,437 | 130 | 3,437 | 9,851 | 226 | 9,851 |
| 20%<HPA | 2,650 | 49 | 2,650 | 10,940 | 227 | 10,940 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 157 | 16 | 146 | 128 | 8 | 122 |
| -20%<HPA<=0% | 184 | 43 | 157 | 146 | 20 | 133 |
| 0%<HPA<=20% | 130 | 50 | 99 | 226 | 64 | 180 |
| 20%<HPA | 49 | 25 | 29 | 227 | 74 | 177 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 27.0% | 10.2% | 25.1% | 18.1% | 6.3% | 17.2% |
| -20%<HPA<=0% | 9.5% | 23.4% | 8.1% | 5.4% | 13.7% | 4.9% |
| 0%<HPA<=20% | 3.8% | 38.5% | 2.9% | 2.3% | 28.3% | 1.8% |
| 20%<HPA | 1.8% | 51.0% | 1.1% | 2.1% | 32.6% | 1.6% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 1.492 | 1.631 | 1.456 | | | |
| -20%<HPA<=0% | 1.767 | 1.706 | 1.655 | | | |
| 0%<HPA<=20% | 1.649 | 1.358 | 1.576 | | | |
| 20%<HPA | 0.891 | 1.565 | 0.676 | | | |

Terminated Loans

| | 95 Uninsured | | | 95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 152 | 63 | 152 | 471 | 59 | 471 |
| -20%<HPA<=0% | 688 | 50 | 688 | 2,031 | 75 | 2,031 |
| 0%<HPA<=20% | 1,112 | 39 | 1,112 | 8,430 | 157 | 8,430 |
| 20%<HPA | 220 | 4 | 220 | 9,586 | 207 | 9,586 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 63 | 4 | 62 | 59 | 0 | 59 |
| -20%<HPA<=0% | 50 | 2 | 50 | 75 | 7 | 69 |
| 0%<HPA<=20% | 39 | 5 | 39 | 157 | 32 | 135 |
| 20%<HPA | 4 | 1 | 3 | 207 | 63 | 166 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | 41.4% | 6.3% | 40.8% | 12.5% | 0.0% | 12.5% |
| -20%<HPA<=0% | 7.3% | 4.0% | 7.3% | 3.7% | 9.3% | 3.4% |
| 0%<HPA<=20% | 3.5% | 12.8% | 3.5% | 1.9% | 20.4% | 1.6% |
| 20%<HPA | 1.8% | 25.0% | 1.4% | 2.2% | 30.4% | 1.7% |
| HPA Range | Ratio of Uninsured to Insured Rate | | | | | |
| HPA<=-20% | 3.309 | NA | 3.256 | | | |
| -20%<HPA<=0% | 1.968 | 0.429 | 2.139 | | | |
| 0%<HPA<=20% | 1.883 | 0.629 | 2.190 | | | |
| 20%<HPA | 0.842 | 0.821 | 0.787 | | | |

Mortgage Insurance Companies of America
Loan Count and Empirical Default Rate Comparison
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
CLTV Cohort: GT95

Terminated and Active Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Terminated Loans

| | GT95 Uninsured | | | GT95 Insured | | |
|---|---|---|---|---|---|---|
| | Default_90 | Cure Given Default_90 | Default_NC | Default_90 | Cure Given Default_90 | Default_NC |
| HPA Range | Observed Loan Count | | | Observed Loan Count | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Number of Responses | | | Number of Responses | | |
| HPA<=-20% | 0 | 0 | 0 | 0 | 0 | 0 |
| -20%<HPA<=0% | 0 | 0 | 0 | 0 | 0 | 0 |
| 0%<HPA<=20% | 0 | 0 | 0 | 0 | 0 | 0 |
| 20%<HPA | 0 | 0 | 0 | 0 | 0 | 0 |
| HPA Range | Response Rate | | | Response Rate | | |
| HPA<=-20% | NA | NA | NA | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA | NA | NA | NA |
| 20%<HPA | NA | NA | NA | NA | NA | NA |

| HPA Range | Ratio of Uninsured to Insured Rate | | |
|---|---|---|---|
| HPA<=-20% | NA | NA | NA |
| -20%<HPA<=0% | NA | NA | NA |
| 0%<HPA<=20% | NA | NA | NA |
| 20%<HPA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8567 | < 0.0001 | -4.3523 | < 0.0001 | -5.4168 | < 0.0001 | -6.1685 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5587 | < 0.0001 | 0.5123 | < 0.0001 | 0.5570 | < 0.0001 | 0.6111 | < 0.0001 |
| | | 90 Uninsured | 0.7371 | < 0.0001 | 0.7944 | < 0.0001 | 0.9001 | < 0.0001 | 0.9701 | < 0.0001 |
| | | 95 Insured | 0.7719 | < 0.0001 | 0.6905 | < 0.0001 | 0.6951 | < 0.0001 | 0.7872 | < 0.0001 |
| | | 95 Uninsured | 0.9951 | < 0.0001 | 1.0010 | < 0.0001 | 1.0949 | < 0.0001 | 1.0694 | < 0.0001 |
| | | GT95 Insured | 0.7197 | < 0.0001 | 0.7581 | < 0.0001 | 0.8877 | < 0.0001 | 0.9780 | < 0.0001 |
| | | GT95 Uninsured | 1.3309 | < 0.0001 | 1.5573 | < 0.0001 | 1.7937 | < 0.0001 | 1.8029 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.5381 | < 0.0001 | 2.5216 | < 0.0001 | 3.1599 | < 0.0001 | 3.4566 | < 0.0001 |
| | | 580 - 599 | 1.3497 | < 0.0001 | 2.2334 | < 0.0001 | 2.7562 | < 0.0001 | 3.0071 | < 0.0001 |
| | | 600 - 619 | 1.3174 | < 0.0001 | 2.0576 | < 0.0001 | 2.5453 | < 0.0001 | 2.7632 | < 0.0001 |
| | | 620 - 659 | 1.2734 | < 0.0001 | 1.8188 | < 0.0001 | 2.1898 | < 0.0001 | 2.3533 | < 0.0001 |
| | | 660 - 689 | 1.0671 | < 0.0001 | 1.4841 | < 0.0001 | 1.7042 | < 0.0001 | 1.8060 | < 0.0001 |
| | | 690 - 719 | 0.8351 | < 0.0001 | 1.1681 | < 0.0001 | 1.2827 | < 0.0001 | 1.3561 | < 0.0001 |
| | | 720 - 749 | 0.6344 | < 0.0001 | 0.8277 | < 0.0001 | 0.8504 | < 0.0001 | 0.8472 | < 0.0001 |
| | | 750 - 779 | 0.3506 | < 0.0001 | 0.3887 | < 0.0001 | 0.3170 | < 0.0001 | 0.3067 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.0924 | 0.0006 | 0.4945 | < 0.0001 | 0.3658 | < 0.0001 | 0.4062 | < 0.0001 |
| | | COND | 0.1507 | < 0.0001 | -0.0768 | < 0.0001 | -0.2214 | < 0.0001 | -0.4240 | < 0.0001 |
| product | Fixed | ARM | -0.1113 | < 0.0001 | -0.0491 | < 0.0001 | -0.0522 | < 0.0001 | -0.0567 | 0.0002 |
| source | Non-Retail | CORRESPOND | 0.2162 | < 0.0001 | 0.1469 | < 0.0001 | 0.1671 | < 0.0001 | 0.1372 | < 0.0001 |
| | | OTHER | -1.7896 | < 0.0001 | -1.4067 | < 0.0001 | -0.5502 | < 0.0001 | 0.1597 | < 0.0001 |
| | | RETAIL | -0.0569 | < 0.0001 | -0.2104 | < 0.0001 | -0.2454 | < 0.0001 | -0.1853 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0948 | < 0.0001 | 0.2350 | < 0.0001 | 0.1714 | < 0.0001 | -0.1993 | < 0.0001 |
| | | R/T REFI | 0.0821 | < 0.0001 | 0.1254 | < 0.0001 | -0.0608 | < 0.0001 | -0.3939 | < 0.0001 |
| Doctype | Full | Low | 0.4329 | < 0.0001 | 0.5198 | < 0.0001 | 0.5647 | < 0.0001 | 0.5309 | < 0.0001 |
| intonly | No | YES | 1.2992 | < 0.0001 | 1.1379 | < 0.0001 | 1.0000 | < 0.0001 | 0.9221 | < 0.0001 |
| negam | No | YES | 0.9615 | < 0.0001 | 0.8963 | < 0.0001 | 0.8304 | < 0.0001 | 0.2745 | < 0.0001 |
| Term | 360 | < 360 | -0.4211 | < 0.0001 | -0.1798 | < 0.0001 | -0.0425 | 0.0004 | 0.1745 | < 0.0001 |
| | | > 360 | 0.4143 | < 0.0001 | 0.7978 | < 0.0001 | 0.9497 | < 0.0001 | 0.9859 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1902 | < 0.0001 | 0.0324 | 0.0012 | 0.1838 | < 0.0001 | 0.2577 | < 0.0001 |
| | | 1 | -0.0416 | < 0.0001 | 0.0346 | 0.0004 | 0.0644 | < 0.0001 | 0.1283 | < 0.0001 |
| | | 3 | -0.0119 | 0.2570 | 0.0014 | 0.9000 | -0.0216 | 0.0507 | -0.0643 | < 0.0001 |
| | | 4 | -0.0665 | < 0.0001 | 0.0346 | 0.0098 | 0.1620 | < 0.0001 | 0.1409 | < 0.0001 |
| ownocc | O | I | 0.2835 | < 0.0001 | 0.5356 | < 0.0001 | 0.7414 | < 0.0001 | 0.3226 | < 0.0001 |
| | | S | 0.0728 | < 0.0001 | 0.2290 | < 0.0001 | 0.4825 | < 0.0001 | -0.1107 | 0.0040 |
| | | U | -0.2607 | < 0.0001 | -0.1800 | < 0.0001 | 0.0029 | 0.7932 | 0.0587 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7706 | < 0.0001 | -4.2195 | < 0.0001 | -5.1956 | < 0.0001 | -5.7357 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5822 | < 0.0001 | 0.5395 | < 0.0001 | 0.5847 | < 0.0001 | 0.6710 | < 0.0001 |
| | | 90 Uninsured | 0.7590 | < 0.0001 | 0.8142 | < 0.0001 | 0.9317 | < 0.0001 | 1.0457 | < 0.0001 |
| | | 95 Insured | 0.7872 | < 0.0001 | 0.7237 | < 0.0001 | 0.7256 | < 0.0001 | 0.8414 | < 0.0001 |
| | | 95 Uninsured | 0.9971 | < 0.0001 | 1.0326 | < 0.0001 | 1.1129 | < 0.0001 | 1.1299 | < 0.0001 |
| | | GT95 Insured | 0.7311 | < 0.0001 | 0.7948 | < 0.0001 | 0.8920 | < 0.0001 | 0.9448 | < 0.0001 |
| | | GT95 Uninsured | 1.3722 | < 0.0001 | 1.6061 | < 0.0001 | 1.8300 | < 0.0001 | 1.9161 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.6436 | < 0.0001 | 2.6587 | < 0.0001 | 3.2753 | < 0.0001 | 3.4212 | < 0.0001 |
| | | 580 - 599 | 1.4441 | < 0.0001 | 2.3593 | < 0.0001 | 2.8779 | < 0.0001 | 2.9892 | < 0.0001 |
| | | 600 - 619 | 1.4201 | < 0.0001 | 2.1737 | < 0.0001 | 2.6655 | < 0.0001 | 2.7510 | < 0.0001 |
| | | 620 - 659 | 1.3470 | < 0.0001 | 1.9078 | < 0.0001 | 2.2817 | < 0.0001 | 2.3384 | < 0.0001 |
| | | 660 - 689 | 1.1123 | < 0.0001 | 1.5275 | < 0.0001 | 1.7580 | < 0.0001 | 1.7673 | < 0.0001 |
| | | 690 - 719 | 0.8710 | < 0.0001 | 1.1933 | < 0.0001 | 1.3073 | < 0.0001 | 1.2850 | < 0.0001 |
| | | 720 - 749 | 0.6531 | < 0.0001 | 0.8350 | < 0.0001 | 0.8609 | < 0.0001 | 0.7884 | < 0.0001 |
| | | 750 - 779 | 0.3621 | < 0.0001 | 0.3854 | < 0.0001 | 0.3171 | < 0.0001 | 0.2881 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.1166 | < 0.0001 | 0.4954 | < 0.0001 | 0.3470 | < 0.0001 | 0.3649 | < 0.0001 |
| | | COND | 0.1237 | < 0.0001 | -0.1085 | < 0.0001 | -0.2579 | < 0.0001 | -0.4244 | < 0.0001 |
| product | Fixed | ARM | -0.1132 | < 0.0001 | -0.0560 | < 0.0001 | -0.0887 | < 0.0001 | -0.1116 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2325 | < 0.0001 | 0.1512 | < 0.0001 | 0.1637 | < 0.0001 | 0.1884 | < 0.0001 |
| | | OTHER | -1.7124 | < 0.0001 | -1.4081 | < 0.0001 | -0.4572 | < 0.0001 | 0.3156 | < 0.0001 |
| | | RETAIL | -0.0480 | < 0.0001 | -0.1938 | < 0.0001 | -0.2029 | < 0.0001 | -0.1304 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1175 | < 0.0001 | 0.2681 | < 0.0001 | 0.1404 | < 0.0001 | -0.2265 | < 0.0001 |
| | | R/T REFI | 0.0910 | < 0.0001 | 0.1291 | < 0.0001 | -0.0738 | < 0.0001 | -0.3736 | < 0.0001 |
| Doctype | Full | Low | 0.4465 | < 0.0001 | 0.5176 | < 0.0001 | 0.5173 | < 0.0001 | 0.4778 | < 0.0001 |
| intonly | No | YES | 1.2585 | < 0.0001 | 1.0531 | < 0.0001 | 0.9048 | < 0.0001 | 0.7361 | < 0.0001 |
| negam | No | YES | 0.8881 | < 0.0001 | 0.8059 | < 0.0001 | 0.7846 | < 0.0001 | 0.2200 | < 0.0001 |
| Term | 360 | < 360 | -0.1312 | < 0.0001 | 0.0788 | < 0.0001 | 0.1366 | < 0.0001 | 0.3182 | < 0.0001 |
| | | > 360 | 0.6760 | < 0.0001 | 1.1579 | < 0.0001 | 1.2562 | < 0.0001 | 1.2123 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.2074 | < 0.0001 | 0.0124 | 0.1875 | 0.1773 | < 0.0001 | 0.2338 | < 0.0001 |
| | | 1 | -0.0442 | < 0.0001 | 0.0328 | 0.0003 | 0.0672 | < 0.0001 | 0.1154 | < 0.0001 |
| | | 3 | -0.0127 | 0.2182 | -0.0037 | 0.7220 | -0.0185 | 0.0613 | -0.0572 | < 0.0001 |
| | | 4 | -0.0803 | < 0.0001 | 0.0188 | 0.1371 | 0.1359 | < 0.0001 | 0.0934 | < 0.0001 |
| ownocc | O | I | 0.2473 | < 0.0001 | 0.4746 | < 0.0001 | 0.6487 | < 0.0001 | 0.2485 | < 0.0001 |
| | | S | 0.0373 | 0.0022 | 0.1989 | < 0.0001 | 0.4349 | < 0.0001 | -0.0822 | 0.0078 |
| | | U | -0.1506 | < 0.0001 | -0.0441 | 0.0042 | 0.0918 | < 0.0001 | 0.1338 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.1765 | < 0.0001 | -1.4264 | < 0.0001 | -0.8291 | < 0.0001 | -0.1122 | 0.0725 |
| CLTV | 80 Uninsured | 90 Insured | 0.1323 | < 0.0001 | 0.0908 | < 0.0001 | 0.1281 | < 0.0001 | 0.3088 | < 0.0001 |
| | | 90 Uninsured | 0.0845 | < 0.0001 | 0.0848 | 0.0003 | 0.2294 | < 0.0001 | 0.5141 | < 0.0001 |
| | | 95 Insured | 0.1408 | < 0.0001 | 0.1924 | < 0.0001 | 0.1885 | < 0.0001 | 0.2892 | < 0.0001 |
| | | 95 Uninsured | -0.0431 | 0.2203 | 0.1074 | 0.0004 | 0.1346 | < 0.0001 | 0.4988 | < 0.0001 |
| | | GT95 Insured | 0.1741 | < 0.0001 | 0.1353 | < 0.0001 | 0.0562 | 0.0045 | 0.0302 | 0.2116 |
| | | GT95 Uninsured | 0.0418 | 0.1205 | 0.1469 | < 0.0001 | 0.2220 | < 0.0001 | 0.5030 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.4452 | < 0.0001 | 1.1180 | < 0.0001 | 0.7325 | < 0.0001 | 0.0808 | 0.1808 |
| | | 580 - 599 | 1.2597 | < 0.0001 | 1.0738 | < 0.0001 | 0.7048 | < 0.0001 | 0.0876 | 0.1603 |
| | | 600 - 619 | 1.0846 | < 0.0001 | 0.9216 | < 0.0001 | 0.6688 | < 0.0001 | 0.0550 | 0.3725 |
| | | 620 - 659 | 0.7849 | < 0.0001 | 0.7035 | < 0.0001 | 0.4855 | < 0.0001 | 0.0082 | 0.8903 |
| | | 660 - 689 | 0.5087 | < 0.0001 | 0.4062 | < 0.0001 | 0.2543 | < 0.0001 | -0.1388 | 0.0214 |
| | | 690 - 719 | 0.3260 | < 0.0001 | 0.2098 | < 0.0001 | 0.1195 | 0.0090 | -0.2329 | 0.0001 |
| | | 720 - 749 | 0.1360 | 0.0023 | 0.0644 | 0.1756 | 0.0018 | 0.9697 | -0.2502 | < 0.0001 |
| | | 750 - 779 | 0.0678 | 0.1492 | -0.0359 | 0.4810 | -0.0858 | 0.0937 | -0.1539 | 0.0232 |
| proptyp | SFR | 2-4U | 0.1188 | 0.0460 | -0.1546 | < 0.0001 | -0.1554 | < 0.0001 | -0.2090 | < 0.0001 |
| | | COND | -0.3013 | < 0.0001 | -0.2242 | < 0.0001 | -0.1697 | < 0.0001 | 0.0000 | 0.9990 |
| product | Fixed | ARM | -0.0535 | 0.0118 | -0.1262 | < 0.0001 | -0.2011 | < 0.0001 | -0.2186 | < 0.0001 |
| source | Non-Retail | CORRESPOND | -0.0154 | 0.3978 | -0.0091 | 0.5770 | -0.0057 | 0.6861 | 0.2647 | < 0.0001 |
| | | OTHER | 1.1014 | < 0.0001 | 0.3748 | < 0.0001 | 0.8215 | < 0.0001 | 1.0903 | < 0.0001 |
| | | RETAIL | -0.0257 | 0.1679 | 0.0302 | 0.0585 | 0.0806 | < 0.0001 | 0.1716 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.2328 | < 0.0001 | 0.1183 | < 0.0001 | -0.1654 | < 0.0001 | -0.1853 | < 0.0001 |
| | | R/T REFI | 0.1318 | < 0.0001 | 0.0199 | 0.2707 | -0.0908 | < 0.0001 | -0.0870 | < 0.0001 |
| Doctype | Full | Low | 0.0989 | < 0.0001 | NA | NA | -0.0734 | < 0.0001 | -0.0759 | < 0.0001 |
| intonly | No | YES | -0.3201 | < 0.0001 | -0.5380 | < 0.0001 | -0.4858 | < 0.0001 | -0.6820 | < 0.0001 |
| negam | No | YES | -0.4630 | < 0.0001 | -0.4853 | < 0.0001 | -0.2294 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | 1.4251 | < 0.0001 | 1.0882 | < 0.0001 | 0.8886 | < 0.0001 | 0.8323 | < 0.0001 |
| | | > 360 | 0.8574 | < 0.0001 | 0.9909 | < 0.0001 | 1.1277 | < 0.0001 | 1.0622 | < 0.0001 |
| Quintile_String | 2 | 0 | NA | NA | -0.0686 | 0.0003 | -0.0437 | 0.0030 | -0.0978 | < 0.0001 |
| | | 1 | NA | NA | -0.0006 | 0.9735 | -0.0105 | 0.4878 | -0.0414 | 0.0322 |
| | | 3 | NA | NA | -0.0036 | 0.8674 | -0.0335 | 0.0818 | -0.0619 | 0.0182 |
| | | 4 | NA | NA | -0.0678 | 0.0135 | -0.0942 | 0.0001 | -0.1874 | < 0.0001 |
| ownocc | O | I | -0.3691 | < 0.0001 | -0.3869 | < 0.0001 | -0.4711 | < 0.0001 | -0.2950 | < 0.0001 |
| | | S | -0.3014 | < 0.0001 | -0.2150 | < 0.0001 | -0.2225 | < 0.0001 | 0.0693 | 0.2658 |
| | | U | 0.4081 | < 0.0001 | 0.5867 | < 0.0001 | 0.2552 | < 0.0001 | 0.1850 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7568 | < 0.0001 | -4.6224 | < 0.0001 | -5.5497 | < 0.0001 | -5.9902 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5027 | < 0.0001 | 0.5945 | < 0.0001 | 0.6432 | < 0.0001 | 0.6039 | < 0.0001 |
| | | 90 Uninsured | 1.1640 | < 0.0001 | 1.0182 | < 0.0001 | 1.0168 | < 0.0001 | 1.0717 | < 0.0001 |
| | | 95 Insured | 0.8283 | < 0.0001 | 0.8326 | < 0.0001 | 0.8554 | < 0.0001 | 0.8147 | < 0.0001 |
| | | 95 Uninsured | 1.4206 | < 0.0001 | 1.1508 | < 0.0001 | 1.1941 | < 0.0001 | 1.0847 | < 0.0001 |
| | | GT95 Insured | 0.8817 | < 0.0001 | 1.1796 | < 0.0001 | 1.1684 | < 0.0001 | 1.0102 | < 0.0001 |
| | | GT95 Uninsured | 1.6619 | < 0.0001 | 1.7093 | < 0.0001 | 1.8468 | < 0.0001 | 1.8758 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.2981 | < 0.0001 | 2.4622 | < 0.0001 | 3.1224 | < 0.0001 | 3.2673 | < 0.0001 |
| | | 580 - 599 | 1.1123 | < 0.0001 | 2.1351 | < 0.0001 | 2.6688 | < 0.0001 | 2.7500 | < 0.0001 |
| | | 600 - 619 | 1.0726 | < 0.0001 | 1.9864 | < 0.0001 | 2.4294 | < 0.0001 | 2.5186 | < 0.0001 |
| | | 620 - 659 | 1.1120 | < 0.0001 | 1.7705 | < 0.0001 | 2.0777 | < 0.0001 | 2.1058 | < 0.0001 |
| | | 660 - 689 | 0.9405 | < 0.0001 | 1.4472 | < 0.0001 | 1.6248 | < 0.0001 | 1.5880 | < 0.0001 |
| | | 690 - 719 | 0.7401 | < 0.0001 | 1.1350 | < 0.0001 | 1.2176 | < 0.0001 | 1.1621 | < 0.0001 |
| | | 720 - 749 | 0.5481 | < 0.0001 | 0.7723 | < 0.0001 | 0.7632 | < 0.0001 | 0.6872 | < 0.0001 |
| | | 750 - 779 | 0.3284 | < 0.0001 | 0.3277 | < 0.0001 | 0.2392 | < 0.0001 | 0.2122 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.0522 | 0.1660 | 0.4020 | < 0.0001 | 0.2764 | < 0.0001 | 0.3978 | < 0.0001 |
| | | COND | 0.1614 | < 0.0001 | -0.1161 | < 0.0001 | -0.3150 | < 0.0001 | -0.4881 | < 0.0001 |
| product | Fixed | ARM | -0.4707 | < 0.0001 | -0.3072 | < 0.0001 | -0.3460 | < 0.0001 | -0.3407 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.5435 | < 0.0001 | 0.3761 | < 0.0001 | 0.6545 | < 0.0001 | 0.9128 | < 0.0001 |
| | | OTHER | -1.8810 | < 0.0001 | -1.4870 | < 0.0001 | -0.9291 | < 0.0001 | -0.4220 | < 0.0001 |
| | | RETAIL | 0.0289 | 0.0191 | -0.2207 | < 0.0001 | -0.1815 | < 0.0001 | -0.1028 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0683 | < 0.0001 | 0.1712 | < 0.0001 | 0.0568 | 0.0007 | -0.3214 | < 0.0001 |
| | | R/T REFI | 0.3220 | < 0.0001 | 0.2811 | < 0.0001 | 0.0387 | 0.0014 | -0.4230 | < 0.0001 |
| Doctype | Full | Low | 0.3760 | < 0.0001 | 0.5915 | < 0.0001 | 0.8196 | < 0.0001 | 0.6909 | < 0.0001 |
| intonly | No | YES | 1.6060 | < 0.0001 | 1.3677 | < 0.0001 | 0.8755 | < 0.0001 | 0.5767 | < 0.0001 |
| negam | No | YES | 0.6955 | < 0.0001 | 0.6910 | < 0.0001 | 0.6087 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | -0.8405 | < 0.0001 | -0.5579 | < 0.0001 | -0.2426 | < 0.0001 | 0.0606 | 0.0018 |
| | | > 360 | 1.1316 | < 0.0001 | 1.4671 | < 0.0001 | 1.5873 | < 0.0001 | 1.3218 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1683 | < 0.0001 | 0.1865 | < 0.0001 | 0.3808 | < 0.0001 | 0.3542 | < 0.0001 |
| | | 1 | -0.0180 | 0.2162 | 0.1025 | < 0.0001 | 0.1471 | < 0.0001 | 0.1634 | < 0.0001 |
| | | 3 | -0.0354 | 0.0207 | 0.0010 | 0.9520 | -0.0726 | < 0.0001 | -0.0406 | 0.0540 |
| | | 4 | -0.1126 | < 0.0001 | 0.0658 | 0.0013 | 0.1369 | < 0.0001 | 0.1689 | < 0.0001 |
| ownocc | O | I | 0.5371 | < 0.0001 | 0.9826 | < 0.0001 | 1.1288 | < 0.0001 | 0.4623 | < 0.0001 |
| | | S | 0.4046 | < 0.0001 | 0.5832 | < 0.0001 | 0.6585 | < 0.0001 | -0.1069 | 0.0381 |
| | | U | -0.3097 | < 0.0001 | -0.4286 | < 0.0001 | 0.0458 | 0.0041 | 0.0584 | 0.0007 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7344 | < 0.0001 | -4.5505 | < 0.0001 | -5.3561 | < 0.0001 | -5.6671 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5236 | < 0.0001 | 0.5970 | < 0.0001 | 0.6214 | < 0.0001 | 0.5929 | < 0.0001 |
| | | 90 Uninsured | 1.1620 | < 0.0001 | 1.0049 | < 0.0001 | 0.9884 | < 0.0001 | 1.1522 | < 0.0001 |
| | | 95 Insured | 0.8376 | < 0.0001 | 0.8327 | < 0.0001 | 0.8151 | < 0.0001 | 0.7913 | < 0.0001 |
| | | 95 Uninsured | 1.4185 | < 0.0001 | 1.1257 | < 0.0001 | 1.1284 | < 0.0001 | 1.0920 | < 0.0001 |
| | | GT95 Insured | 0.9196 | < 0.0001 | 1.1816 | < 0.0001 | 1.0971 | < 0.0001 | 0.9369 | < 0.0001 |
| | | GT95 Uninsured | 1.6571 | < 0.0001 | 1.6838 | < 0.0001 | 1.7720 | < 0.0001 | 1.9504 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.3441 | < 0.0001 | 2.5155 | < 0.0001 | 3.1675 | < 0.0001 | 3.2850 | < 0.0001 |
| | | 580 - 599 | 1.1469 | < 0.0001 | 2.2094 | < 0.0001 | 2.7274 | < 0.0001 | 2.7817 | < 0.0001 |
| | | 600 - 619 | 1.1297 | < 0.0001 | 2.0220 | < 0.0001 | 2.4789 | < 0.0001 | 2.5425 | < 0.0001 |
| | | 620 - 659 | 1.1328 | < 0.0001 | 1.7881 | < 0.0001 | 2.1028 | < 0.0001 | 2.1124 | < 0.0001 |
| | | 660 - 689 | 0.9489 | < 0.0001 | 1.4441 | < 0.0001 | 1.6170 | < 0.0001 | 1.5607 | < 0.0001 |
| | | 690 - 719 | 0.7441 | < 0.0001 | 1.1261 | < 0.0001 | 1.2029 | < 0.0001 | 1.1175 | < 0.0001 |
| | | 720 - 749 | 0.5499 | < 0.0001 | 0.7547 | < 0.0001 | 0.7465 | < 0.0001 | 0.6481 | < 0.0001 |
| | | 750 - 779 | 0.3275 | < 0.0001 | 0.3092 | < 0.0001 | 0.2165 | < 0.0001 | 0.2053 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.0641 | 0.0877 | 0.3990 | < 0.0001 | 0.2942 | < 0.0001 | 0.3919 | < 0.0001 |
| | | COND | 0.1629 | < 0.0001 | -0.1077 | < 0.0001 | -0.2823 | < 0.0001 | -0.4286 | < 0.0001 |
| product | Fixed | ARM | -0.4752 | < 0.0001 | -0.3074 | < 0.0001 | -0.3266 | < 0.0001 | -0.3114 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.5326 | < 0.0001 | 0.3592 | < 0.0001 | 0.6194 | < 0.0001 | 0.8328 | < 0.0001 |
| | | OTHER | -1.7638 | < 0.0001 | -1.3957 | < 0.0001 | -0.7923 | < 0.0001 | -0.3100 | < 0.0001 |
| | | RETAIL | 0.0168 | 0.1719 | -0.2263 | < 0.0001 | -0.1663 | < 0.0001 | -0.0788 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0635 | < 0.0001 | 0.1507 | < 0.0001 | NA | NA | -0.2997 | < 0.0001 |
| | | R/T REFI | 0.3177 | < 0.0001 | 0.2605 | < 0.0001 | NA | NA | -0.4074 | < 0.0001 |
| Doctype | Full | Low | 0.3867 | < 0.0001 | 0.5889 | < 0.0001 | 0.7633 | < 0.0001 | 0.6071 | < 0.0001 |
| intonly | No | YES | 1.5981 | < 0.0001 | 1.3538 | < 0.0001 | 0.8428 | < 0.0001 | 0.4894 | < 0.0001 |
| negam | No | YES | 0.6770 | < 0.0001 | 0.6696 | < 0.0001 | 0.5873 | < 0.0001 | -0.2224 | 0.0368 |
| Term | 360 | < 360 | -0.7004 | < 0.0001 | -0.3603 | < 0.0001 | -0.1212 | < 0.0001 | 0.1582 | < 0.0001 |
| | | > 360 | 1.2419 | < 0.0001 | 1.6762 | < 0.0001 | 1.8368 | < 0.0001 | 1.5609 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1728 | < 0.0001 | 0.1827 | < 0.0001 | 0.3671 | < 0.0001 | 0.3221 | < 0.0001 |
| | | 1 | -0.0224 | 0.1224 | 0.0999 | < 0.0001 | 0.1411 | < 0.0001 | 0.1502 | < 0.0001 |
| | | 3 | -0.0360 | 0.0180 | 0.0007 | 0.9682 | -0.0713 | < 0.0001 | -0.0433 | 0.0204 |
| | | 4 | -0.1144 | < 0.0001 | 0.0598 | 0.0029 | 0.1209 | < 0.0001 | 0.1443 | < 0.0001 |
| ownocc | O | I | 0.5342 | < 0.0001 | 0.9585 | < 0.0001 | 1.0529 | < 0.0001 | 0.4121 | < 0.0001 |
| | | S | 0.4067 | < 0.0001 | 0.5717 | < 0.0001 | 0.6124 | < 0.0001 | -0.0490 | 0.2659 |
| | | U | -0.3368 | < 0.0001 | -0.4434 | < 0.0001 | 0.0093 | 0.5412 | 0.0283 | 0.0686 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 1: All loans in the filtered dataset
Terminated Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.2684 | < 0.0001 | -2.0589 | < 0.0001 | -1.1580 | < 0.0001 | -0.5211 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.2366 | < 0.0001 | -0.0690 | 0.1520 | -0.0669 | 0.0525 | 0.0968 | 0.0054 |
| | | 90 Uninsured | 0.0923 | 0.0514 | -0.0658 | 0.2343 | 0.0427 | 0.4493 | 0.4581 | < 0.0001 |
| | | 95 Insured | 0.2156 | 0.0054 | 0.0717 | 0.2283 | -0.0920 | 0.0194 | 0.0342 | 0.3755 |
| | | 95 Uninsured | 0.1380 | 0.0638 | -0.1940 | 0.0080 | -0.2298 | 0.0007 | 0.2869 | 0.0045 |
| | | GT95 Insured | 0.4225 | < 0.0001 | -0.0835 | 0.0663 | -0.2940 | < 0.0001 | -0.1856 | < 0.0001 |
| | | GT95 Uninsured | 0.1530 | 0.0079 | -0.0938 | 0.0615 | -0.0517 | 0.2013 | 0.5056 | < 0.0001 |
| ficobucket | 780-850 | 350 - 579 | 1.9295 | < 0.0001 | 1.0782 | < 0.0001 | 0.6007 | < 0.0001 | 0.2388 | 0.0050 |
| | | 580 - 599 | 1.6577 | < 0.0001 | 1.1344 | < 0.0001 | 0.6733 | < 0.0001 | 0.2490 | 0.0047 |
| | | 600 - 619 | 1.4194 | < 0.0001 | 0.9011 | < 0.0001 | 0.5724 | < 0.0001 | 0.1659 | 0.0567 |
| | | 620 - 659 | 1.0187 | < 0.0001 | 0.5764 | < 0.0001 | 0.3223 | < 0.0001 | 0.0853 | 0.3108 |
| | | 660 - 689 | 0.6704 | < 0.0001 | 0.2129 | 0.0188 | 0.0060 | 0.9354 | -0.1313 | 0.1238 |
| | | 690 - 719 | 0.3574 | 0.0003 | -0.0082 | 0.9290 | -0.0926 | 0.2170 | -0.2060 | 0.0179 |
| | | 720 - 749 | 0.0699 | 0.4927 | -0.2016 | 0.0362 | -0.1736 | 0.0264 | -0.2332 | 0.0097 |
| | | 750 - 779 | -0.0405 | 0.7087 | -0.2867 | 0.0062 | -0.2256 | 0.0083 | -0.1138 | 0.2363 |
| proptyp | SFR | 2-4U | 0.2380 | 0.0421 | NA | NA | -0.0276 | 0.6749 | -0.0947 | 0.1132 |
| | | COND | -0.1424 | 0.0029 | NA | NA | 0.1753 | < 0.0001 | 0.2498 | < 0.0001 |
| product | Fixed | ARM | -0.1294 | 0.0061 | NA | NA | 0.0736 | 0.0093 | 0.1081 | 0.0013 |
| source | Non-Retail | CORRESPOND | -0.2252 | < 0.0001 | -0.0504 | 0.1382 | -0.1181 | < 0.0001 | -0.1602 | < 0.0001 |
| | | OTHER | 1.4467 | < 0.0001 | 0.6301 | < 0.0001 | 0.7641 | < 0.0001 | 0.6827 | < 0.0001 |
| | | RETAIL | -0.2921 | < 0.0001 | -0.0622 | 0.0638 | 0.0389 | 0.0886 | 0.1074 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | NA | NA | -0.2042 | < 0.0001 | -0.2643 | < 0.0001 | -0.0542 | 0.1625 |
| | | R/T REFI | NA | NA | -0.2501 | < 0.0001 | -0.2348 | < 0.0001 | -0.1418 | < 0.0001 |
| Doctype | Full | Low | 0.1547 | < 0.0001 | 0.0741 | 0.0096 | -0.2117 | < 0.0001 | -0.2574 | < 0.0001 |
| intonly | No | YES | -0.1745 | 0.0005 | -0.4881 | < 0.0001 | -0.4668 | < 0.0001 | -0.5613 | < 0.0001 |
| negam | No | YES | -0.2611 | < 0.0001 | -0.6192 | < 0.0001 | -0.4029 | < 0.0001 | -0.5729 | 0.0098 |
| Term | 360 | < 360 | 1.7124 | < 0.0001 | 1.5573 | < 0.0001 | 0.9702 | < 0.0001 | 0.7097 | < 0.0001 |
| | | > 360 | 0.8268 | < 0.0001 | 1.4895 | < 0.0001 | 2.1108 | < 0.0001 | 2.1997 | < 0.0001 |
| Quintile_String | 2 | 0 | 0.0767 | 0.1182 | NA | NA | -0.0980 | 0.0002 | -0.1222 | < 0.0001 |
| | | 1 | -0.0343 | 0.4581 | NA | NA | -0.0350 | 0.1910 | -0.0321 | 0.2485 |
| | | 3 | 0.0145 | 0.7734 | NA | NA | -0.0240 | 0.4884 | -0.0657 | 0.0845 |
| | | 4 | 0.0847 | 0.1462 | NA | NA | -0.0765 | 0.0837 | -0.1524 | 0.0023 |
| ownocc | O | I | -0.1753 | 0.0046 | -0.2529 | < 0.0001 | -0.5357 | < 0.0001 | -0.2784 | < 0.0001 |
| | | S | -0.0719 | 0.2634 | -0.2037 | 0.0193 | -0.2631 | 0.0003 | 0.1634 | 0.0706 |
| | | U | -0.3951 | 0.0049 | -0.0920 | 0.1787 | -0.5351 | < 0.0001 | -0.3016 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8965 | < 0.0001 | -4.4280 | < 0.0001 | -5.5337 | < 0.0001 | -6.3297 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.6213 | < 0.0001 | 0.6334 | < 0.0001 | 0.6623 | < 0.0001 | 0.6868 | < 0.0001 |
| | | 90 Uninsured | 0.7341 | < 0.0001 | 0.7665 | < 0.0001 | 0.8294 | < 0.0001 | 0.9102 | < 0.0001 |
| | | 95 Insured | 0.8388 | < 0.0001 | 0.8441 | < 0.0001 | 0.8180 | < 0.0001 | 0.8780 | < 0.0001 |
| | | 95 Uninsured | 0.9859 | < 0.0001 | 0.9551 | < 0.0001 | 1.0170 | < 0.0001 | 1.0547 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.8065 | < 0.0001 | 2.7714 | < 0.0001 | 3.3833 | < 0.0001 | 3.5896 | < 0.0001 |
| | | 580 - 599 | 1.4222 | < 0.0001 | 2.1854 | < 0.0001 | 2.7103 | < 0.0001 | 3.0201 | < 0.0001 |
| | | 600 - 619 | 1.3658 | < 0.0001 | 1.9788 | < 0.0001 | 2.4327 | < 0.0001 | 2.7475 | < 0.0001 |
| | | 620 - 659 | 1.2822 | < 0.0001 | 1.7807 | < 0.0001 | 2.1525 | < 0.0001 | 2.3299 | < 0.0001 |
| | | 660 - 689 | 1.0779 | < 0.0001 | 1.5118 | < 0.0001 | 1.7589 | < 0.0001 | 1.8377 | < 0.0001 |
| | | 690 - 719 | 0.8491 | < 0.0001 | 1.2023 | < 0.0001 | 1.3494 | < 0.0001 | 1.3648 | < 0.0001 |
| | | 720 - 749 | 0.6419 | < 0.0001 | 0.8542 | < 0.0001 | 0.9330 | < 0.0001 | 0.8727 | < 0.0001 |
| | | 750 - 779 | 0.3572 | < 0.0001 | 0.4071 | < 0.0001 | 0.3782 | < 0.0001 | 0.3209 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.0955 | 0.0006 | 0.4884 | < 0.0001 | 0.3979 | < 0.0001 | 0.5332 | < 0.0001 |
| | | COND | 0.1388 | < 0.0001 | -0.0619 | < 0.0001 | -0.2230 | < 0.0001 | -0.4167 | < 0.0001 |
| product | Fixed | ARM | -0.1133 | < 0.0001 | -0.0771 | < 0.0001 | -0.1010 | < 0.0001 | -0.1697 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2133 | < 0.0001 | 0.1227 | < 0.0001 | 0.1272 | < 0.0001 | -0.0058 | 0.7562 |
| | | OTHER | -1.8851 | < 0.0001 | -1.6269 | < 0.0001 | -0.8851 | < 0.0001 | -0.0447 | 0.2592 |
| | | RETAIL | -0.0435 | < 0.0001 | -0.1846 | < 0.0001 | -0.2150 | < 0.0001 | -0.2457 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1083 | < 0.0001 | 0.3128 | < 0.0001 | 0.3558 | < 0.0001 | 0.1115 | < 0.0001 |
| | | R/T REFI | 0.1219 | < 0.0001 | 0.2446 | < 0.0001 | 0.1683 | < 0.0001 | -0.0124 | 0.4342 |
| Doctype | Full | Low | 0.4716 | < 0.0001 | 0.5878 | < 0.0001 | 0.6733 | < 0.0001 | 0.7279 | < 0.0001 |
| intonly | No | YES | 1.3247 | < 0.0001 | 1.2718 | < 0.0001 | 1.2182 | < 0.0001 | 1.1199 | < 0.0001 |
| negam | No | YES | 0.9541 | < 0.0001 | 0.9047 | < 0.0001 | 0.8646 | < 0.0001 | 0.3850 | < 0.0001 |
| Term | 360 | < 360 | -0.4609 | < 0.0001 | -0.3774 | < 0.0001 | -0.4170 | < 0.0001 | -0.3033 | < 0.0001 |
| | | > 360 | 0.3672 | < 0.0001 | 0.5968 | < 0.0001 | 0.5398 | < 0.0001 | 0.5396 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1741 | < 0.0001 | 0.0476 | 0.0002 | 0.2271 | < 0.0001 | 0.3519 | < 0.0001 |
| | | 1 | -0.0439 | < 0.0001 | 0.0381 | 0.0013 | 0.0756 | < 0.0001 | 0.1737 | < 0.0001 |
| | | 3 | -0.0207 | 0.0592 | -0.0104 | 0.4050 | -0.0161 | 0.2611 | -0.0187 | 0.3943 |
| | | 4 | -0.0734 | < 0.0001 | 0.0076 | 0.5960 | 0.1455 | < 0.0001 | 0.2229 | < 0.0001 |
| ownocc | O | I | 0.2774 | < 0.0001 | 0.5090 | < 0.0001 | 0.6931 | < 0.0001 | 0.3466 | < 0.0001 |
| | | S | 0.0617 | < 0.0001 | 0.1946 | < 0.0001 | 0.4456 | < 0.0001 | -0.0698 | 0.0769 |
| | | U | -0.0200 | 0.6046 | -0.1227 | 0.0002 | -0.0065 | 0.8443 | -0.2099 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8100 | < 0.0001 | -4.2873 | < 0.0001 | -5.2727 | < 0.0001 | -5.8430 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.6494 | < 0.0001 | 0.6616 | < 0.0001 | 0.6821 | < 0.0001 | 0.7501 | < 0.0001 |
| | | 90 Uninsured | 0.7544 | < 0.0001 | 0.7840 | < 0.0001 | 0.8584 | < 0.0001 | 0.9841 | < 0.0001 |
| | | 95 Insured | 0.8596 | < 0.0001 | 0.8773 | < 0.0001 | 0.8381 | < 0.0001 | 0.9469 | < 0.0001 |
| | | 95 Uninsured | 0.9840 | < 0.0001 | 0.9829 | < 0.0001 | 1.0267 | < 0.0001 | 1.1008 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.9009 | < 0.0001 | 2.9288 | < 0.0001 | 3.4904 | < 0.0001 | 3.5573 | < 0.0001 |
| | | 580 - 599 | 1.5357 | < 0.0001 | 2.3187 | < 0.0001 | 2.8500 | < 0.0001 | 3.0140 | < 0.0001 |
| | | 600 - 619 | 1.4505 | < 0.0001 | 2.1126 | < 0.0001 | 2.5712 | < 0.0001 | 2.7351 | < 0.0001 |
| | | 620 - 659 | 1.3483 | < 0.0001 | 1.8662 | < 0.0001 | 2.2267 | < 0.0001 | 2.2868 | < 0.0001 |
| | | 660 - 689 | 1.1198 | < 0.0001 | 1.5496 | < 0.0001 | 1.7914 | < 0.0001 | 1.7655 | < 0.0001 |
| | | 690 - 719 | 0.8824 | < 0.0001 | 1.2221 | < 0.0001 | 1.3559 | < 0.0001 | 1.2639 | < 0.0001 |
| | | 720 - 749 | 0.6572 | < 0.0001 | 0.8584 | < 0.0001 | 0.9223 | < 0.0001 | 0.7816 | < 0.0001 |
| | | 750 - 779 | 0.3649 | < 0.0001 | 0.4067 | < 0.0001 | 0.3611 | < 0.0001 | 0.2758 | < 0.0001 |
| proptyp | SFR | 2-4U | 0.1158 | < 0.0001 | 0.4929 | < 0.0001 | 0.3814 | < 0.0001 | 0.4830 | < 0.0001 |
| | | COND | 0.1127 | < 0.0001 | -0.0929 | < 0.0001 | -0.2529 | < 0.0001 | -0.3907 | < 0.0001 |
| product | Fixed | ARM | -0.1213 | < 0.0001 | -0.0854 | < 0.0001 | -0.1331 | < 0.0001 | -0.2336 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2311 | < 0.0001 | 0.1283 | < 0.0001 | 0.1398 | < 0.0001 | 0.1126 | < 0.0001 |
| | | OTHER | -1.8084 | < 0.0001 | -1.6138 | < 0.0001 | -0.7675 | < 0.0001 | 0.1099 | 0.0004 |
| | | RETAIL | -0.0300 | 0.0007 | -0.1693 | < 0.0001 | -0.1775 | < 0.0001 | -0.2068 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1335 | < 0.0001 | 0.3518 | < 0.0001 | 0.3253 | < 0.0001 | 0.0814 | < 0.0001 |
| | | R/T REFI | 0.1354 | < 0.0001 | 0.2515 | < 0.0001 | 0.1482 | < 0.0001 | 0.0006 | 0.9656 |
| Doctype | Full | Low | 0.4848 | < 0.0001 | 0.5885 | < 0.0001 | 0.6307 | < 0.0001 | 0.6669 | < 0.0001 |
| intonly | No | YES | 1.3030 | < 0.0001 | 1.1983 | < 0.0001 | 1.1245 | < 0.0001 | 0.9374 | < 0.0001 |
| negam | No | YES | 0.8914 | < 0.0001 | 0.8174 | < 0.0001 | 0.8175 | < 0.0001 | 0.3942 | < 0.0001 |
| Term | 360 | < 360 | -0.1947 | < 0.0001 | -0.1452 | < 0.0001 | -0.2854 | < 0.0001 | -0.1846 | < 0.0001 |
| | | > 360 | 0.5935 | < 0.0001 | 0.8974 | < 0.0001 | 0.7609 | < 0.0001 | 0.6510 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1904 | < 0.0001 | 0.0242 | 0.0419 | 0.2114 | < 0.0001 | 0.3239 | < 0.0001 |
| | | 1 | -0.0459 | < 0.0001 | 0.0330 | 0.0031 | 0.0745 | < 0.0001 | 0.1663 | < 0.0001 |
| | | 3 | -0.0205 | 0.0565 | -0.0158 | 0.1789 | -0.0249 | 0.0506 | -0.0194 | 0.2732 |
| | | 4 | -0.0872 | < 0.0001 | -0.0070 | 0.6081 | 0.1114 | < 0.0001 | 0.1571 | < 0.0001 |
| ownocc | O | I | 0.2395 | < 0.0001 | 0.4483 | < 0.0001 | 0.6021 | < 0.0001 | 0.2686 | < 0.0001 |
| | | S | 0.0243 | 0.0489 | 0.1645 | < 0.0001 | 0.3935 | < 0.0001 | -0.0492 | 0.1197 |
| | | U | 0.0787 | 0.0269 | 0.0078 | 0.7890 | 0.0724 | 0.0101 | -0.1040 | 0.0096 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.1606 | < 0.0001 | -1.4107 | < 0.0001 | -0.7495 | < 0.0001 | -0.0338 | 0.6482 |
| CLTV | 80 Uninsured | 90 Insured | 0.1290 | < 0.0001 | 0.0734 | 0.0013 | 0.1010 | < 0.0001 | 0.3259 | < 0.0001 |
| | | 90 Uninsured | 0.0711 | 0.0007 | 0.0666 | 0.0044 | 0.2040 | < 0.0001 | 0.4693 | < 0.0001 |
| | | 95 Insured | 0.1467 | < 0.0001 | 0.1724 | < 0.0001 | 0.1777 | < 0.0001 | 0.3386 | < 0.0001 |
| | | 95 Uninsured | -0.0793 | 0.0238 | 0.0821 | 0.0071 | 0.0897 | 0.0066 | 0.4063 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.3991 | < 0.0001 | 1.2452 | < 0.0001 | 0.8271 | < 0.0001 | 0.2773 | 0.0009 |
| | | 580 - 599 | 1.0975 | < 0.0001 | 1.1577 | < 0.0001 | 0.8112 | < 0.0001 | 0.2509 | 0.0052 |
| | | 600 - 619 | 1.0413 | < 0.0001 | 0.9434 | < 0.0001 | 0.7750 | < 0.0001 | 0.1877 | 0.0211 |
| | | 620 - 659 | 0.7347 | < 0.0001 | 0.6920 | < 0.0001 | 0.4506 | < 0.0001 | -0.0194 | 0.7844 |
| | | 660 - 689 | 0.4810 | < 0.0001 | 0.3989 | < 0.0001 | 0.2269 | < 0.0001 | -0.1779 | 0.0121 |
| | | 690 - 719 | 0.2960 | < 0.0001 | 0.2022 | < 0.0001 | 0.0854 | 0.1113 | -0.2887 | < 0.0001 |
| | | 720 - 749 | 0.1154 | 0.0156 | 0.0542 | 0.3096 | -0.0642 | 0.2467 | -0.3178 | < 0.0001 |
| | | 750 - 779 | 0.0435 | 0.3871 | -0.0349 | 0.5401 | -0.1222 | 0.0405 | -0.1924 | 0.0148 |
| proptyp | SFR | 2-4U | 0.1136 | 0.0727 | -0.1095 | 0.0054 | -0.1666 | 0.0006 | -0.1912 | 0.0017 |
| | | COND | -0.2697 | < 0.0001 | -0.2029 | < 0.0001 | -0.1466 | < 0.0001 | 0.0477 | 0.2922 |
| product | Fixed | ARM | -0.1353 | < 0.0001 | -0.1373 | < 0.0001 | -0.1768 | < 0.0001 | -0.2323 | < 0.0001 |
| source | Non-Retail | CORRESPOND | -0.0133 | 0.5139 | 0.0122 | 0.5498 | 0.0426 | 0.0380 | 0.4321 | < 0.0001 |
| | | OTHER | 1.1801 | < 0.0001 | 0.3490 | 0.0012 | 0.7126 | < 0.0001 | 0.8245 | < 0.0001 |
| | | RETAIL | 0.0092 | 0.6598 | 0.0144 | 0.4702 | 0.0764 | < 0.0001 | 0.1646 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.2398 | < 0.0001 | 0.1190 | < 0.0001 | -0.1819 | < 0.0001 | -0.1889 | < 0.0001 |
| | | R/T REFI | 0.1429 | < 0.0001 | 0.0200 | 0.3403 | -0.1181 | < 0.0001 | -0.0595 | 0.0195 |
| Doctype | Full | Low | 0.0895 | < 0.0001 | 0.0347 | 0.0453 | -0.0631 | 0.0002 | -0.1329 | < 0.0001 |
| intonly | No | YES | -0.1245 | < 0.0001 | -0.4558 | < 0.0001 | -0.4192 | < 0.0001 | -0.7028 | < 0.0001 |
| negam | No | YES | -0.3529 | < 0.0001 | -0.4732 | < 0.0001 | -0.2321 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | 1.3251 | < 0.0001 | 0.8384 | < 0.0001 | 0.5538 | < 0.0001 | 0.4532 | < 0.0001 |
| | | > 360 | 0.7399 | < 0.0001 | 0.7870 | < 0.0001 | 0.7871 | < 0.0001 | 0.7640 | < 0.0001 |
| Quintile_String | 2 | 0 | NA | NA | -0.0925 | 0.0003 | -0.0592 | 0.0151 | -0.0719 | 0.0236 |
| | | 1 | NA | NA | -0.0065 | 0.7803 | -0.0061 | 0.8014 | -0.0072 | 0.8228 |
| | | 3 | NA | NA | 0.0075 | 0.7621 | -0.0449 | 0.0803 | -0.0583 | 0.0985 |
| | | 4 | NA | NA | -0.0573 | 0.0525 | -0.1035 | 0.0003 | -0.2114 | < 0.0001 |
| ownocc | O | I | -0.4063 | < 0.0001 | -0.3892 | < 0.0001 | -0.4788 | < 0.0001 | -0.3321 | < 0.0001 |
| | | S | -0.3298 | < 0.0001 | -0.2242 | < 0.0001 | -0.2657 | < 0.0001 | 0.0217 | 0.7345 |
| | | U | 0.1842 | 0.0192 | 0.3939 | < 0.0001 | 0.2203 | < 0.0001 | 0.2667 | 0.0010 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7968 | < 0.0001 | -4.6801 | < 0.0001 | -5.6640 | < 0.0001 | -6.2129 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5818 | < 0.0001 | 0.7249 | < 0.0001 | 0.7692 | < 0.0001 | 0.7293 | < 0.0001 |
| | | 90 Uninsured | 1.1585 | < 0.0001 | 0.9770 | < 0.0001 | 0.9304 | < 0.0001 | 1.0046 | < 0.0001 |
| | | 95 Insured | 0.9126 | < 0.0001 | 0.9925 | < 0.0001 | 0.9991 | < 0.0001 | 0.9746 | < 0.0001 |
| | | 95 Uninsured | 1.4016 | < 0.0001 | 1.0895 | < 0.0001 | 1.1239 | < 0.0001 | 1.0901 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.4535 | < 0.0001 | 2.5941 | < 0.0001 | 3.2957 | < 0.0001 | 3.3865 | < 0.0001 |
| | | 580 - 599 | 1.1355 | < 0.0001 | 2.0518 | < 0.0001 | 2.4460 | < 0.0001 | 2.7021 | < 0.0001 |
| | | 600 - 619 | 1.0928 | < 0.0001 | 1.9135 | < 0.0001 | 2.2364 | < 0.0001 | 2.3849 | < 0.0001 |
| | | 620 - 659 | 1.1386 | < 0.0001 | 1.7423 | < 0.0001 | 2.0263 | < 0.0001 | 2.0734 | < 0.0001 |
| | | 660 - 689 | 0.9583 | < 0.0001 | 1.4837 | < 0.0001 | 1.6612 | < 0.0001 | 1.6043 | < 0.0001 |
| | | 690 - 719 | 0.7568 | < 0.0001 | 1.1751 | < 0.0001 | 1.2869 | < 0.0001 | 1.1659 | < 0.0001 |
| | | 720 - 749 | 0.5583 | < 0.0001 | 0.8022 | < 0.0001 | 0.8440 | < 0.0001 | 0.7228 | < 0.0001 |
| | | 750 - 779 | 0.3373 | < 0.0001 | 0.3431 | < 0.0001 | 0.2971 | < 0.0001 | 0.2258 | 0.0002 |
| proptyp | SFR | 2-4U | 0.0652 | 0.0955 | 0.4364 | < 0.0001 | 0.3555 | < 0.0001 | 0.5135 | < 0.0001 |
| | | COND | 0.1377 | < 0.0001 | -0.0841 | < 0.0001 | -0.2987 | < 0.0001 | -0.4529 | < 0.0001 |
| product | Fixed | ARM | -0.5091 | < 0.0001 | -0.3803 | < 0.0001 | -0.4150 | < 0.0001 | -0.4857 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.5177 | < 0.0001 | 0.2752 | < 0.0001 | 0.4446 | < 0.0001 | 0.5162 | < 0.0001 |
| | | OTHER | -1.9532 | < 0.0001 | -1.6335 | < 0.0001 | -1.1285 | < 0.0001 | -0.4485 | < 0.0001 |
| | | RETAIL | 0.0197 | 0.1443 | -0.2480 | < 0.0001 | -0.2264 | < 0.0001 | -0.2365 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0848 | < 0.0001 | 0.2725 | < 0.0001 | 0.2914 | < 0.0001 | 0.0317 | 0.2059 |
| | | R/T REFI | 0.3683 | < 0.0001 | 0.4264 | < 0.0001 | 0.3376 | < 0.0001 | 0.0588 | 0.0058 |
| Doctype | Full | Low | 0.3952 | < 0.0001 | 0.6075 | < 0.0001 | 0.9339 | < 0.0001 | 0.9656 | < 0.0001 |
| intonly | No | YES | 1.7410 | < 0.0001 | 1.6203 | < 0.0001 | 1.1925 | < 0.0001 | 0.9592 | < 0.0001 |
| negam | No | YES | 0.7485 | < 0.0001 | 0.7710 | < 0.0001 | 0.6342 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | -0.8845 | < 0.0001 | -0.7486 | < 0.0001 | -0.6197 | < 0.0001 | -0.3720 | < 0.0001 |
| | | > 360 | 1.0965 | < 0.0001 | 1.3376 | < 0.0001 | 1.1560 | < 0.0001 | 0.3280 | 0.1600 |
| Quintile_String | 2 | 0 | -0.1561 | < 0.0001 | 0.2083 | < 0.0001 | 0.4152 | < 0.0001 | 0.4383 | < 0.0001 |
| | | 1 | -0.0268 | 0.0912 | 0.1088 | < 0.0001 | 0.1505 | < 0.0001 | 0.1849 | < 0.0001 |
| | | 3 | -0.0488 | 0.0024 | -0.0164 | 0.3979 | -0.0440 | 0.0336 | 0.0110 | 0.6993 |
| | | 4 | -0.1265 | < 0.0001 | 0.0354 | 0.1102 | 0.1382 | < 0.0001 | 0.2527 | < 0.0001 |
| ownocc | O | I | 0.5341 | < 0.0001 | 0.9430 | < 0.0001 | 1.0783 | < 0.0001 | 0.5029 | < 0.0001 |
| | | S | 0.3989 | < 0.0001 | 0.5562 | < 0.0001 | 0.6384 | < 0.0001 | -0.0420 | 0.4258 |
| | | U | 0.1174 | 0.0630 | -0.5309 | < 0.0001 | -0.1504 | 0.0091 | -0.3302 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7744 | < 0.0001 | -4.6010 | < 0.0001 | -5.4526 | < 0.0001 | -5.8145 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.6032 | < 0.0001 | 0.7243 | < 0.0001 | 0.7365 | < 0.0001 | 0.7173 | < 0.0001 |
| | | 90 Uninsured | 1.1552 | < 0.0001 | 0.9628 | < 0.0001 | 0.9056 | < 0.0001 | 1.0802 | < 0.0001 |
| | | 95 Insured | 0.9199 | < 0.0001 | 0.9864 | < 0.0001 | 0.9518 | < 0.0001 | 0.9362 | < 0.0001 |
| | | 95 Uninsured | 1.3982 | < 0.0001 | 1.0635 | < 0.0001 | 1.0644 | < 0.0001 | 1.0830 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.5039 | < 0.0001 | 2.6738 | < 0.0001 | 3.3495 | < 0.0001 | 3.4037 | < 0.0001 |
| | | 580 - 599 | 1.1811 | < 0.0001 | 2.1653 | < 0.0001 | 2.5566 | < 0.0001 | 2.7707 | < 0.0001 |
| | | 600 - 619 | 1.1663 | < 0.0001 | 1.9653 | < 0.0001 | 2.3046 | < 0.0001 | 2.4335 | < 0.0001 |
| | | 620 - 659 | 1.1574 | < 0.0001 | 1.7557 | < 0.0001 | 2.0371 | < 0.0001 | 2.0633 | < 0.0001 |
| | | 660 - 689 | 0.9667 | < 0.0001 | 1.4731 | < 0.0001 | 1.6343 | < 0.0001 | 1.5563 | < 0.0001 |
| | | 690 - 719 | 0.7607 | < 0.0001 | 1.1595 | < 0.0001 | 1.2544 | < 0.0001 | 1.0995 | < 0.0001 |
| | | 720 - 749 | 0.5596 | < 0.0001 | 0.7809 | < 0.0001 | 0.8115 | < 0.0001 | 0.6592 | < 0.0001 |
| | | 750 - 779 | 0.3372 | < 0.0001 | 0.3237 | < 0.0001 | 0.2612 | < 0.0001 | 0.2019 | 0.0001 |
| proptyp | SFR | 2-4U | 0.0810 | 0.0376 | 0.4339 | < 0.0001 | 0.3803 | < 0.0001 | 0.4915 | < 0.0001 |
| | | COND | 0.1399 | < 0.0001 | -0.0799 | < 0.0001 | -0.2774 | < 0.0001 | -0.4068 | < 0.0001 |
| product | Fixed | ARM | -0.5133 | < 0.0001 | -0.3787 | < 0.0001 | -0.3974 | < 0.0001 | -0.4695 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.5074 | < 0.0001 | 0.2598 | < 0.0001 | 0.4292 | < 0.0001 | 0.5098 | < 0.0001 |
| | | OTHER | -1.8336 | < 0.0001 | -1.5397 | < 0.0001 | -0.9579 | < 0.0001 | -0.3461 | < 0.0001 |
| | | RETAIL | 0.0114 | 0.3959 | -0.2481 | < 0.0001 | -0.2124 | < 0.0001 | -0.2318 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0824 | < 0.0001 | 0.2556 | < 0.0001 | 0.2532 | < 0.0001 | NA | NA |
| | | R/T REFI | 0.3675 | < 0.0001 | 0.4091 | < 0.0001 | 0.2950 | < 0.0001 | NA | NA |
| Doctype | Full | Low | 0.4047 | < 0.0001 | 0.6077 | < 0.0001 | 0.8747 | < 0.0001 | 0.8637 | < 0.0001 |
| intonly | No | YES | 1.7311 | < 0.0001 | 1.5965 | < 0.0001 | 1.1512 | < 0.0001 | 0.8562 | < 0.0001 |
| negam | No | YES | 0.7311 | < 0.0001 | 0.7468 | < 0.0001 | 0.6076 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | -0.8028 | < 0.0001 | -0.6063 | < 0.0001 | -0.5095 | < 0.0001 | -0.2728 | < 0.0001 |
| | | > 360 | 1.1754 | < 0.0001 | 1.4276 | < 0.0001 | 1.2285 | < 0.0001 | 0.4400 | 0.0272 |
| Quintile_String | 2 | 0 | -0.1570 | < 0.0001 | 0.2029 | < 0.0001 | 0.3916 | < 0.0001 | 0.3975 | < 0.0001 |
| | | 1 | -0.0307 | 0.0519 | 0.1039 | < 0.0001 | 0.1426 | < 0.0001 | 0.1719 | < 0.0001 |
| | | 3 | -0.0485 | 0.0024 | -0.0159 | 0.4049 | -0.0451 | 0.0208 | -0.0013 | 0.9589 |
| | | 4 | -0.1276 | < 0.0001 | 0.0314 | 0.1500 | 0.1220 | < 0.0001 | 0.2121 | < 0.0001 |
| ownocc | O | I | 0.5293 | < 0.0001 | 0.9189 | < 0.0001 | 1.0126 | < 0.0001 | 0.4331 | < 0.0001 |
| | | S | 0.4009 | < 0.0001 | 0.5465 | < 0.0001 | 0.6011 | < 0.0001 | 0.0003 | 0.9941 |
| | | U | 0.1016 | 0.1057 | -0.5168 | < 0.0001 | -0.1344 | 0.0106 | -0.3445 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.1942 | < 0.0001 | -2.0078 | < 0.0001 | -0.9919 | < 0.0001 | -0.3299 | 0.0013 |
| CLTV | 80 Uninsured | 90 Insured | 0.2560 | < 0.0001 | -0.0862 | 0.0901 | -0.0816 | 0.0283 | 0.0915 | 0.0191 |
| | | 90 Uninsured | 0.0492 | 0.2858 | -0.1021 | 0.0657 | 0.0478 | 0.3971 | 0.4365 | < 0.0001 |
| | | 95 Insured | 0.2250 | 0.0046 | 0.0190 | 0.7673 | -0.0864 | 0.0478 | 0.0488 | 0.2719 |
| | | 95 Uninsured | 0.0854 | 0.2483 | -0.2438 | 0.0009 | -0.2228 | 0.0010 | 0.2342 | 0.0224 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.8440 | < 0.0001 | 1.2881 | < 0.0001 | 0.6663 | < 0.0001 | 0.3476 | 0.0032 |
| | | 580 - 599 | 1.5924 | < 0.0001 | 1.2705 | < 0.0001 | 0.7914 | < 0.0001 | 0.2767 | 0.0288 |
| | | 600 - 619 | 1.4721 | < 0.0001 | 0.9235 | < 0.0001 | 0.5524 | < 0.0001 | 0.2048 | 0.0763 |
| | | 620 - 659 | 0.9591 | < 0.0001 | 0.5168 | < 0.0001 | 0.1863 | 0.0290 | -0.0101 | 0.9182 |
| | | 660 - 689 | 0.6430 | < 0.0001 | 0.1731 | 0.0877 | -0.0491 | 0.5643 | -0.2244 | 0.0231 |
| | | 690 - 719 | 0.3295 | 0.0019 | -0.0207 | 0.8396 | -0.1506 | 0.0801 | -0.3073 | 0.0022 |
| | | 720 - 749 | 0.0440 | 0.6924 | -0.2077 | 0.0527 | -0.2449 | 0.0062 | -0.3445 | 0.0009 |
| | | 750 - 779 | -0.0375 | 0.7497 | -0.3054 | 0.0089 | -0.2404 | 0.0132 | -0.1692 | 0.1241 |
| proptyp | SFR | 2-4U | 0.3107 | 0.0114 | NA | NA | NA | NA | -0.1386 | 0.0915 |
| | | COND | -0.0424 | 0.4126 | NA | NA | NA | NA | 0.1960 | 0.0018 |
| product | Fixed | ARM | -0.2829 | < 0.0001 | NA | NA | NA | NA | NA | NA |
| source | Non-Retail | CORRESPOND | -0.2867 | < 0.0001 | -0.0650 | 0.1549 | -0.1586 | < 0.0001 | 0.0946 | 0.0724 |
| | | OTHER | 1.6119 | < 0.0001 | 0.6247 | < 0.0001 | 0.8090 | < 0.0001 | 0.5892 | < 0.0001 |
| | | RETAIL | -0.2296 | < 0.0001 | 0.0019 | 0.9651 | 0.0041 | 0.9065 | 0.0759 | 0.0413 |
| loanpurp | Purchase | C/O REFI | NA | NA | -0.1944 | < 0.0001 | -0.2817 | < 0.0001 | -0.0857 | 0.0548 |
| | | R/T REFI | NA | NA | -0.2620 | < 0.0001 | -0.2925 | < 0.0001 | -0.2041 | < 0.0001 |
| Doctype | Full | Low | 0.1372 | 0.0011 | 0.1031 | 0.0075 | -0.2180 | < 0.0001 | -0.2965 | < 0.0001 |
| intonly | No | YES | NA | NA | -0.5127 | < 0.0001 | -0.3343 | < 0.0001 | -0.4933 | 0.0003 |
| negam | No | YES | NA | NA | -0.5524 | < 0.0001 | -0.3105 | 0.0002 | -0.5007 | 0.0261 |
| Term | 360 | < 360 | 1.3314 | < 0.0001 | 1.0425 | < 0.0001 | 0.6586 | < 0.0001 | 0.3722 | < 0.0001 |
| | | > 360 | 0.4524 | < 0.0001 | 0.7351 | < 0.0001 | 1.0159 | < 0.0001 | 1.6047 | 0.0002 |
| Quintile_String | 2 | 0 | NA | NA | NA | NA | -0.1772 | < 0.0001 | -0.1659 | 0.0004 |
| | | 1 | NA | NA | NA | NA | -0.0689 | 0.1176 | -0.0639 | 0.1766 |
| | | 3 | NA | NA | NA | NA | -0.0454 | 0.3293 | -0.0522 | 0.3056 |
| | | 4 | NA | NA | NA | NA | -0.0724 | 0.1562 | -0.1838 | 0.0013 |
| ownocc | O | I | -0.2469 | < 0.0001 | -0.2591 | < 0.0001 | -0.5056 | < 0.0001 | -0.2826 | < 0.0001 |
| | | S | -0.1279 | 0.0523 | -0.2272 | 0.0103 | -0.2685 | 0.0003 | 0.1351 | 0.1435 |
| | | U | -0.7015 | 0.0253 | 0.1369 | 0.4419 | -0.0680 | 0.5800 | 0.0516 | 0.6966 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8946 | < 0.0001 | -4.7926 | < 0.0001 | -5.6952 | < 0.0001 | -6.5152 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.6053 | < 0.0001 | 0.7270 | < 0.0001 | 0.5396 | < 0.0001 | 0.6315 | < 0.0001 |
| | | 90 Uninsured | 0.5846 | < 0.0001 | 0.7444 | < 0.0001 | 0.6314 | < 0.0001 | 0.4525 | 0.0001 |
| | | 95 Insured | 0.7791 | < 0.0001 | 0.8788 | < 0.0001 | 0.5933 | < 0.0001 | 0.7749 | < 0.0001 |
| | | 95 Uninsured | 0.7804 | < 0.0001 | 0.8889 | < 0.0001 | 0.7079 | < 0.0001 | 0.6325 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.8974 | < 0.0001 | 1.3321 | < 0.0001 | 1.2739 | < 0.0001 | 1.5602 | < 0.0001 |
| | | 720 - 749 | 0.6986 | < 0.0001 | 0.9647 | < 0.0001 | 0.8244 | < 0.0001 | 1.0240 | < 0.0001 |
| | | 750 - 779 | 0.3972 | < 0.0001 | 0.4780 | < 0.0001 | 0.2442 | 0.0002 | 0.3318 | 0.0007 |
| proptyp | SFR | 2-4U | 0.2174 | 0.1713 | 0.8203 | < 0.0001 | 0.4456 | < 0.0001 | 0.8357 | < 0.0001 |
| | | COND | 0.3363 | < 0.0001 | 0.0897 | 0.0460 | -0.2627 | < 0.0001 | -0.3802 | < 0.0001 |
| product | Fixed | ARM | -0.9632 | < 0.0001 | -0.7127 | < 0.0001 | -0.3375 | < 0.0001 | -0.3499 | 0.0019 |
| source | Non-Retail | CORRESPOND | 0.2521 | < 0.0001 | 0.2460 | < 0.0001 | 0.3912 | < 0.0001 | 0.0206 | 0.6837 |
| | | OTHER | -1.2243 | < 0.0001 | -1.4478 | < 0.0001 | -1.0457 | < 0.0001 | -0.3075 | 0.0226 |
| | | RETAIL | 0.0654 | 0.0637 | -0.0612 | 0.0968 | 0.0107 | 0.7715 | -0.2046 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1213 | 0.0010 | 0.4161 | < 0.0001 | 0.4622 | < 0.0001 | 0.1332 | 0.0133 |
| | | R/T REFI | 0.0712 | 0.0905 | 0.3265 | < 0.0001 | 0.1750 | < 0.0001 | -0.0661 | 0.1658 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -0.4778 | < 0.0001 | -0.2676 | < 0.0001 | -0.4399 | < 0.0001 | -0.3619 | < 0.0001 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.1791 | < 0.0001 | 0.1927 | < 0.0001 | 0.5312 | < 0.0001 | 0.5821 | < 0.0001 |
| | | 1 | -0.0310 | 0.4562 | 0.0396 | 0.3396 | 0.2230 | < 0.0001 | 0.2610 | < 0.0001 |
| | | 3 | -0.0551 | 0.1980 | -0.1347 | 0.0028 | -0.1072 | 0.0222 | -0.1291 | 0.0431 |
| | | 4 | -0.1323 | 0.0083 | -0.1731 | 0.0015 | -0.0685 | 0.1957 | 0.0253 | 0.7247 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.7903 | < 0.0001 | -4.6652 | < 0.0001 | -5.4388 | < 0.0001 | -6.0133 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.6097 | < 0.0001 | 0.7313 | < 0.0001 | 0.5597 | < 0.0001 | 0.6717 | < 0.0001 |
| | | 90 Uninsured | 0.6001 | < 0.0001 | 0.7480 | < 0.0001 | 0.6470 | < 0.0001 | 0.5305 | < 0.0001 |
| | | 95 Insured | 0.8019 | < 0.0001 | 0.9193 | < 0.0001 | 0.6597 | < 0.0001 | 0.8069 | < 0.0001 |
| | | 95 Uninsured | 0.8016 | < 0.0001 | 0.9200 | < 0.0001 | 0.7133 | < 0.0001 | 0.6412 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.9019 | < 0.0001 | 1.3725 | < 0.0001 | 1.3018 | < 0.0001 | 1.4389 | < 0.0001 |
| | | 720 - 749 | 0.6954 | < 0.0001 | 0.9748 | < 0.0001 | 0.8163 | < 0.0001 | 0.9258 | < 0.0001 |
| | | 750 - 779 | 0.3918 | < 0.0001 | 0.4798 | < 0.0001 | 0.2102 | 0.0003 | 0.2878 | 0.0001 |
| proptyp | SFR | 2-4U | 0.2462 | 0.1016 | 0.7791 | < 0.0001 | 0.4746 | < 0.0001 | 0.7535 | < 0.0001 |
| | | COND | 0.3015 | < 0.0001 | 0.0465 | 0.2682 | -0.2705 | < 0.0001 | -0.3819 | < 0.0001 |
| product | Fixed | ARM | -0.9164 | < 0.0001 | -0.6234 | < 0.0001 | -0.3743 | < 0.0001 | -0.4324 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2559 | < 0.0001 | 0.2567 | < 0.0001 | 0.3992 | < 0.0001 | 0.2020 | < 0.0001 |
| | | OTHER | -1.1044 | < 0.0001 | -1.5822 | < 0.0001 | -0.8463 | < 0.0001 | -0.0151 | 0.8746 |
| | | RETAIL | 0.0676 | 0.0449 | -0.0176 | 0.6022 | 0.0405 | 0.2077 | -0.1352 | 0.0003 |
| loanpurp | Purchase | C/O REFI | 0.1600 | < 0.0001 | 0.4174 | < 0.0001 | 0.4339 | < 0.0001 | 0.1164 | 0.0071 |
| | | R/T REFI | 0.0977 | 0.0146 | 0.3093 | < 0.0001 | 0.1679 | < 0.0001 | -0.0441 | 0.2418 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -0.1916 | 0.0005 | NA | NA | -0.2928 | < 0.0001 | -0.2317 | < 0.0001 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.1955 | < 0.0001 | 0.1741 | < 0.0001 | 0.4859 | < 0.0001 | 0.5079 | < 0.0001 |
| | | 1 | -0.0361 | 0.3627 | 0.0522 | 0.1696 | 0.2154 | < 0.0001 | 0.2050 | < 0.0001 |
| | | 3 | -0.0610 | 0.1342 | -0.1272 | 0.0020 | -0.1361 | 0.0009 | -0.1240 | 0.0129 |
| | | 4 | -0.1759 | 0.0003 | -0.1596 | 0.0013 | -0.0639 | 0.1638 | 0.0068 | 0.9041 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated and Active Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.0766 | < 0.0001 | -1.5582 | < 0.0001 | -0.8165 | < 0.0001 | -0.3114 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | NA | NA | NA | NA | 0.0447 | 0.5011 | 0.1366 | 0.0691 |
| | | 90 Uninsured | NA | NA | NA | NA | -0.0149 | 0.9035 | 0.4868 | 0.0087 |
| | | 95 Insured | NA | NA | NA | NA | 0.2284 | 0.0020 | 0.1853 | 0.0231 |
| | | 95 Uninsured | NA | NA | NA | NA | 0.1087 | 0.3634 | 0.0381 | 0.8419 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | NA | NA | 0.5098 | 0.0002 | 0.0579 | 0.5870 | NA | NA |
| | | 720 - 749 | NA | NA | 0.2523 | 0.0740 | -0.1257 | 0.2590 | NA | NA |
| | | 750 - 779 | NA | NA | 0.1405 | 0.3510 | -0.1691 | 0.1648 | NA | NA |
| proptyp | SFR | 2-4U | 0.4767 | 0.1711 | -0.3706 | 0.0344 | NA | NA | -0.4503 | 0.0074 |
| | | COND | -0.3179 | 0.0073 | -0.3635 | 0.0003 | NA | NA | -0.0249 | 0.8408 |
| product | Fixed | ARM | 0.4476 | 0.0092 | NA | NA | -0.3488 | 0.0396 | -0.4148 | 0.0391 |
| source | Non-Retail | CORRESPOND | NA | NA | NA | NA | 0.1077 | 0.0967 | 0.6418 | < 0.0001 |
| | | OTHER | NA | NA | NA | NA | 0.5432 | 0.0081 | 0.7216 | 0.0003 |
| | | RETAIL | NA | NA | NA | NA | 0.1048 | 0.1181 | 0.2289 | 0.0025 |
| loanpurp | Purchase | C/O REFI | 0.3147 | 0.0003 | NA | NA | NA | NA | -0.2900 | 0.0008 |
| | | R/T REFI | 0.3386 | 0.0008 | NA | NA | NA | NA | -0.0358 | 0.6348 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | 1.4240 | < 0.0001 | 1.0032 | < 0.0001 | 0.4784 | < 0.0001 | 0.3947 | < 0.0001 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.0594 | 0.6162 | NA | NA | NA | NA | NA | NA |
| | | 1 | -0.0259 | 0.8069 | NA | NA | NA | NA | NA | NA |
| | | 3 | 0.1147 | 0.2817 | NA | NA | NA | NA | NA | NA |
| | | 4 | -0.3144 | 0.0239 | NA | NA | NA | NA | NA | NA |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8903 | < 0.0001 | -5.1308 | < 0.0001 | -5.6061 | < 0.0001 | -6.4475 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.7478 | < 0.0001 | 0.8107 | < 0.0001 | 0.5059 | < 0.0001 | 0.6582 | < 0.0001 |
| | | 90 Uninsured | 1.3587 | < 0.0001 | 1.0377 | < 0.0001 | 0.8857 | < 0.0001 | 0.8886 | 0.0006 |
| | | 95 Insured | 0.8057 | < 0.0001 | 1.0532 | < 0.0001 | 0.5654 | < 0.0001 | 0.8356 | < 0.0001 |
| | | 95 Uninsured | 1.6282 | < 0.0001 | 1.1023 | < 0.0001 | 0.8492 | < 0.0001 | 0.9102 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.7623 | < 0.0001 | 1.2239 | < 0.0001 | 1.1006 | < 0.0001 | 1.4489 | < 0.0001 |
| | | 720 - 749 | 0.6251 | < 0.0001 | 0.8820 | < 0.0001 | 0.6850 | < 0.0001 | 0.9827 | < 0.0001 |
| | | 750 - 779 | 0.3860 | < 0.0001 | 0.3364 | 0.0011 | 0.0336 | 0.7066 | 0.3597 | 0.0040 |
| proptyp | SFR | 2-4U | 0.3509 | 0.1764 | 1.0953 | < 0.0001 | 0.5793 | < 0.0001 | 0.9748 | < 0.0001 |
| | | COND | 0.3776 | < 0.0001 | 0.0601 | 0.4359 | -0.3772 | < 0.0001 | -0.4217 | < 0.0001 |
| product | Fixed | ARM | -1.5045 | < 0.0001 | -1.0521 | < 0.0001 | -0.4501 | < 0.0001 | -0.4616 | 0.0001 |
| source | Non-Retail | CORRESPOND | 0.9098 | < 0.0001 | 0.6239 | < 0.0001 | 0.8982 | < 0.0001 | 0.5114 | < 0.0001 |
| | | OTHER | -1.2857 | < 0.0001 | -1.3833 | < 0.0001 | -0.9866 | < 0.0001 | -0.4102 | 0.0041 |
| | | RETAIL | 0.3380 | < 0.0001 | -0.0118 | 0.8528 | 0.0443 | 0.3983 | -0.2320 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | NA | NA | 0.5175 | < 0.0001 | 0.3966 | < 0.0001 | 0.0264 | 0.6880 |
| | | R/T REFI | NA | NA | 0.2168 | 0.0011 | 0.2055 | < 0.0001 | -0.1422 | 0.0211 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -1.2017 | < 0.0001 | -0.8671 | < 0.0001 | -0.7175 | < 0.0001 | -0.4768 | < 0.0001 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.2656 | 0.0005 | 0.5450 | < 0.0001 | 0.7248 | < 0.0001 | 0.6294 | < 0.0001 |
| | | 1 | 0.0433 | 0.5217 | 0.1230 | 0.0843 | 0.2516 | < 0.0001 | 0.3061 | < 0.0001 |
| | | 3 | -0.1006 | 0.1453 | -0.0970 | 0.1987 | -0.1831 | 0.0055 | -0.0932 | 0.2407 |
| | | 4 | -0.1352 | 0.0928 | -0.1572 | 0.0857 | -0.1666 | 0.0252 | 0.1832 | 0.0340 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8611 | < 0.0001 | -5.0526 | < 0.0001 | -5.3859 | < 0.0001 | -6.0312 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.7466 | < 0.0001 | 0.8126 | < 0.0001 | 0.4810 | < 0.0001 | 0.6585 | < 0.0001 |
| | | 90 Uninsured | 1.3389 | < 0.0001 | 1.0032 | < 0.0001 | 0.8587 | < 0.0001 | 0.8428 | 0.0002 |
| | | 95 Insured | 0.7962 | < 0.0001 | 1.0228 | < 0.0001 | 0.5736 | < 0.0001 | 0.8184 | < 0.0001 |
| | | 95 Uninsured | 1.6195 | < 0.0001 | 1.0565 | < 0.0001 | 0.7908 | < 0.0001 | 0.8514 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.7548 | < 0.0001 | 1.2431 | < 0.0001 | 1.0765 | < 0.0001 | 1.3190 | < 0.0001 |
| | | 720 - 749 | 0.6242 | < 0.0001 | 0.8947 | < 0.0001 | 0.6236 | < 0.0001 | 0.8331 | < 0.0001 |
| | | 750 - 779 | 0.3857 | < 0.0001 | 0.3282 | 0.0012 | 0.0066 | 0.9359 | 0.2677 | 0.0096 |
| proptyp | SFR | 2-4U | 0.3847 | 0.1302 | 1.1266 | < 0.0001 | 0.5684 | < 0.0001 | 0.9824 | < 0.0001 |
| | | COND | 0.3749 | < 0.0001 | 0.0566 | 0.4522 | -0.3050 | 0.0004 | -0.4099 | < 0.0001 |
| product | Fixed | ARM | -1.4527 | < 0.0001 | -0.9349 | < 0.0001 | -0.3958 | < 0.0001 | -0.4282 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.9022 | < 0.0001 | 0.5971 | < 0.0001 | 0.8282 | < 0.0001 | 0.5960 | < 0.0001 |
| | | OTHER | -1.1031 | < 0.0001 | -1.4461 | < 0.0001 | -0.7814 | < 0.0001 | -0.2131 | 0.0618 |
| | | RETAIL | 0.3231 | < 0.0001 | -0.0173 | 0.7786 | 0.0065 | 0.8940 | -0.2436 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | NA | NA | 0.4775 | < 0.0001 | 0.3833 | < 0.0001 | 0.0134 | 0.8155 |
| | | R/T REFI | NA | NA | 0.2034 | 0.0016 | 0.1909 | 0.0001 | -0.1497 | 0.0054 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -1.1982 | < 0.0001 | -0.7572 | < 0.0001 | -0.6324 | < 0.0001 | -0.4132 | < 0.0001 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.2464 | 0.0011 | 0.5250 | < 0.0001 | 0.6391 | < 0.0001 | 0.6067 | < 0.0001 |
| | | 1 | 0.0396 | 0.5558 | 0.1044 | 0.1328 | 0.2448 | < 0.0001 | 0.2478 | < 0.0001 |
| | | 3 | -0.0878 | 0.1989 | -0.1247 | 0.0903 | -0.2068 | 0.0008 | -0.0923 | 0.1768 |
| | | 4 | -0.1238 | 0.1192 | -0.1531 | 0.0832 | -0.1227 | 0.0710 | 0.1369 | 0.0695 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.4084 | < 0.0001 | -2.4814 | < 0.0001 | -0.9102 | < 0.0001 | -0.7820 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | NA | NA | -0.0006 | 0.9976 | NA | NA | NA | NA |
| | | 90 Uninsured | NA | NA | -0.5893 | 0.0880 | NA | NA | NA | NA |
| | | 95 Insured | NA | NA | -0.6290 | 0.0338 | NA | NA | NA | NA |
| | | 95 Uninsured | NA | NA | -1.0310 | 0.0168 | NA | NA | NA | NA |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | NA | NA | 0.5037 | 0.1327 | -0.2140 | 0.2087 | NA | NA |
| | | 720 - 749 | NA | NA | 0.1171 | 0.7390 | -0.4544 | 0.0123 | NA | NA |
| | | 750 - 779 | NA | NA | -0.2152 | 0.5875 | -0.1898 | 0.3350 | NA | NA |
| proptyp | SFR | 2-4U | NA | NA | NA | NA | NA | NA | NA | NA |
| | | COND | NA | NA | NA | NA | NA | NA | NA | NA |
| product | Fixed | ARM | 0.9897 | 0.0048 | 0.7196 | 0.0140 | NA | NA | NA | NA |
| source | Non-Retail | CORRESPOND | -0.1379 | 0.5659 | NA | NA | -0.4359 | 0.0004 | 0.4725 | 0.0005 |
| | | OTHER | 2.0837 | 0.0007 | NA | NA | 0.7504 | 0.0016 | 0.6614 | 0.0035 |
| | | RETAIL | -0.5033 | 0.0671 | NA | NA | -0.1953 | 0.1064 | -0.0506 | 0.6463 |
| loanpurp | Purchase | C/O REFI | NA | NA | NA | NA | NA | NA | NA | NA |
| | | R/T REFI | NA | NA | NA | NA | NA | NA | NA | NA |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | NA | NA | 0.8947 | 0.0007 | 0.3726 | 0.0105 | NA | NA |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | 0.9133 | 0.0039 | NA | NA | -0.4636 | 0.0015 | NA | NA |
| | | 1 | 0.2123 | 0.5252 | NA | NA | -0.0784 | 0.5706 | NA | NA |
| | | 3 | 0.5441 | 0.0900 | NA | NA | -0.2563 | 0.0974 | NA | NA |
| | | 4 | 0.0758 | 0.8496 | NA | NA | 0.0011 | 0.9944 | NA | NA |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.9581 | < 0.0001 | -4.2087 | < 0.0001 | -5.2029 | < 0.0001 | -5.9618 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5217 | < 0.0001 | 0.4557 | < 0.0001 | 0.5423 | < 0.0001 | 0.7750 | < 0.0001 |
| | | 90 Uninsured | 0.7858 | < 0.0001 | 0.8145 | < 0.0001 | 0.8938 | < 0.0001 | 1.0854 | < 0.0001 |
| | | 95 Insured | 0.8072 | < 0.0001 | 0.6827 | < 0.0001 | 0.7599 | < 0.0001 | 0.9465 | < 0.0001 |
| | | 95 Uninsured | 1.1474 | < 0.0001 | 1.0046 | < 0.0001 | 1.1214 | < 0.0001 | 1.3414 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 2.3619 | < 0.0001 | 3.2588 | < 0.0001 | 3.5849 | < 0.0001 | 3.5314 | < 0.0001 |
| | | 580 - 599 | 1.8752 | < 0.0001 | 2.5811 | < 0.0001 | 2.9230 | < 0.0001 | 3.0011 | < 0.0001 |
| | | 600 - 619 | 1.5444 | < 0.0001 | 2.2239 | < 0.0001 | 2.6000 | < 0.0001 | 2.6597 | < 0.0001 |
| | | 620 - 659 | 1.3538 | < 0.0001 | 1.7597 | < 0.0001 | 2.0957 | < 0.0001 | 2.1652 | < 0.0001 |
| | | 660 - 689 | 1.1170 | < 0.0001 | 1.5039 | < 0.0001 | 1.6991 | < 0.0001 | 1.6775 | < 0.0001 |
| | | 690 - 719 | 0.8545 | < 0.0001 | 1.1735 | < 0.0001 | 1.2577 | < 0.0001 | 1.1920 | < 0.0001 |
| | | 720 - 749 | 0.6260 | < 0.0001 | 0.7947 | < 0.0001 | 0.8523 | < 0.0001 | 0.6886 | < 0.0001 |
| | | 750 - 779 | 0.3385 | < 0.0001 | 0.3557 | < 0.0001 | 0.3244 | < 0.0001 | 0.1738 | 0.0587 |
| proptyp | SFR | 2-4U | 0.0979 | 0.0020 | 0.3936 | < 0.0001 | 0.2744 | < 0.0001 | 0.5264 | < 0.0001 |
| | | COND | 0.1509 | < 0.0001 | -0.0635 | < 0.0001 | -0.2475 | < 0.0001 | -0.3401 | < 0.0001 |
| product | Fixed | ARM | -0.1257 | < 0.0001 | -0.2059 | < 0.0001 | -0.2677 | < 0.0001 | -0.3709 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2031 | < 0.0001 | 0.0612 | < 0.0001 | -0.0420 | 0.0391 | -0.1678 | < 0.0001 |
| | | OTHER | -1.7214 | < 0.0001 | -1.7386 | < 0.0001 | -1.3894 | < 0.0001 | -0.2847 | 0.0005 |
| | | RETAIL | -0.1187 | < 0.0001 | -0.2236 | < 0.0001 | -0.3791 | < 0.0001 | -0.4471 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1117 | < 0.0001 | 0.2371 | < 0.0001 | 0.2157 | < 0.0001 | 0.1284 | 0.0005 |
| | | R/T REFI | 0.2274 | < 0.0001 | 0.2622 | < 0.0001 | 0.1600 | < 0.0001 | -0.0835 | 0.0059 |
| Doctype | Full | Low | 0.4750 | < 0.0001 | 0.5852 | < 0.0001 | 0.7380 | < 0.0001 | 0.8851 | < 0.0001 |
| intonly | No | YES | 1.3451 | < 0.0001 | 1.2899 | < 0.0001 | 1.1519 | < 0.0001 | 0.9367 | < 0.0001 |
| negam | No | YES | 0.9742 | < 0.0001 | 0.9331 | < 0.0001 | 0.8282 | < 0.0001 | 0.3691 | < 0.0001 |
| Term | 360 | < 360 | -0.3485 | < 0.0001 | -0.4438 | < 0.0001 | -0.4851 | < 0.0001 | -0.3583 | < 0.0001 |
| | | > 360 | 0.2711 | < 0.0001 | 0.2540 | < 0.0001 | 0.0711 | 0.0353 | 0.2587 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1702 | < 0.0001 | NA | NA | 0.1731 | < 0.0001 | 0.2548 | < 0.0001 |
| | | 1 | -0.0534 | 0.0002 | NA | NA | 0.0766 | 0.0011 | 0.1888 | < 0.0001 |
| | | 3 | -0.0272 | 0.0537 | NA | NA | 0.0312 | 0.1991 | -0.0144 | 0.7322 |
| | | 4 | -0.0463 | 0.0014 | NA | NA | 0.1920 | < 0.0001 | 0.2471 | < 0.0001 |
| ownocc | O | I | 0.3217 | < 0.0001 | 0.5045 | < 0.0001 | 0.7437 | < 0.0001 | 0.3229 | < 0.0001 |
| | | S | 0.0825 | < 0.0001 | 0.1446 | < 0.0001 | 0.5301 | < 0.0001 | 0.0793 | 0.2758 |
| | | U | -0.6595 | < 0.0001 | -0.0730 | 0.2111 | 0.1278 | 0.0130 | 0.1721 | 0.0279 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8988 | < 0.0001 | -4.1020 | < 0.0001 | -5.0006 | < 0.0001 | -5.5875 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.5441 | < 0.0001 | 0.4741 | < 0.0001 | 0.5475 | < 0.0001 | 0.7543 | < 0.0001 |
| | | 90 Uninsured | 0.8047 | < 0.0001 | 0.8375 | < 0.0001 | 0.9499 | < 0.0001 | 1.1690 | < 0.0001 |
| | | 95 Insured | 0.8317 | < 0.0001 | 0.7362 | < 0.0001 | 0.7541 | < 0.0001 | 0.9267 | < 0.0001 |
| | | 95 Uninsured | 1.1350 | < 0.0001 | 1.0454 | < 0.0001 | 1.1782 | < 0.0001 | 1.4190 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 2.6182 | < 0.0001 | 3.5409 | < 0.0001 | 3.7441 | < 0.0001 | 3.6395 | < 0.0001 |
| | | 580 - 599 | 2.0471 | < 0.0001 | 2.7368 | < 0.0001 | 3.0406 | < 0.0001 | 3.0307 | < 0.0001 |
| | | 600 - 619 | 1.6562 | < 0.0001 | 2.3555 | < 0.0001 | 2.6998 | < 0.0001 | 2.7661 | < 0.0001 |
| | | 620 - 659 | 1.4120 | < 0.0001 | 1.8287 | < 0.0001 | 2.1471 | < 0.0001 | 2.1770 | < 0.0001 |
| | | 660 - 689 | 1.1514 | < 0.0001 | 1.5192 | < 0.0001 | 1.7194 | < 0.0001 | 1.6381 | < 0.0001 |
| | | 690 - 719 | 0.8828 | < 0.0001 | 1.1747 | < 0.0001 | 1.2543 | < 0.0001 | 1.1471 | < 0.0001 |
| | | 720 - 749 | 0.6407 | < 0.0001 | 0.7851 | < 0.0001 | 0.8337 | < 0.0001 | 0.6352 | < 0.0001 |
| | | 750 - 779 | 0.3458 | < 0.0001 | 0.3361 | < 0.0001 | 0.2942 | < 0.0001 | 0.1511 | 0.0491 |
| proptyp | SFR | 2-4U | 0.1174 | 0.0002 | 0.4017 | < 0.0001 | 0.2982 | < 0.0001 | 0.4401 | < 0.0001 |
| | | COND | 0.1202 | < 0.0001 | -0.0943 | < 0.0001 | -0.2547 | < 0.0001 | -0.3316 | < 0.0001 |
| product | Fixed | ARM | -0.1203 | < 0.0001 | -0.1942 | < 0.0001 | -0.2742 | < 0.0001 | -0.3732 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.2221 | < 0.0001 | 0.0762 | < 0.0001 | -0.0202 | 0.2847 | -0.0522 | 0.1170 |
| | | OTHER | -1.6267 | < 0.0001 | -1.7153 | < 0.0001 | -1.2524 | < 0.0001 | -0.1758 | 0.0106 |
| | | RETAIL | -0.1044 | < 0.0001 | -0.2193 | < 0.0001 | -0.3501 | < 0.0001 | -0.4035 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1377 | < 0.0001 | 0.2744 | < 0.0001 | 0.2217 | < 0.0001 | 0.1411 | < 0.0001 |
| | | R/T REFI | 0.2772 | < 0.0001 | 0.2973 | < 0.0001 | 0.1589 | < 0.0001 | -0.0872 | 0.0008 |
| Doctype | Full | Low | 0.4885 | < 0.0001 | 0.5978 | < 0.0001 | 0.7281 | < 0.0001 | 0.8342 | < 0.0001 |
| intonly | No | YES | 1.3759 | < 0.0001 | 1.2568 | < 0.0001 | 1.0770 | < 0.0001 | 0.7798 | < 0.0001 |
| negam | No | YES | 0.9349 | < 0.0001 | 0.8636 | < 0.0001 | 0.7823 | < 0.0001 | 0.3667 | < 0.0001 |
| Term | 360 | < 360 | -0.1582 | 0.0009 | -0.2369 | < 0.0001 | -0.3563 | < 0.0001 | -0.2581 | < 0.0001 |
| | | > 360 | 0.3425 | < 0.0001 | 0.3567 | < 0.0001 | 0.1737 | < 0.0001 | 0.4143 | < 0.0001 |
| Quintile_String | 2 | 0 | -0.1821 | < 0.0001 | NA | NA | 0.1688 | < 0.0001 | 0.2598 | < 0.0001 |
| | | 1 | -0.0557 | < 0.0001 | NA | NA | 0.0760 | 0.0004 | 0.1787 | < 0.0001 |
| | | 3 | -0.0254 | 0.0685 | NA | NA | 0.0286 | 0.2001 | -0.0312 | 0.3827 |
| | | 4 | -0.0604 | < 0.0001 | NA | NA | 0.1614 | < 0.0001 | 0.1654 | < 0.0001 |
| ownocc | O | I | 0.2939 | < 0.0001 | 0.4706 | < 0.0001 | 0.6840 | < 0.0001 | 0.2994 | < 0.0001 |
| | | S | 0.0505 | 0.0029 | 0.1262 | < 0.0001 | 0.4656 | < 0.0001 | 0.1104 | 0.0734 |
| | | U | -0.5587 | < 0.0001 | 0.0145 | 0.7871 | 0.1510 | 0.0012 | 0.2205 | 0.0008 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.3530 | < 0.0001 | -1.6180 | < 0.0001 | -1.0265 | < 0.0001 | -0.2065 | 0.1552 |
| CLTV | 80 Uninsured | 90 Insured | 0.1869 | < 0.0001 | 0.1527 | 0.0001 | 0.0821 | 0.0438 | 0.0217 | 0.7018 |
| | | 90 Uninsured | 0.0556 | 0.0231 | 0.0954 | 0.0013 | 0.3025 | < 0.0001 | 0.5094 | < 0.0001 |
| | | 95 Insured | 0.2549 | < 0.0001 | 0.2987 | < 0.0001 | 0.0934 | 0.0506 | 0.0456 | 0.4933 |
| | | 95 Uninsured | -0.1499 | 0.0004 | 0.1781 | < 0.0001 | 0.2525 | < 0.0001 | 0.4293 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 1.6865 | < 0.0001 | 1.4475 | < 0.0001 | 1.0135 | < 0.0001 | 0.4895 | 0.0011 |
| | | 580 - 599 | 1.2922 | < 0.0001 | 1.3693 | < 0.0001 | 0.9061 | < 0.0001 | 0.3947 | 0.0190 |
| | | 600 - 619 | 1.2031 | < 0.0001 | 1.0905 | < 0.0001 | 0.7736 | < 0.0001 | 0.3296 | 0.0354 |
| | | 620 - 659 | 0.7086 | < 0.0001 | 0.6998 | < 0.0001 | 0.4644 | < 0.0001 | 0.0268 | 0.8477 |
| | | 660 - 689 | 0.4587 | < 0.0001 | 0.3879 | < 0.0001 | 0.2698 | 0.0035 | -0.1985 | 0.1559 |
| | | 690 - 719 | 0.2877 | < 0.0001 | 0.1402 | 0.0658 | 0.0874 | 0.3493 | -0.2987 | 0.0348 |
| | | 720 - 749 | 0.1207 | 0.0574 | 0.0203 | 0.7971 | -0.1080 | 0.2654 | -0.3900 | 0.0081 |
| | | 750 - 779 | 0.0310 | 0.6444 | -0.1197 | 0.1598 | -0.1799 | 0.0869 | -0.3207 | 0.0421 |
| proptyp | SFR | 2-4U | 0.1235 | 0.0826 | -0.1180 | 0.0246 | NA | NA | -0.2602 | 0.0110 |
| | | COND | -0.2893 | < 0.0001 | -0.2233 | < 0.0001 | NA | NA | 0.0301 | 0.7242 |
| product | Fixed | ARM | -0.1269 | < 0.0001 | NA | NA | -0.1081 | 0.0028 | NA | NA |
| source | Non-Retail | CORRESPOND | -0.0199 | 0.4344 | NA | NA | 0.0590 | 0.1097 | 0.4579 | < 0.0001 |
| | | OTHER | 1.3295 | < 0.0001 | NA | NA | 0.5957 | < 0.0001 | 0.8736 | < 0.0001 |
| | | RETAIL | 0.0593 | 0.0234 | NA | NA | 0.0368 | 0.2721 | 0.1518 | 0.0022 |
| loanpurp | Purchase | C/O REFI | 0.2601 | < 0.0001 | 0.1424 | < 0.0001 | -0.0296 | 0.4638 | -0.0883 | 0.1536 |
| | | R/T REFI | 0.2626 | < 0.0001 | 0.0963 | 0.0013 | -0.0797 | 0.0167 | -0.1220 | 0.0158 |
| Doctype | Full | Low | 0.0707 | 0.0041 | 0.0649 | 0.0114 | NA | NA | NA | NA |
| intonly | No | YES | 0.2781 | < 0.0001 | -0.2190 | < 0.0001 | -0.2451 | < 0.0001 | -0.6458 | < 0.0001 |
| negam | No | YES | -0.1421 | < 0.0001 | -0.4354 | < 0.0001 | -0.2493 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | 1.4790 | < 0.0001 | 0.9510 | < 0.0001 | 0.7011 | < 0.0001 | 0.5468 | < 0.0001 |
| | | > 360 | 0.2774 | < 0.0001 | 0.3832 | < 0.0001 | 0.6180 | < 0.0001 | 0.8972 | < 0.0001 |
| Quintile_String | 2 | 0 | NA | NA | -0.0801 | 0.0384 | NA | NA | -0.0543 | 0.3993 |
| | | 1 | NA | NA | -0.0334 | 0.3399 | NA | NA | -0.1226 | 0.0600 |
| | | 3 | NA | NA | 0.0278 | 0.4372 | NA | NA | -0.1244 | 0.0809 |
| | | 4 | NA | NA | -0.0299 | 0.4386 | NA | NA | -0.3117 | < 0.0001 |
| ownocc | O | I | -0.3670 | < 0.0001 | -0.3366 | < 0.0001 | -0.4322 | < 0.0001 | -0.2364 | 0.0029 |
| | | S | -0.3227 | < 0.0001 | -0.1375 | 0.0403 | -0.3238 | < 0.0001 | 0.1035 | 0.4132 |
| | | U | 0.8369 | < 0.0001 | 0.5995 | < 0.0001 | 0.1492 | 0.0882 | 0.0131 | 0.9181 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.9819 | < 0.0001 | -4.5359 | < 0.0001 | -5.3167 | < 0.0001 | -5.6732 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.3877 | < 0.0001 | 0.3337 | < 0.0001 | 0.5044 | < 0.0001 | 0.7462 | < 0.0001 |
| | | 90 Uninsured | 1.1902 | < 0.0001 | 1.0610 | < 0.0001 | 0.9803 | < 0.0001 | 1.1731 | < 0.0001 |
| | | 95 Insured | 0.7478 | < 0.0001 | 0.6508 | < 0.0001 | 0.7092 | < 0.0001 | 0.8732 | < 0.0001 |
| | | 95 Uninsured | 1.4859 | < 0.0001 | 1.0819 | < 0.0001 | 1.1299 | < 0.0001 | 1.3680 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 2.3784 | < 0.0001 | 3.4550 | < 0.0001 | 3.8938 | < 0.0001 | 3.4943 | < 0.0001 |
| | | 580 - 599 | 1.9017 | < 0.0001 | 2.6410 | < 0.0001 | 2.8402 | < 0.0001 | 2.6553 | < 0.0001 |
| | | 600 - 619 | 1.4386 | < 0.0001 | 2.3093 | < 0.0001 | 2.4981 | < 0.0001 | 2.2423 | < 0.0001 |
| | | 620 - 659 | 1.2479 | < 0.0001 | 1.8294 | < 0.0001 | 2.0922 | < 0.0001 | 1.9290 | < 0.0001 |
| | | 660 - 689 | 1.0372 | < 0.0001 | 1.5503 | < 0.0001 | 1.6755 | < 0.0001 | 1.4912 | < 0.0001 |
| | | 690 - 719 | 0.8075 | < 0.0001 | 1.2357 | < 0.0001 | 1.2809 | < 0.0001 | 1.0159 | < 0.0001 |
| | | 720 - 749 | 0.5817 | < 0.0001 | 0.8026 | < 0.0001 | 0.8459 | < 0.0001 | 0.5762 | < 0.0001 |
| | | 750 - 779 | 0.3369 | < 0.0001 | 0.3326 | < 0.0001 | 0.3412 | < 0.0001 | 0.0999 | 0.3628 |
| proptyp | SFR | 2-4U | 0.0617 | 0.1643 | 0.3312 | < 0.0001 | 0.1780 | 0.0002 | 0.4478 | < 0.0001 |
| | | COND | 0.1549 | < 0.0001 | -0.0511 | 0.0402 | -0.3155 | < 0.0001 | -0.3233 | < 0.0001 |
| product | Fixed | ARM | -0.4873 | < 0.0001 | -0.4998 | < 0.0001 | -0.5168 | < 0.0001 | -0.6817 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.4006 | < 0.0001 | 0.1195 | < 0.0001 | 0.1964 | < 0.0001 | 0.3616 | < 0.0001 |
| | | OTHER | -1.7423 | < 0.0001 | -1.5623 | < 0.0001 | -1.4714 | < 0.0001 | -0.7738 | < 0.0001 |
| | | RETAIL | -0.1041 | < 0.0001 | -0.3207 | < 0.0001 | -0.4468 | < 0.0001 | -0.5506 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1030 | < 0.0001 | 0.1646 | < 0.0001 | 0.1128 | 0.0002 | NA | NA |
| | | R/T REFI | 0.4520 | < 0.0001 | 0.3940 | < 0.0001 | 0.2507 | < 0.0001 | NA | NA |
| Doctype | Full | Low | 0.2937 | < 0.0001 | 0.4387 | < 0.0001 | 0.8482 | < 0.0001 | 0.9991 | < 0.0001 |
| intonly | No | YES | 2.0548 | < 0.0001 | 1.8818 | < 0.0001 | 1.2383 | < 0.0001 | 0.7507 | < 0.0001 |
| negam | No | YES | 0.9516 | < 0.0001 | 0.9359 | < 0.0001 | 0.5870 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | -0.6710 | < 0.0001 | -0.7853 | < 0.0001 | -0.5939 | < 0.0001 | -0.4070 | < 0.0001 |
| | | > 360 | 1.0451 | < 0.0001 | 1.1504 | < 0.0001 | 0.7151 | < 0.0001 | -0.5482 | 0.0933 |
| Quintile_String | 2 | 0 | -0.1927 | < 0.0001 | 0.1360 | < 0.0001 | 0.3330 | < 0.0001 | 0.3108 | < 0.0001 |
| | | 1 | -0.0511 | 0.0121 | 0.0978 | 0.0002 | 0.1435 | < 0.0001 | 0.2202 | < 0.0001 |
| | | 3 | -0.0570 | 0.0050 | 0.0164 | 0.5380 | 0.0222 | 0.5109 | -0.0020 | 0.9695 |
| | | 4 | -0.0970 | < 0.0001 | 0.0483 | 0.0873 | 0.1816 | < 0.0001 | 0.1672 | 0.0012 |
| ownocc | O | I | 0.6130 | < 0.0001 | 0.9303 | < 0.0001 | 1.1217 | < 0.0001 | 0.3344 | < 0.0001 |
| | | S | 0.4145 | < 0.0001 | 0.4459 | < 0.0001 | 0.6437 | < 0.0001 | -0.0006 | 0.9948 |
| | | U | -1.8304 | < 0.0001 | -1.3404 | < 0.0001 | -0.7455 | < 0.0001 | -0.4241 | 0.0004 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.9584 | < 0.0001 | -4.4522 | < 0.0001 | -5.1114 | < 0.0001 | -5.3330 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.3965 | < 0.0001 | 0.3273 | < 0.0001 | 0.4831 | < 0.0001 | 0.7155 | < 0.0001 |
| | | 90 Uninsured | 1.1857 | < 0.0001 | 1.0496 | < 0.0001 | 0.9785 | < 0.0001 | 1.2998 | < 0.0001 |
| | | 95 Insured | 0.7489 | < 0.0001 | 0.6368 | < 0.0001 | 0.6811 | < 0.0001 | 0.8506 | < 0.0001 |
| | | 95 Uninsured | 1.4850 | < 0.0001 | 1.0543 | < 0.0001 | 1.0934 | < 0.0001 | 1.4164 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 2.4497 | < 0.0001 | 3.4667 | < 0.0001 | 3.8686 | < 0.0001 | 3.4823 | < 0.0001 |
| | | 580 - 599 | 1.9719 | < 0.0001 | 2.7637 | < 0.0001 | 2.8356 | < 0.0001 | 2.5922 | < 0.0001 |
| | | 600 - 619 | 1.4718 | < 0.0001 | 2.3138 | < 0.0001 | 2.4740 | < 0.0001 | 2.2376 | < 0.0001 |
| | | 620 - 659 | 1.2607 | < 0.0001 | 1.8336 | < 0.0001 | 2.0646 | < 0.0001 | 1.8987 | < 0.0001 |
| | | 660 - 689 | 1.0412 | < 0.0001 | 1.5322 | < 0.0001 | 1.6284 | < 0.0001 | 1.4217 | < 0.0001 |
| | | 690 - 719 | 0.8097 | < 0.0001 | 1.2110 | < 0.0001 | 1.2343 | < 0.0001 | 0.9633 | < 0.0001 |
| | | 720 - 749 | 0.5800 | < 0.0001 | 0.7838 | < 0.0001 | 0.8038 | < 0.0001 | 0.5180 | < 0.0001 |
| | | 750 - 779 | 0.3343 | < 0.0001 | 0.3088 | < 0.0001 | 0.2742 | < 0.0001 | 0.0999 | 0.2905 |
| proptyp | SFR | 2-4U | 0.0728 | 0.0994 | 0.3331 | < 0.0001 | 0.2112 | < 0.0001 | 0.3927 | < 0.0001 |
| | | COND | 0.1585 | < 0.0001 | -0.0423 | 0.0843 | -0.3007 | < 0.0001 | -0.2984 | < 0.0001 |
| product | Fixed | ARM | -0.4838 | < 0.0001 | -0.4982 | < 0.0001 | -0.4958 | < 0.0001 | -0.6484 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.3933 | < 0.0001 | 0.1175 | < 0.0001 | 0.1847 | < 0.0001 | 0.3211 | < 0.0001 |
| | | OTHER | -1.6337 | < 0.0001 | -1.4798 | < 0.0001 | -1.2617 | < 0.0001 | -0.6127 | < 0.0001 |
| | | RETAIL | -0.1081 | < 0.0001 | -0.3185 | < 0.0001 | -0.4359 | < 0.0001 | -0.5276 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.1049 | < 0.0001 | 0.1524 | < 0.0001 | 0.1110 | 0.0001 | 0.0954 | 0.0151 |
| | | R/T REFI | 0.4516 | < 0.0001 | 0.3839 | < 0.0001 | 0.2310 | < 0.0001 | -0.0411 | 0.2513 |
| Doctype | Full | Low | 0.3029 | < 0.0001 | 0.4459 | < 0.0001 | 0.8124 | < 0.0001 | 0.8849 | < 0.0001 |
| intonly | No | YES | 2.0411 | < 0.0001 | 1.8472 | < 0.0001 | 1.1836 | < 0.0001 | 0.6450 | < 0.0001 |
| negam | No | YES | 0.9288 | < 0.0001 | 0.9010 | < 0.0001 | 0.5378 | < 0.0001 | NA | NA |
| Term | 360 | < 360 | -0.6635 | < 0.0001 | -0.7193 | < 0.0001 | -0.5076 | < 0.0001 | -0.3021 | < 0.0001 |
| | | > 360 | 1.0901 | < 0.0001 | 1.1685 | < 0.0001 | 0.7322 | < 0.0001 | -0.3163 | 0.2401 |
| Quintile_String | 2 | 0 | -0.1909 | < 0.0001 | 0.1309 | < 0.0001 | 0.3139 | < 0.0001 | 0.2929 | < 0.0001 |
| | | 1 | -0.0546 | 0.0072 | 0.0896 | 0.0005 | 0.1354 | < 0.0001 | 0.2089 | < 0.0001 |
| | | 3 | -0.0570 | 0.0048 | 0.0158 | 0.5469 | 0.0179 | 0.5737 | -0.0099 | 0.8294 |
| | | 4 | -0.0986 | < 0.0001 | 0.0499 | 0.0727 | 0.1699 | < 0.0001 | 0.1437 | 0.0018 |
| ownocc | O | I | 0.6073 | < 0.0001 | 0.9081 | < 0.0001 | 1.0590 | < 0.0001 | 0.3203 | < 0.0001 |
| | | S | 0.4175 | < 0.0001 | 0.4383 | < 0.0001 | 0.6045 | < 0.0001 | 0.0336 | 0.6783 |
| | | U | -1.7789 | < 0.0001 | -1.2829 | < 0.0001 | -0.6572 | < 0.0001 | -0.4253 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.2682 | < 0.0001 | -2.0554 | < 0.0001 | -1.1636 | < 0.0001 | -0.3850 | 0.0240 |
| CLTV | 80 Uninsured | 90 Insured | 0.1993 | 0.0236 | NA | NA | -0.0772 | 0.2294 | -0.0746 | 0.2805 |
| | | 90 Uninsured | 0.1220 | 0.0221 | NA | NA | 0.1699 | 0.0265 | 0.6405 | < 0.0001 |
| | | 95 Insured | 0.2307 | 0.0654 | NA | NA | -0.0898 | 0.2359 | -0.0965 | 0.2379 |
| | | 95 Uninsured | 0.1193 | 0.1665 | NA | NA | -0.0281 | 0.7602 | 0.2318 | 0.1320 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | 2.0003 | < 0.0001 | 1.3383 | < 0.0001 | 0.6073 | 0.0002 | 0.1062 | 0.5970 |
| | | 580 - 599 | 1.8497 | < 0.0001 | 1.3691 | < 0.0001 | 0.5828 | 0.0031 | -0.0368 | 0.8775 |
| | | 600 - 619 | 1.4523 | < 0.0001 | 0.9311 | < 0.0001 | 0.3935 | 0.0256 | -0.0271 | 0.8988 |
| | | 620 - 659 | 0.8933 | < 0.0001 | 0.4754 | 0.0013 | 0.1528 | 0.2738 | -0.1436 | 0.4100 |
| | | 660 - 689 | 0.5952 | < 0.0001 | 0.1681 | 0.2490 | 0.0009 | 0.9950 | -0.3078 | 0.0781 |
| | | 690 - 719 | 0.3179 | 0.0210 | -0.1574 | 0.2899 | -0.1214 | 0.3849 | -0.4065 | 0.0223 |
| | | 720 - 749 | 0.0079 | 0.9563 | -0.1442 | 0.3499 | -0.1405 | 0.3315 | -0.4335 | 0.0192 |
| | | 750 - 779 | -0.0559 | 0.7147 | -0.3319 | 0.0505 | -0.3339 | 0.0370 | -0.3014 | 0.1269 |
| proptyp | SFR | 2-4U | NA | NA | NA | NA | NA | NA | -0.2858 | 0.0196 |
| | | COND | NA | NA | NA | NA | NA | NA | 0.1554 | 0.1531 |
| product | Fixed | ARM | -0.1981 | 0.0011 | NA | NA | NA | NA | NA | NA |
| source | Non-Retail | CORRESPOND | -0.2640 | < 0.0001 | -0.0504 | 0.4588 | -0.1418 | 0.0420 | 0.0404 | 0.7230 |
| | | OTHER | 1.6747 | < 0.0001 | 0.5716 | 0.0031 | 0.8046 | < 0.0001 | 0.7816 | < 0.0001 |
| | | RETAIL | -0.1363 | 0.0179 | 0.1075 | 0.0776 | -0.0461 | 0.4153 | 0.0697 | 0.3007 |
| loanpurp | Purchase | C/O REFI | NA | NA | -0.1679 | 0.0157 | -0.0489 | 0.4635 | NA | NA |
| | | R/T REFI | NA | NA | -0.2189 | 0.0019 | -0.1740 | 0.0038 | NA | NA |
| Doctype | Full | Low | 0.1460 | 0.0066 | 0.1184 | 0.0344 | -0.1047 | 0.0342 | -0.3374 | < 0.0001 |
| intonly | No | YES | 0.1277 | 0.0105 | -0.5312 | < 0.0001 | -0.2948 | < 0.0001 | -0.5301 | 0.0014 |
| negam | No | YES | NA | NA | -0.5571 | < 0.0001 | -0.4247 | < 0.0001 | -0.5074 | 0.0307 |
| Term | 360 | < 360 | 0.9250 | 0.0001 | 0.8912 | < 0.0001 | 0.5790 | < 0.0001 | 0.4888 | < 0.0001 |
| | | > 360 | 0.1683 | 0.0362 | 0.3203 | 0.0218 | 1.0118 | < 0.0001 | 1.2663 | 0.0236 |
| Quintile_String | 2 | 0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 1 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 3 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 4 | NA | NA | NA | NA | NA | NA | NA | NA |
| ownocc | O | I | -0.3124 | < 0.0001 | -0.3304 | < 0.0001 | -0.6238 | < 0.0001 | NA | NA |
| | | S | -0.2572 | 0.0035 | -0.0968 | 0.4425 | -0.3041 | 0.0105 | NA | NA |
| | | U | 0.9644 | 0.0527 | 0.4124 | 0.1992 | 0.2274 | 0.2247 | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.0014 | < 0.0001 | -4.7316 | < 0.0001 | -5.1074 | < 0.0001 | -5.7219 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.7868 | < 0.0001 | 0.6201 | < 0.0001 | 0.4482 | < 0.0001 | 0.9981 | < 0.0001 |
| | | 90 Uninsured | 0.9680 | < 0.0001 | 1.0162 | < 0.0001 | 0.7190 | < 0.0001 | 0.2660 | 0.1457 |
| | | 95 Insured | 0.9829 | < 0.0001 | 0.8860 | < 0.0001 | 0.5404 | < 0.0001 | 0.9457 | < 0.0001 |
| | | 95 Uninsured | 1.3422 | < 0.0001 | 1.2579 | < 0.0001 | 0.9035 | < 0.0001 | 0.7648 | 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.9066 | < 0.0001 | 1.2809 | < 0.0001 | 1.0269 | < 0.0001 | 1.3268 | < 0.0001 |
| | | 720 - 749 | 0.6885 | < 0.0001 | 0.8272 | < 0.0001 | 0.6699 | < 0.0001 | 0.8127 | < 0.0001 |
| | | 750 - 779 | 0.3938 | 0.0002 | 0.2783 | 0.0249 | 0.0021 | 0.9867 | 0.3184 | 0.0707 |
| proptyp | SFR | 2-4U | 0.2865 | 0.3112 | 0.9177 | < 0.0001 | 0.3855 | 0.0381 | 0.7273 | < 0.0001 |
| | | COND | 0.3538 | < 0.0001 | -0.0478 | 0.6054 | -0.4027 | 0.0031 | -0.4597 | 0.0028 |
| product | Fixed | ARM | -1.2745 | < 0.0001 | -1.0751 | < 0.0001 | -0.4959 | < 0.0001 | -0.6774 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.4190 | < 0.0001 | 0.5168 | < 0.0001 | 0.4084 | < 0.0001 | -0.2835 | 0.0508 |
| | | OTHER | -1.7793 | < 0.0001 | -1.3993 | < 0.0001 | -1.2210 | < 0.0001 | -0.4425 | 0.0958 |
| | | RETAIL | -0.1554 | 0.0163 | -0.1983 | 0.0037 | -0.3074 | < 0.0001 | -0.7901 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | -0.0011 | 0.9877 | 0.2415 | 0.0021 | 0.1729 | 0.0304 | -0.1411 | 0.1602 |
| | | R/T REFI | 0.2538 | 0.0010 | 0.5210 | < 0.0001 | 0.1410 | 0.0594 | -0.2075 | 0.0278 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -0.6034 | < 0.0001 | -0.4897 | < 0.0001 | -0.3940 | < 0.0001 | -0.2736 | 0.0174 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.2739 | 0.0042 | 0.2491 | 0.0065 | 0.4629 | < 0.0001 | 0.3641 | 0.0006 |
| | | 1 | -0.0454 | 0.6035 | 0.0724 | 0.4159 | 0.2061 | 0.0208 | 0.1039 | 0.3296 |
| | | 3 | -0.1182 | 0.1822 | -0.1280 | 0.1703 | -0.1153 | 0.2249 | -0.1875 | 0.1022 |
| | | 4 | -0.1384 | 0.1019 | -0.1349 | 0.1505 | -0.0725 | 0.4422 | -0.0762 | 0.5050 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.8857 | < 0.0001 | -4.5854 | < 0.0001 | -4.9491 | < 0.0001 | -5.3560 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.7649 | < 0.0001 | 0.5978 | < 0.0001 | 0.4607 | < 0.0001 | 0.9463 | < 0.0001 |
| | | 90 Uninsured | 1.0015 | < 0.0001 | 1.0508 | < 0.0001 | 0.7889 | < 0.0001 | 0.3895 | 0.0056 |
| | | 95 Insured | 0.9406 | < 0.0001 | 0.8440 | < 0.0001 | 0.5733 | < 0.0001 | 0.8734 | < 0.0001 |
| | | 95 Uninsured | 1.3381 | < 0.0001 | 1.2945 | < 0.0001 | 0.9755 | < 0.0001 | 0.8841 | < 0.0001 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.8924 | < 0.0001 | 1.2264 | < 0.0001 | 1.0844 | < 0.0001 | 1.2445 | < 0.0001 |
| | | 720 - 749 | 0.6678 | < 0.0001 | 0.7653 | < 0.0001 | 0.6529 | < 0.0001 | 0.7178 | < 0.0001 |
| | | 750 - 779 | 0.3841 | 0.0001 | 0.2261 | 0.0455 | -0.0230 | 0.8376 | 0.1626 | 0.2563 |
| proptyp | SFR | 2-4U | 0.2383 | 0.3873 | 0.8946 | < 0.0001 | 0.4059 | 0.0148 | 0.6970 | < 0.0001 |
| | | COND | 0.3380 | < 0.0001 | -0.0854 | 0.3243 | -0.3353 | 0.0052 | -0.4089 | 0.0014 |
| product | Fixed | ARM | -1.1760 | < 0.0001 | -0.8644 | < 0.0001 | -0.4910 | < 0.0001 | -0.6542 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 0.4475 | < 0.0001 | 0.5738 | < 0.0001 | 0.4560 | < 0.0001 | -0.1483 | 0.1899 |
| | | OTHER | -1.3027 | < 0.0001 | -1.5300 | < 0.0001 | -1.1227 | < 0.0001 | -0.2706 | 0.1812 |
| | | RETAIL | -0.1416 | 0.0221 | -0.1201 | 0.0574 | -0.3200 | < 0.0001 | -0.6907 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | 0.0322 | 0.6468 | 0.2598 | 0.0004 | 0.1533 | 0.0328 | -0.0502 | 0.5349 |
| | | R/T REFI | 0.3450 | < 0.0001 | 0.5220 | < 0.0001 | 0.1601 | 0.0161 | -0.2395 | 0.0024 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -0.5504 | < 0.0001 | -0.2832 | 0.0037 | -0.2810 | 0.0002 | NA | NA |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.2989 | 0.0011 | 0.2501 | 0.0033 | 0.4383 | < 0.0001 | 0.3885 | < 0.0001 |
| | | 1 | -0.0938 | 0.2616 | 0.0950 | 0.2492 | 0.2005 | 0.0125 | 0.0812 | 0.3721 |
| | | 3 | -0.1201 | 0.1515 | -0.1570 | 0.0720 | -0.1066 | 0.2122 | -0.1555 | 0.1071 |
| | | 4 | -0.1716 | 0.0330 | -0.1156 | 0.1820 | -0.0062 | 0.9413 | -0.1031 | 0.2902 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -2.2186 | < 0.0001 | -1.4546 | < 0.0001 | -1.0385 | < 0.0001 | -0.3751 | 0.1511 |
| CLTV | 80 Uninsured | 90 Insured | NA | NA | NA | NA | NA | NA | -0.1083 | 0.4725 |
| | | 90 Uninsured | NA | NA | NA | NA | NA | NA | 0.8982 | 0.0023 |
| | | 95 Insured | NA | NA | NA | NA | NA | NA | -0.1238 | 0.4798 |
| | | 95 Uninsured | NA | NA | NA | NA | NA | NA | 0.4279 | 0.1652 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | NA | NA | NA | NA | NA | NA | -0.3270 | 0.2083 |
| | | 720 - 749 | NA | NA | NA | NA | NA | NA | -0.3209 | 0.2382 |
| | | 750 - 779 | NA | NA | NA | NA | NA | NA | -0.7525 | 0.0126 |
| proptyp | SFR | 2-4U | NA | NA | NA | NA | NA | NA | NA | NA |
| | | COND | NA | NA | NA | NA | NA | NA | NA | NA |
| product | Fixed | ARM | 0.5811 | 0.0087 | 0.5262 | 0.0121 | NA | NA | NA | NA |
| source | Non-Retail | CORRESPOND | -0.0354 | 0.8560 | NA | NA | 0.4301 | 0.0043 | 0.5745 | 0.0123 |
| | | OTHER | 1.8134 | 0.0011 | NA | NA | 0.0139 | 0.9622 | 0.6715 | 0.1043 |
| | | RETAIL | -0.0002 | 0.9988 | NA | NA | -0.1239 | 0.3521 | 0.3193 | 0.0315 |
| loanpurp | Purchase | C/O REFI | 0.4058 | 0.0255 | NA | NA | NA | NA | NA | NA |
| | | R/T REFI | 0.8588 | < 0.0001 | NA | NA | NA | NA | NA | NA |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | NA | NA | 0.8514 | < 0.0001 | 0.6858 | < 0.0001 | 0.6390 | 0.0004 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 1 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 3 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 4 | NA | NA | NA | NA | NA | NA | NA | NA |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Default_NC

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.1244 | < 0.0001 | -5.0848 | < 0.0001 | -4.9145 | < 0.0001 | -5.5782 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.8337 | < 0.0001 | 0.3856 | 0.0029 | 0.3542 | 0.0002 | 0.9921 | < 0.0001 |
| | | 90 Uninsured | 1.7666 | < 0.0001 | 1.2422 | < 0.0001 | 0.9560 | < 0.0001 | 0.0939 | 0.8757 |
| | | 95 Insured | 0.9864 | < 0.0001 | 0.8960 | < 0.0001 | 0.4868 | < 0.0001 | 0.9680 | < 0.0001 |
| | | 95 Uninsured | 2.3174 | < 0.0001 | 1.5426 | < 0.0001 | 1.0991 | < 0.0001 | 0.4851 | 0.4162 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.8301 | < 0.0001 | 1.2508 | < 0.0001 | 0.8032 | < 0.0001 | 1.2204 | < 0.0001 |
| | | 720 - 749 | 0.6812 | < 0.0001 | 0.7632 | < 0.0001 | 0.5128 | < 0.0001 | 0.7463 | < 0.0001 |
| | | 750 - 779 | 0.4204 | 0.0096 | 0.1908 | 0.3076 | -0.1645 | 0.2617 | 0.3036 | 0.1266 |
| proptyp | SFR | 2-4U | NA | NA | 1.2723 | < 0.0001 | 0.4116 | 0.0568 | 0.7541 | < 0.0001 |
| | | COND | NA | NA | -0.1436 | 0.3185 | -0.6295 | 0.0003 | -0.4494 | 0.0070 |
| product | Fixed | ARM | -1.5668 | < 0.0001 | -1.2180 | < 0.0001 | -0.5597 | < 0.0001 | -0.7363 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 1.0295 | < 0.0001 | 0.8029 | < 0.0001 | 0.8075 | < 0.0001 | 0.5280 | 0.0147 |
| | | OTHER | -2.5188 | < 0.0001 | -1.2761 | < 0.0001 | -1.2632 | < 0.0001 | -0.4294 | 0.1080 |
| | | RETAIL | -0.2903 | 0.0045 | -0.3279 | 0.0020 | -0.4218 | < 0.0001 | -0.9170 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | NA | NA | 0.3922 | 0.0008 | 0.2847 | 0.0036 | -0.1527 | 0.1725 |
| | | R/T REFI | NA | NA | 0.1940 | 0.1189 | 0.0832 | 0.3900 | -0.2936 | 0.0070 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -1.1765 | < 0.0001 | -0.8935 | < 0.0001 | -0.3860 | 0.0012 | -0.4119 | 0.0050 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | -0.2924 | 0.0484 | 0.6077 | < 0.0001 | 0.5679 | < 0.0001 | 0.3232 | 0.0057 |
| | | 1 | 0.0182 | 0.8944 | 0.2386 | 0.0876 | 0.0917 | 0.4002 | 0.0617 | 0.5969 |
| | | 3 | -0.0954 | 0.4886 | -0.1691 | 0.2699 | -0.1311 | 0.2425 | -0.1362 | 0.2679 |
| | | 4 | 0.0932 | 0.4863 | 0.1772 | 0.2283 | -0.1382 | 0.2341 | -0.0088 | 0.9437 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Default_90

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.0808 | < 0.0001 | -4.9667 | < 0.0001 | -4.7420 | < 0.0001 | -5.1533 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | 0.7972 | < 0.0001 | 0.3970 | 0.0016 | 0.3072 | 0.0006 | 0.9398 | < 0.0001 |
| | | 90 Uninsured | 1.7289 | < 0.0001 | 1.2400 | < 0.0001 | 0.9255 | < 0.0001 | 0.0693 | 0.8943 |
| | | 95 Insured | 0.8795 | < 0.0001 | 0.9171 | < 0.0001 | 0.4932 | < 0.0001 | 0.9057 | < 0.0001 |
| | | 95 Uninsured | 2.2885 | < 0.0001 | 1.4885 | < 0.0001 | 0.9685 | < 0.0001 | 0.4885 | 0.3460 |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | 0.7702 | < 0.0001 | 1.2193 | < 0.0001 | 0.8015 | < 0.0001 | 1.0921 | < 0.0001 |
| | | 720 - 749 | 0.6452 | < 0.0001 | 0.7497 | < 0.0001 | 0.4512 | 0.0002 | 0.6080 | < 0.0001 |
| | | 750 - 779 | 0.3885 | 0.0141 | 0.1489 | 0.4094 | -0.2000 | 0.1391 | 0.1467 | 0.3771 |
| proptyp | SFR | 2-4U | NA | NA | 1.3238 | < 0.0001 | 0.4572 | 0.0200 | 0.7282 | < 0.0001 |
| | | COND | NA | NA | -0.1684 | 0.2279 | -0.5700 | 0.0003 | -0.4560 | 0.0019 |
| product | Fixed | ARM | -1.4736 | < 0.0001 | -1.0557 | < 0.0001 | -0.5166 | < 0.0001 | -0.7187 | < 0.0001 |
| source | Non-Retail | CORRESPOND | 1.0478 | < 0.0001 | 0.7713 | < 0.0001 | 0.7107 | < 0.0001 | 0.5347 | 0.0044 |
| | | OTHER | -1.8240 | < 0.0001 | -1.3432 | < 0.0001 | -1.1380 | < 0.0001 | -0.1843 | 0.3704 |
| | | RETAIL | -0.3088 | 0.0022 | -0.3268 | 0.0015 | -0.4549 | < 0.0001 | -0.8944 | < 0.0001 |
| loanpurp | Purchase | C/O REFI | NA | NA | 0.3558 | 0.0017 | 0.3172 | 0.0005 | -0.1059 | 0.2732 |
| | | R/T REFI | NA | NA | 0.1601 | 0.1849 | 0.1108 | 0.2163 | -0.3269 | 0.0008 |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | -1.1778 | < 0.0001 | -0.8520 | < 0.0001 | -0.3386 | 0.0019 | -0.2599 | 0.0312 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | NA | NA | 0.5982 | < 0.0001 | 0.5092 | < 0.0001 | 0.3042 | 0.0030 |
| | | 1 | NA | NA | 0.1981 | 0.1418 | 0.0843 | 0.4086 | 0.0305 | 0.7665 |
| | | 3 | NA | NA | -0.2380 | 0.1106 | -0.0775 | 0.4532 | -0.1372 | 0.1993 |
| | | 4 | NA | NA | 0.1729 | 0.2198 | -0.0703 | 0.5092 | -0.0798 | 0.4683 |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Parameter Estimates and Significance
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans
Response Variable: Cure

| | | HPA Bucket: | HPA<=-20% | | -20%<HPA<=0% | | 0%<HPA<=20% | | 20%<HPA | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Reference Level | Level | Parameter | p-value | Parameter | p-value | Parameter | p-value | Parameter | p-value |
| | | Intercept | -3.3509 | < 0.0001 | -2.4042 | < 0.0001 | -1.4639 | < 0.0001 | -0.8775 | < 0.0001 |
| CLTV | 80 Uninsured | 90 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 90 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Insured | NA | NA | NA | NA | NA | NA | NA | NA |
| | | GT95 Uninsured | NA | NA | NA | NA | NA | NA | NA | NA |
| ficobucket | 780-850 | 350 - 579 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 580 - 599 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 600 - 619 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 620 - 659 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 660 - 689 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 690 - 719 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 720 - 749 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 750 - 779 | NA | NA | NA | NA | NA | NA | NA | NA |
| proptyp | SFR | 2-4U | NA | NA | NA | NA | NA | NA | NA | NA |
| | | COND | NA | NA | NA | NA | NA | NA | NA | NA |
| product | Fixed | ARM | 1.1434 | 0.0096 | 0.9804 | 0.0048 | NA | NA | NA | NA |
| source | Non-Retail | CORRESPOND | -0.1458 | 0.7894 | NA | NA | NA | NA | NA | NA |
| | | OTHER | 3.3893 | 0.0001 | NA | NA | NA | NA | NA | NA |
| | | RETAIL | -0.4176 | 0.3682 | NA | NA | NA | NA | NA | NA |
| loanpurp | Purchase | C/O REFI | -0.1147 | 0.8241 | NA | NA | NA | NA | NA | NA |
| | | R/T REFI | 1.3036 | 0.0020 | NA | NA | NA | NA | NA | NA |
| Doctype | Full | Low | NA | NA | NA | NA | NA | NA | NA | NA |
| intonly | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| negam | No | YES | NA | NA | NA | NA | NA | NA | NA | NA |
| Term | 360 | < 360 | NA | NA | NA | NA | 0.4787 | 0.0444 | 0.8310 | 0.0003 |
| | | > 360 | NA | NA | NA | NA | NA | NA | NA | NA |
| Quintile_String | 2 | 0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 1 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 3 | NA | NA | NA | NA | NA | NA | NA | NA |
| | | 4 | NA | NA | NA | NA | NA | NA | NA | NA |
| ownocc | O | I | NA | NA | NA | NA | NA | NA | NA | NA |
| | | S | NA | NA | NA | NA | NA | NA | NA | NA |
| | | U | NA | NA | NA | NA | NA | NA | NA | NA |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 80,539 | 36,246 | 45.0% | 47,743 | 13,838 | 29.0% | 1.553 | 1.195 | < 0.0001 |
| | -20%<HPA<=0% | 90,231 | 17,320 | 19.2% | 123,527 | 14,691 | 11.9% | 1.614 | 1.326 | < 0.0001 |
| | 0%<HPA<=20% | 92,784 | 7,194 | 7.8% | 308,605 | 17,487 | 5.7% | 1.368 | 1.409 | < 0.0001 |
| | 20%<HPA | 60,436 | 1,818 | 3.0% | 341,716 | 9,119 | 2.7% | 1.127 | 1.432 | < 0.0001 |
| Default_90 | HPA<=-20% | 80,539 | 38,415 | 47.7% | 47,743 | 15,344 | 32.1% | 1.484 | 1.193 | < 0.0001 |
| | -20%<HPA<=0% | 90,231 | 19,359 | 21.5% | 123,527 | 17,938 | 14.5% | 1.477 | 1.316 | < 0.0001 |
| | 0%<HPA<=20% | 92,784 | 8,883 | 9.6% | 308,605 | 23,053 | 7.5% | 1.282 | 1.415 | < 0.0001 |
| | 20%<HPA | 60,436 | 2,811 | 4.7% | 341,716 | 14,351 | 4.2% | 1.108 | 1.455 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 38,415 | 4,824 | 12.6% | 15,344 | 2,703 | 17.6% | 0.713 | 0.953 | 0.0990 |
| | -20%<HPA<=0% | 19,359 | 4,187 | 21.6% | 17,938 | 5,548 | 30.9% | 0.699 | 0.994 | 0.8215 |
| | 0%<HPA<=20% | 8,883 | 3,254 | 36.6% | 23,053 | 9,208 | 39.9% | 0.917 | 1.107 | 0.0003 |
| | 20%<HPA | 2,811 | 1,663 | 59.2% | 14,351 | 7,902 | 55.1% | 1.074 | 1.228 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 21,854 | 9,496 | 43.5% | 20,912 | 6,443 | 30.8% | 1.410 | 1.250 | < 0.0001 |
| | -20%<HPA<=0% | 44,092 | 7,392 | 16.8% | 61,640 | 7,468 | 12.1% | 1.384 | 1.364 | < 0.0001 |
| | 0%<HPA<=20% | 63,349 | 4,491 | 7.1% | 196,782 | 11,597 | 5.9% | 1.203 | 1.491 | < 0.0001 |
| | 20%<HPA | 37,426 | 1,248 | 3.3% | 225,957 | 7,483 | 3.3% | 1.007 | 1.326 | < 0.0001 |
| Default_90 | HPA<=-20% | 21,854 | 9,976 | 45.6% | 20,912 | 7,077 | 33.8% | 1.349 | 1.234 | < 0.0001 |
| | -20%<HPA<=0% | 44,092 | 8,358 | 19.0% | 61,640 | 9,119 | 14.8% | 1.281 | 1.362 | < 0.0001 |
| | 0%<HPA<=20% | 63,349 | 5,535 | 8.7% | 196,782 | 15,587 | 7.9% | 1.103 | 1.473 | < 0.0001 |
| | 20%<HPA | 37,426 | 1,882 | 5.0% | 225,957 | 11,695 | 5.2% | 0.972 | 1.334 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 9,976 | 1,124 | 11.3% | 7,077 | 1,222 | 17.3% | 0.653 | 0.832 | < 0.0001 |
| | -20%<HPA<=0% | 8,358 | 1,986 | 23.8% | 9,119 | 3,040 | 33.3% | 0.713 | 0.919 | 0.0178 |
| | 0%<HPA<=20% | 5,535 | 2,026 | 36.6% | 15,587 | 6,978 | 44.8% | 0.818 | 0.947 | 0.1115 |
| | 20%<HPA | 1,882 | 1,125 | 59.8% | 11,695 | 6,604 | 56.5% | 1.059 | 1.233 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
GT95 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated and Active Loans

| | | GT95 Uninsured | | | GT95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 35,323 | 18,774 | 53.1% | 28,024 | 7,597 | 27.1% | 1.961 | 1.843 | < 0.0001 |
| | -20%<HPA<=0% | 68,218 | 19,038 | 27.9% | 131,023 | 18,857 | 14.4% | 1.939 | 2.224 | < 0.0001 |
| | 0%<HPA<=20% | 116,952 | 21,605 | 18.5% | 490,179 | 46,409 | 9.5% | 1.951 | 2.474 | < 0.0001 |
| | 20%<HPA | 63,413 | 8,734 | 13.8% | 523,286 | 32,236 | 6.2% | 2.236 | 2.282 | < 0.0001 |
| Default_90 | HPA<=-20% | 35,323 | 19,923 | 56.4% | 28,024 | 8,592 | 30.7% | 1.840 | 1.899 | < 0.0001 |
| | -20%<HPA<=0% | 68,218 | 21,619 | 31.7% | 131,023 | 23,491 | 17.9% | 1.768 | 2.251 | < 0.0001 |
| | 0%<HPA<=20% | 116,952 | 26,902 | 23.0% | 490,179 | 61,156 | 12.5% | 1.844 | 2.555 | < 0.0001 |
| | 20%<HPA | 63,413 | 12,779 | 20.2% | 523,286 | 45,205 | 8.6% | 2.333 | 2.641 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 19,923 | 2,695 | 13.5% | 8,592 | 2,116 | 24.6% | 0.549 | 0.876 | 0.0002 |
| | -20%<HPA<=0% | 21,619 | 6,587 | 30.5% | 23,491 | 9,195 | 39.1% | 0.778 | 1.012 | 0.5952 |
| | 0%<HPA<=20% | 26,902 | 13,217 | 49.1% | 61,156 | 28,213 | 46.1% | 1.065 | 1.180 | < 0.0001 |
| | 20%<HPA | 12,779 | 8,376 | 65.5% | 45,205 | 23,093 | 51.1% | 1.283 | 1.604 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 33,361 | 17,953 | 53.8% | 21,721 | 6,600 | 30.4% | 1.771 | 1.937 | < 0.0001 |
| | -20%<HPA<=0% | 33,881 | 6,661 | 19.7% | 56,257 | 6,132 | 10.9% | 1.804 | 1.528 | < 0.0001 |
| | 0%<HPA<=20% | 31,769 | 2,732 | 8.6% | 154,422 | 8,995 | 5.8% | 1.476 | 1.453 | < 0.0001 |
| | 20%<HPA | 13,882 | 531 | 3.8% | 199,332 | 5,396 | 2.7% | 1.413 | 1.596 | < 0.0001 |
| Default_90 | HPA<=-20% | 33,361 | 18,040 | 54.1% | 21,721 | 6,792 | 31.3% | 1.729 | 1.894 | < 0.0001 |
| | -20%<HPA<=0% | 33,881 | 6,778 | 20.0% | 56,257 | 6,480 | 11.5% | 1.737 | 1.504 | < 0.0001 |
| | 0%<HPA<=20% | 31,769 | 2,929 | 9.2% | 154,422 | 10,082 | 6.5% | 1.412 | 1.443 | < 0.0001 |
| | 20%<HPA | 13,882 | 704 | 5.1% | 199,332 | 7,114 | 3.6% | 1.421 | 1.749 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 18,040 | 861 | 4.8% | 6,792 | 511 | 7.5% | 0.634 | 0.866 | 0.0248 |
| | -20%<HPA<=0% | 6,778 | 564 | 8.3% | 6,480 | 870 | 13.4% | 0.620 | 1.003 | 0.9591 |
| | 0%<HPA<=20% | 2,929 | 524 | 17.9% | 10,082 | 2,142 | 21.2% | 0.842 | 1.116 | 0.0615 |
| | 20%<HPA | 704 | 285 | 40.5% | 7,114 | 2,681 | 37.7% | 1.074 | 1.435 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 8,105 | 4,821 | 59.5% | 9,072 | 3,041 | 33.5% | 1.774 | 1.808 | < 0.0001 |
| | -20%<HPA<=0% | 16,143 | 2,971 | 18.4% | 26,977 | 2,940 | 10.9% | 1.689 | 1.375 | < 0.0001 |
| | 0%<HPA<=20% | 23,205 | 1,868 | 8.0% | 95,859 | 5,803 | 6.1% | 1.330 | 1.403 | < 0.0001 |
| | 20%<HPA | 10,140 | 391 | 3.9% | 126,861 | 4,331 | 3.4% | 1.129 | 1.310 | < 0.0001 |
| Default_90 | HPA<=-20% | 8,105 | 4,843 | 59.8% | 9,072 | 3,106 | 34.2% | 1.745 | 1.788 | < 0.0001 |
| | -20%<HPA<=0% | 16,143 | 3,010 | 18.6% | 26,977 | 3,120 | 11.6% | 1.612 | 1.340 | < 0.0001 |
| | 0%<HPA<=20% | 23,205 | 1,971 | 8.5% | 95,859 | 6,565 | 6.8% | 1.240 | 1.368 | < 0.0001 |
| | 20%<HPA | 10,140 | 481 | 4.7% | 126,861 | 5,608 | 4.4% | 1.073 | 1.351 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 4,843 | 234 | 4.8% | 3,106 | 237 | 7.6% | 0.633 | 0.925 | 0.4336 |
| | -20%<HPA<=0% | 3,010 | 252 | 8.4% | 3,120 | 509 | 16.3% | 0.513 | 0.767 | 0.0017 |
| | 0%<HPA<=20% | 1,971 | 315 | 16.0% | 6,565 | 1,579 | 24.1% | 0.664 | 0.871 | 0.0508 |
| | 20%<HPA | 481 | 178 | 37.0% | 5,608 | 2,105 | 37.5% | 0.986 | 1.287 | 0.0135 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
GT95 CLTV - Insurance Variable
Loan Population 1: All loans in the filtered dataset
Terminated Loans

| | | GT95 Uninsured | | | GT95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 15,675 | 10,695 | 68.2% | 14,576 | 4,421 | 30.3% | 2.250 | 2.182 | < 0.0001 |
| | -20%<HPA<=0% | 23,624 | 7,309 | 30.9% | 63,674 | 10,611 | 16.7% | 1.857 | 1.698 | < 0.0001 |
| | 0%<HPA<=20% | 37,154 | 6,977 | 18.8% | 245,040 | 28,573 | 11.7% | 1.610 | 1.971 | < 0.0001 |
| | 20%<HPA | 15,031 | 2,327 | 15.5% | 330,249 | 22,211 | 6.7% | 2.302 | 2.377 | < 0.0001 |
| Default_90 | HPA<=-20% | 15,675 | 10,733 | 68.5% | 14,576 | 4,647 | 31.9% | 2.148 | 2.091 | < 0.0001 |
| | -20%<HPA<=0% | 23,624 | 7,425 | 31.4% | 63,674 | 11,366 | 17.9% | 1.761 | 1.652 | < 0.0001 |
| | 0%<HPA<=20% | 37,154 | 7,352 | 19.8% | 245,040 | 31,500 | 12.9% | 1.539 | 1.964 | < 0.0001 |
| | 20%<HPA | 15,031 | 2,874 | 19.1% | 330,249 | 26,905 | 8.1% | 2.347 | 2.755 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 10,733 | 570 | 5.3% | 4,647 | 685 | 14.7% | 0.360 | 0.764 | 0.0001 |
| | -20%<HPA<=0% | 7,425 | 894 | 12.0% | 11,366 | 2,266 | 19.9% | 0.604 | 0.990 | 0.8306 |
| | 0%<HPA<=20% | 7,352 | 1,872 | 25.5% | 31,500 | 7,384 | 23.4% | 1.086 | 1.274 | < 0.0001 |
| | 20%<HPA | 2,874 | 1,366 | 47.5% | 26,905 | 8,918 | 33.1% | 1.434 | 1.996 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated and Active Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 80,539 | 36,246 | 45.0% | 44,408 | 13,480 | 30.4% | 1.483 | 1.119 | < 0.0001 |
| | -20%<HPA<=0% | 90,231 | 17,320 | 19.2% | 109,852 | 13,770 | 12.5% | 1.531 | 1.142 | < 0.0001 |
| | 0%<HPA<=20% | 92,784 | 7,194 | 7.8% | 267,317 | 15,215 | 5.7% | 1.362 | 1.182 | < 0.0001 |
| | 20%<HPA | 60,436 | 1,818 | 3.0% | 278,755 | 6,599 | 2.4% | 1.271 | 1.250 | < 0.0001 |
| Default_90 | HPA<=-20% | 80,539 | 38,415 | 47.7% | 44,408 | 14,876 | 33.5% | 1.424 | 1.111 | < 0.0001 |
| | -20%<HPA<=0% | 90,231 | 19,359 | 21.5% | 109,852 | 16,567 | 15.1% | 1.423 | 1.130 | < 0.0001 |
| | 0%<HPA<=20% | 92,784 | 8,883 | 9.6% | 267,317 | 19,664 | 7.4% | 1.301 | 1.193 | < 0.0001 |
| | 20%<HPA | 60,436 | 2,811 | 4.7% | 278,755 | 10,519 | 3.8% | 1.233 | 1.264 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 38,415 | 4,824 | 12.6% | 14,876 | 2,515 | 16.9% | 0.743 | 0.944 | 0.0491 |
| | -20%<HPA<=0% | 19,359 | 4,187 | 21.6% | 16,567 | 4,854 | 29.3% | 0.738 | 0.993 | 0.8050 |
| | 0%<HPA<=20% | 8,883 | 3,254 | 36.6% | 19,664 | 7,423 | 37.7% | 0.970 | 1.109 | 0.0004 |
| | 20%<HPA | 2,811 | 1,663 | 59.2% | 10,519 | 5,819 | 55.3% | 1.069 | 1.154 | 0.0017 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated and Active Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 21,854 | 9,496 | 43.5% | 19,414 | 6,239 | 32.1% | 1.352 | 1.158 | < 0.0001 |
| | -20%<HPA<=0% | 44,092 | 7,392 | 16.8% | 53,427 | 6,836 | 12.8% | 1.310 | 1.117 | < 0.0001 |
| | 0%<HPA<=20% | 63,349 | 4,491 | 7.1% | 163,582 | 9,323 | 5.7% | 1.244 | 1.220 | < 0.0001 |
| | 20%<HPA | 37,426 | 1,248 | 3.3% | 181,614 | 5,244 | 2.9% | 1.155 | 1.193 | < 0.0001 |
| Default_90 | HPA<=-20% | 21,854 | 9,976 | 45.6% | 19,414 | 6,828 | 35.2% | 1.298 | 1.132 | < 0.0001 |
| | -20%<HPA<=0% | 44,092 | 8,358 | 19.0% | 53,427 | 8,225 | 15.4% | 1.231 | 1.111 | < 0.0001 |
| | 0%<HPA<=20% | 63,349 | 5,535 | 8.7% | 163,582 | 12,360 | 7.6% | 1.156 | 1.208 | < 0.0001 |
| | 20%<HPA | 37,426 | 1,882 | 5.0% | 181,614 | 8,449 | 4.7% | 1.081 | 1.166 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 9,976 | 1,124 | 11.3% | 6,828 | 1,139 | 16.7% | 0.675 | 0.798 | < 0.0001 |
| | -20%<HPA<=0% | 8,358 | 1,986 | 23.8% | 8,225 | 2,596 | 31.6% | 0.753 | 0.914 | 0.0145 |
| | 0%<HPA<=20% | 5,535 | 2,026 | 36.6% | 12,360 | 5,353 | 43.3% | 0.845 | 0.916 | 0.0122 |
| | 20%<HPA | 1,882 | 1,125 | 59.8% | 8,449 | 4,914 | 58.2% | 1.028 | 1.070 | 0.2191 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 33,361 | 17,953 | 53.8% | 19,815 | 6,399 | 32.3% | 1.666 | 1.780 | < 0.0001 |
| | -20%<HPA<=0% | 33,881 | 6,661 | 19.7% | 48,479 | 5,620 | 11.6% | 1.696 | 1.287 | < 0.0001 |
| | 0%<HPA<=20% | 31,769 | 2,732 | 8.6% | 131,518 | 7,565 | 5.8% | 1.495 | 1.175 | < 0.0001 |
| | 20%<HPA | 13,882 | 531 | 3.8% | 157,011 | 3,550 | 2.3% | 1.692 | 1.317 | < 0.0001 |
| Default_90 | HPA<=-20% | 33,361 | 18,040 | 54.1% | 19,815 | 6,575 | 33.2% | 1.630 | 1.737 | < 0.0001 |
| | -20%<HPA<=0% | 33,881 | 6,778 | 20.0% | 48,479 | 5,891 | 12.2% | 1.646 | 1.269 | < 0.0001 |
| | 0%<HPA<=20% | 31,769 | 2,929 | 9.2% | 131,518 | 8,358 | 6.4% | 1.451 | 1.184 | < 0.0001 |
| | 20%<HPA | 13,882 | 704 | 5.1% | 157,011 | 4,683 | 3.0% | 1.700 | 1.437 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 18,040 | 861 | 4.8% | 6,575 | 470 | 7.1% | 0.668 | 0.813 | 0.0011 |
| | -20%<HPA<=0% | 6,778 | 564 | 8.3% | 5,891 | 727 | 12.3% | 0.674 | 0.984 | 0.8091 |
| | 0%<HPA<=20% | 2,929 | 524 | 17.9% | 8,358 | 1,608 | 19.2% | 0.930 | 1.138 | 0.0308 |
| | 20%<HPA | 704 | 285 | 40.5% | 4,683 | 1,709 | 36.5% | 1.109 | 1.412 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 2: All loans excluding FHA and GT95 CLTV
Terminated Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 8,105 | 4,821 | 59.5% | 8,283 | 2,914 | 35.2% | 1.691 | 1.631 | < 0.0001 |
| | -20%<HPA<=0% | 16,143 | 2,971 | 18.4% | 22,896 | 2,604 | 11.4% | 1.618 | 1.102 | 0.0024 |
| | 0%<HPA<=20% | 23,205 | 1,868 | 8.0% | 79,008 | 4,389 | 5.6% | 1.449 | 1.133 | < 0.0001 |
| | 20%<HPA | 10,140 | 391 | 3.9% | 98,521 | 2,730 | 2.8% | 1.392 | 1.122 | 0.0503 |
| Default_90 | HPA<=-20% | 8,105 | 4,843 | 59.8% | 8,283 | 2,970 | 35.9% | 1.666 | 1.613 | < 0.0001 |
| | -20%<HPA<=0% | 16,143 | 3,010 | 18.6% | 22,896 | 2,743 | 12.0% | 1.556 | 1.080 | 0.0143 |
| | 0%<HPA<=20% | 23,205 | 1,971 | 8.5% | 79,008 | 4,922 | 6.2% | 1.363 | 1.119 | 0.0002 |
| | 20%<HPA | 10,140 | 481 | 4.7% | 98,521 | 3,589 | 3.6% | 1.302 | 1.158 | 0.0059 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 4,843 | 234 | 4.8% | 2,970 | 216 | 7.3% | 0.664 | 0.870 | 0.1649 |
| | -20%<HPA<=0% | 3,010 | 252 | 8.4% | 2,743 | 413 | 15.1% | 0.556 | 0.769 | 0.0029 |
| | 0%<HPA<=20% | 1,971 | 315 | 16.0% | 4,922 | 1,117 | 22.7% | 0.704 | 0.873 | 0.0610 |
| | 20%<HPA | 481 | 178 | 37.0% | 3,589 | 1,363 | 38.0% | 0.974 | 1.204 | 0.0792 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated and Active Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 3,145 | 519 | 16.5% | 6,006 | 1,053 | 17.5% | 0.941 | 0.980 | 0.7296 |
| | -20%<HPA<=0% | 8,817 | 454 | 5.1% | 20,819 | 1,200 | 5.8% | 0.893 | 1.018 | 0.7625 |
| | 0%<HPA<=20% | 14,544 | 261 | 1.8% | 67,874 | 1,317 | 1.9% | 0.925 | 1.096 | 0.1842 |
| | 20%<HPA | 12,697 | 78 | 0.6% | 90,049 | 796 | 0.9% | 0.695 | 0.836 | 0.1343 |
| Default_90 | HPA<=-20% | 3,145 | 582 | 18.5% | 6,006 | 1,175 | 19.6% | 0.946 | 0.990 | 0.8664 |
| | -20%<HPA<=0% | 8,817 | 536 | 6.1% | 20,819 | 1,431 | 6.9% | 0.884 | 1.017 | 0.7538 |
| | 0%<HPA<=20% | 14,544 | 344 | 2.4% | 67,874 | 1,740 | 2.6% | 0.923 | 1.091 | 0.1483 |
| | 20%<HPA | 12,697 | 133 | 1.0% | 90,049 | 1,296 | 1.4% | 0.728 | 0.868 | 0.1250 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 582 | 87 | 14.9% | 1,175 | 164 | 14.0% | 1.071 | NA | NA |
| | -20%<HPA<=0% | 536 | 129 | 24.1% | 1,431 | 351 | 24.5% | 0.981 | NA | NA |
| | 0%<HPA<=20% | 344 | 114 | 33.1% | 1,740 | 596 | 34.3% | 0.967 | 0.942 | 0.6377 |
| | 20%<HPA | 133 | 78 | 58.6% | 1,296 | 649 | 50.1% | 1.171 | 1.419 | 0.0631 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated and Active Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 2,269 | 436 | 19.2% | 3,187 | 609 | 19.1% | 1.006 | 1.001 | 0.9860 |
| | -20%<HPA<=0% | 7,967 | 467 | 5.9% | 11,795 | 650 | 5.5% | 1.064 | 1.010 | 0.8728 |
| | 0%<HPA<=20% | 14,238 | 279 | 2.0% | 47,684 | 844 | 1.8% | 1.107 | 1.121 | 0.1031 |
| | 20%<HPA | 9,254 | 77 | 0.8% | 62,894 | 649 | 1.0% | 0.806 | 0.867 | 0.2416 |
| Default_90 | HPA<=-20% | 2,269 | 482 | 21.2% | 3,187 | 672 | 21.1% | 1.007 | 1.000 | 0.9964 |
| | -20%<HPA<=0% | 7,967 | 555 | 7.0% | 11,795 | 787 | 6.7% | 1.044 | 1.001 | 0.9907 |
| | 0%<HPA<=20% | 14,238 | 360 | 2.5% | 47,684 | 1,164 | 2.4% | 1.036 | 1.055 | 0.3845 |
| | 20%<HPA | 9,254 | 121 | 1.3% | 62,894 | 1,028 | 1.6% | 0.800 | 0.847 | 0.0887 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 482 | 66 | 13.7% | 672 | 84 | 12.5% | 1.095 | NA | NA |
| | -20%<HPA<=0% | 555 | 133 | 24.0% | 787 | 199 | 25.3% | 0.948 | NA | NA |
| | 0%<HPA<=20% | 360 | 124 | 34.4% | 1,164 | 437 | 37.5% | 0.917 | 0.887 | 0.3463 |
| | 20%<HPA | 121 | 59 | 48.8% | 1,028 | 539 | 52.4% | 0.930 | 0.863 | 0.4512 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 575 | 192 | 33.4% | 1,988 | 400 | 20.1% | 1.660 | 1.842 | < 0.0001 |
| | -20%<HPA<=0% | 2,626 | 157 | 6.0% | 8,532 | 403 | 4.7% | 1.266 | 1.255 | 0.0237 |
| | 0%<HPA<=20% | 3,531 | 98 | 2.8% | 37,251 | 640 | 1.7% | 1.615 | 1.462 | 0.0008 |
| | 20%<HPA | 1,198 | 16 | 1.3% | 56,881 | 517 | 0.9% | 1.469 | 1.259 | 0.3751 |
| Default_90 | HPA<=-20% | 575 | 193 | 33.6% | 1,988 | 408 | 20.5% | 1.635 | 1.808 | < 0.0001 |
| | -20%<HPA<=0% | 2,626 | 159 | 6.1% | 8,532 | 424 | 5.0% | 1.218 | 1.210 | 0.0546 |
| | 0%<HPA<=20% | 3,531 | 108 | 3.1% | 37,251 | 720 | 1.9% | 1.582 | 1.459 | 0.0005 |
| | 20%<HPA | 1,198 | 21 | 1.8% | 56,881 | 685 | 1.2% | 1.456 | 1.202 | 0.4175 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 193 | 4 | 2.1% | 408 | 21 | 5.1% | 0.403 | na | na |
| | -20%<HPA<=0% | 159 | 10 | 6.3% | 424 | 46 | 10.8% | 0.580 | 0.555 | 0.1061 |
| | 0%<HPA<=20% | 108 | 17 | 15.7% | 720 | 126 | 17.5% | 0.899 | na | na |
| | 20%<HPA | 21 | 9 | 42.9% | 685 | 221 | 32.3% | 1.328 | na | na |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 460 | 188 | 40.9% | 1,016 | 214 | 21.1% | 1.940 | 2.276 | < 0.0001 |
| | -20%<HPA<=0% | 2,426 | 151 | 6.2% | 4,621 | 227 | 4.9% | 1.267 | 1.050 | 0.6586 |
| | 0%<HPA<=20% | 4,175 | 117 | 2.8% | 24,426 | 402 | 1.6% | 1.703 | 1.328 | 0.0094 |
| | 20%<HPA | 1,459 | 21 | 1.4% | 37,396 | 419 | 1.1% | 1.285 | 1.077 | 0.7445 |
| Default_90 | HPA<=-20% | 460 | 190 | 41.3% | 1,016 | 217 | 21.4% | 1.934 | 2.278 | < 0.0001 |
| | -20%<HPA<=0% | 2,426 | 152 | 6.3% | 4,621 | 235 | 5.1% | 1.232 | 1.034 | 0.7597 |
| | 0%<HPA<=20% | 4,175 | 124 | 3.0% | 24,426 | 467 | 1.9% | 1.553 | 1.243 | 0.0388 |
| | 20%<HPA | 1,459 | 27 | 1.9% | 37,396 | 545 | 1.5% | 1.270 | 1.034 | 0.8705 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 190 | 8 | 4.2% | 217 | 9 | 4.1% | 1.015 | na | na |
| | -20%<HPA<=0% | 152 | 6 | 3.9% | 235 | 14 | 6.0% | 0.663 | 0.669 | 0.4229 |
| | 0%<HPA<=20% | 124 | 17 | 13.7% | 467 | 96 | 20.6% | 0.667 | na | na |
| | 20%<HPA | 27 | 7 | 25.9% | 545 | 186 | 34.1% | 0.760 | na | na |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 59,350 | 28,946 | 48.8% | 16,736 | 5,624 | 33.6% | 1.451 | 1.302 | < 0.0001 |
| | -20%<HPA<=0% | 51,992 | 12,936 | 24.9% | 31,107 | 4,017 | 12.9% | 1.927 | 1.432 | < 0.0001 |
| | 0%<HPA<=20% | 39,084 | 4,652 | 11.9% | 64,135 | 3,874 | 6.0% | 1.970 | 1.421 | < 0.0001 |
| | 20%<HPA | 22,787 | 1,122 | 4.9% | 59,026 | 1,792 | 3.0% | 1.622 | 1.364 | < 0.0001 |
| Default_90 | HPA<=-20% | 59,350 | 30,531 | 51.4% | 16,736 | 6,067 | 36.3% | 1.419 | 1.298 | < 0.0001 |
| | -20%<HPA<=0% | 51,992 | 14,247 | 27.4% | 31,107 | 4,615 | 14.8% | 1.847 | 1.438 | < 0.0001 |
| | 0%<HPA<=20% | 39,084 | 5,675 | 14.5% | 64,135 | 4,713 | 7.3% | 1.976 | 1.495 | < 0.0001 |
| | 20%<HPA | 22,787 | 1,702 | 7.5% | 59,026 | 2,464 | 4.2% | 1.789 | 1.514 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 30,531 | 3,849 | 12.6% | 6,067 | 961 | 15.8% | 0.796 | 0.877 | 0.0015 |
| | -20%<HPA<=0% | 14,247 | 2,986 | 21.0% | 4,615 | 1,212 | 26.3% | 0.798 | 0.944 | 0.1777 |
| | 0%<HPA<=20% | 5,675 | 2,156 | 38.0% | 4,713 | 1,562 | 33.1% | 1.146 | 1.247 | < 0.0001 |
| | 20%<HPA | 1,702 | 1,070 | 62.9% | 2,464 | 1,058 | 42.9% | 1.464 | 1.629 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 12,775 | 6,624 | 51.9% | 7,163 | 2,589 | 36.1% | 1.435 | 1.405 | < 0.0001 |
| | -20%<HPA<=0% | 18,620 | 4,397 | 23.6% | 15,402 | 2,112 | 13.7% | 1.722 | 1.380 | < 0.0001 |
| | 0%<HPA<=20% | 20,938 | 2,622 | 12.5% | 38,098 | 2,435 | 6.4% | 1.959 | 1.436 | < 0.0001 |
| | 20%<HPA | 11,084 | 833 | 7.5% | 34,570 | 1,161 | 3.4% | 2.238 | 1.484 | < 0.0001 |
| Default_90 | HPA<=-20% | 12,775 | 6,897 | 54.0% | 7,163 | 2,782 | 38.8% | 1.390 | 1.354 | < 0.0001 |
| | -20%<HPA<=0% | 18,620 | 4,932 | 26.5% | 15,402 | 2,482 | 16.1% | 1.644 | 1.362 | < 0.0001 |
| | 0%<HPA<=20% | 20,938 | 3,220 | 15.4% | 38,098 | 2,978 | 7.8% | 1.967 | 1.528 | < 0.0001 |
| | 20%<HPA | 11,084 | 1,238 | 11.2% | 34,570 | 1,609 | 4.7% | 2.400 | 1.636 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 6,897 | 774 | 11.2% | 2,782 | 443 | 15.9% | 0.705 | 0.667 | < 0.0001 |
| | -20%<HPA<=0% | 4,932 | 1,247 | 25.3% | 2,482 | 739 | 29.8% | 0.849 | 0.886 | 0.0363 |
| | 0%<HPA<=20% | 3,220 | 1,297 | 40.3% | 2,978 | 1,099 | 36.9% | 1.091 | 1.172 | 0.0042 |
| | 20%<HPA | 1,238 | 782 | 63.2% | 1,609 | 741 | 46.1% | 1.372 | 1.468 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 25,776 | 13,994 | 54.3% | 9,266 | 2,698 | 29.1% | 1.865 | 2.231 | < 0.0001 |
| | -20%<HPA<=0% | 19,599 | 4,839 | 24.7% | 18,454 | 1,647 | 8.9% | 2.766 | 2.069 | < 0.0001 |
| | 0%<HPA<=20% | 12,737 | 1,599 | 12.6% | 44,173 | 2,308 | 5.2% | 2.403 | 1.610 | < 0.0001 |
| | 20%<HPA | 3,685 | 250 | 6.8% | 46,307 | 1,318 | 2.8% | 2.384 | 1.533 | < 0.0001 |
| Default_90 | HPA<=-20% | 25,776 | 14,062 | 54.6% | 9,266 | 2,749 | 29.7% | 1.839 | 2.202 | < 0.0001 |
| | -20%<HPA<=0% | 19,599 | 4,919 | 25.1% | 18,454 | 1,712 | 9.3% | 2.705 | 2.059 | < 0.0001 |
| | 0%<HPA<=20% | 12,737 | 1,714 | 13.5% | 44,173 | 2,541 | 5.8% | 2.339 | 1.641 | < 0.0001 |
| | 20%<HPA | 3,685 | 326 | 8.8% | 46,307 | 1,674 | 3.6% | 2.447 | 1.794 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 14,062 | 730 | 5.2% | 2,749 | 173 | 6.3% | 0.825 | 0.926 | 0.3935 |
| | -20%<HPA<=0% | 4,919 | 414 | 8.4% | 1,712 | 196 | 11.4% | 0.735 | na | na |
| | 0%<HPA<=20% | 1,714 | 331 | 19.3% | 2,541 | 487 | 19.2% | 1.008 | 1.280 | 0.0044 |
| | 20%<HPA | 326 | 149 | 45.7% | 1,674 | 539 | 32.2% | 1.419 | 2.044 | < 0.0001 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 5,229 | 3,287 | 62.9% | 3,878 | 1,181 | 30.5% | 2.064 | 2.092 | < 0.0001 |
| | -20%<HPA<=0% | 6,884 | 1,669 | 24.2% | 9,085 | 838 | 9.2% | 2.628 | 1.539 | < 0.0001 |
| | 0%<HPA<=20% | 7,833 | 940 | 12.0% | 27,837 | 1,330 | 4.8% | 2.512 | 1.523 | < 0.0001 |
| | 20%<HPA | 2,368 | 207 | 8.7% | 27,497 | 799 | 2.9% | 3.008 | 1.640 | < 0.0001 |
| Default_90 | HPA<=-20% | 5,229 | 3,305 | 63.2% | 3,878 | 1,198 | 30.9% | 2.046 | 2.088 | < 0.0001 |
| | -20%<HPA<=0% | 6,884 | 1,685 | 24.5% | 9,085 | 873 | 9.6% | 2.547 | 1.518 | < 0.0001 |
| | 0%<HPA<=20% | 7,833 | 991 | 12.7% | 27,837 | 1,491 | 5.4% | 2.362 | 1.510 | < 0.0001 |
| | 20%<HPA | 2,368 | 245 | 10.3% | 27,497 | 1,011 | 3.7% | 2.814 | 1.761 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 3,305 | 179 | 5.4% | 1,198 | 79 | 6.6% | 0.821 | 0.895 | 0.4368 |
| | -20%<HPA<=0% | 1,685 | 163 | 9.7% | 873 | 117 | 13.4% | 0.722 | na | na |
| | 0%<HPA<=20% | 991 | 192 | 19.4% | 1,491 | 329 | 22.1% | 0.878 | 1.064 | 0.5606 |
| | 20%<HPA | 245 | 91 | 37.1% | 1,011 | 329 | 32.5% | 1.141 | 1.389 | 0.0418 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 1,182 | 213 | 18.0% | 1,549 | 249 | 16.1% | 1.121 | 1.199 | 0.0883 |
| | -20%<HPA<=0% | 2,905 | 169 | 5.8% | 5,217 | 244 | 4.7% | 1.244 | 1.486 | 0.0002 |
| | 0%<HPA<=20% | 5,531 | 121 | 2.2% | 14,374 | 269 | 1.9% | 1.169 | 1.311 | 0.0168 |
| | 20%<HPA | 6,209 | 35 | 0.6% | 16,634 | 289 | 1.7% | 0.324 | 0.481 | < 0.0001 |
| Default_90 | HPA<=-20% | 1,182 | 240 | 20.3% | 1,549 | 272 | 17.6% | 1.156 | 1.267 | 0.0206 |
| | -20%<HPA<=0% | 2,905 | 202 | 7.0% | 5,217 | 278 | 5.3% | 1.305 | 1.573 | < 0.0001 |
| | 0%<HPA<=20% | 5,531 | 161 | 2.9% | 14,374 | 334 | 2.3% | 1.253 | 1.388 | 0.0010 |
| | 20%<HPA | 6,209 | 61 | 1.0% | 16,634 | 393 | 2.4% | 0.416 | 0.573 | < 0.0001 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 240 | 39 | 16.3% | 272 | 32 | 11.8% | 1.381 | na | na |
| | -20%<HPA<=0% | 202 | 48 | 23.8% | 278 | 53 | 19.1% | 1.246 | na | na |
| | 0%<HPA<=20% | 161 | 54 | 33.5% | 334 | 102 | 30.5% | 1.098 | na | na |
| | 20%<HPA | 61 | 40 | 65.6% | 393 | 135 | 34.4% | 1.909 | 2.736 | 0.0009 |

Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated and Active Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 582 | 146 | 25.1% | 708 | 122 | 17.2% | 1.456 | 1.432 | 0.0116 |
| | -20%<HPA<=0% | 1,944 | 157 | 8.1% | 2,725 | 133 | 4.9% | 1.655 | 1.450 | 0.0031 |
| | 0%<HPA<=20% | 3,437 | 99 | 2.9% | 9,851 | 180 | 1.8% | 1.576 | 1.438 | 0.0050 |
| | 20%<HPA | 2,650 | 29 | 1.1% | 10,940 | 177 | 1.6% | 0.676 | 0.835 | 0.3807 |
| Default_90 | HPA<=-20% | 582 | 157 | 27.0% | 708 | 128 | 18.1% | 1.492 | 1.488 | 0.0043 |
| | -20%<HPA<=0% | 1,944 | 184 | 9.5% | 2,725 | 146 | 5.4% | 1.767 | 1.569 | 0.0001 |
| | 0%<HPA<=20% | 3,437 | 130 | 3.8% | 9,851 | 226 | 2.3% | 1.649 | 1.495 | 0.0004 |
| | 20%<HPA | 2,650 | 49 | 1.8% | 10,940 | 227 | 2.1% | 0.891 | 1.011 | 0.9474 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 157 | 16 | 10.2% | 128 | 8 | 6.3% | 1.631 | na | na |
| | -20%<HPA<=0% | 184 | 43 | 23.4% | 146 | 20 | 13.7% | 1.706 | na | na |
| | 0%<HPA<=20% | 130 | 50 | 38.5% | 226 | 64 | 28.3% | 1.358 | na | na |
| | 20%<HPA | 49 | 25 | 51.0% | 227 | 74 | 32.6% | 1.565 | 1.736 | 0.0916 |

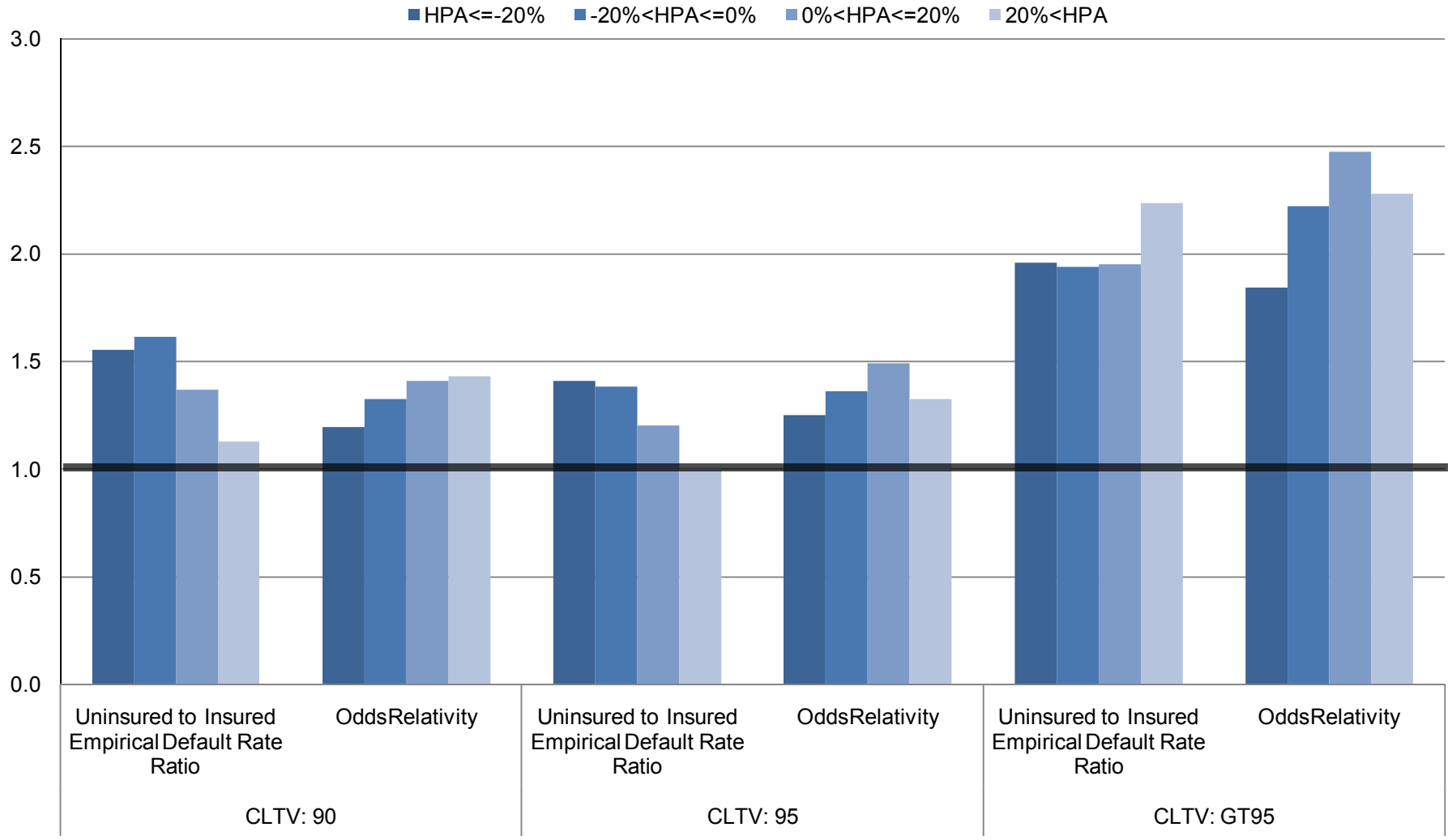
Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
90 CLTV - Insurance Variable
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans

| | | 90 Uninsured | | | 90 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 256 | 78 | 30.5% | 835 | 102 | 12.2% | 2.494 | 2.542 | < 0.0001 |
| | -20%<HPA<=0% | 881 | 50 | 5.7% | 3,606 | 92 | 2.6% | 2.224 | 2.355 | < 0.0001 |
| | 0%<HPA<=20% | 1,123 | 33 | 2.9% | 11,721 | 191 | 1.6% | 1.803 | 1.825 | 0.0023 |
| | 20%<HPA | 322 | 3 | 0.9% | 14,212 | 265 | 1.9% | 0.500 | 0.407 | 0.1343 |
| Default_90 | HPA<=-20% | 256 | 79 | 30.9% | 835 | 106 | 12.7% | 2.431 | 2.539 | < 0.0001 |
| | -20%<HPA<=0% | 881 | 52 | 5.9% | 3,606 | 97 | 2.7% | 2.194 | 2.323 | < 0.0001 |
| | 0%<HPA<=20% | 1,123 | 37 | 3.3% | 11,721 | 214 | 1.8% | 1.805 | 1.856 | 0.0009 |
| | 20%<HPA | 322 | 4 | 1.2% | 14,212 | 338 | 2.4% | 0.522 | 0.419 | 0.0945 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 79 | 2 | 2.5% | 106 | 7 | 6.6% | 0.383 | na | na |
| | -20%<HPA<=0% | 52 | 3 | 5.8% | 97 | 8 | 8.2% | 0.700 | na | na |
| | 0%<HPA<=20% | 37 | 4 | 10.8% | 214 | 41 | 19.2% | 0.564 | na | na |
| | 20%<HPA | 4 | 2 | 50.0% | 338 | 103 | 30.5% | 1.641 | na | na |

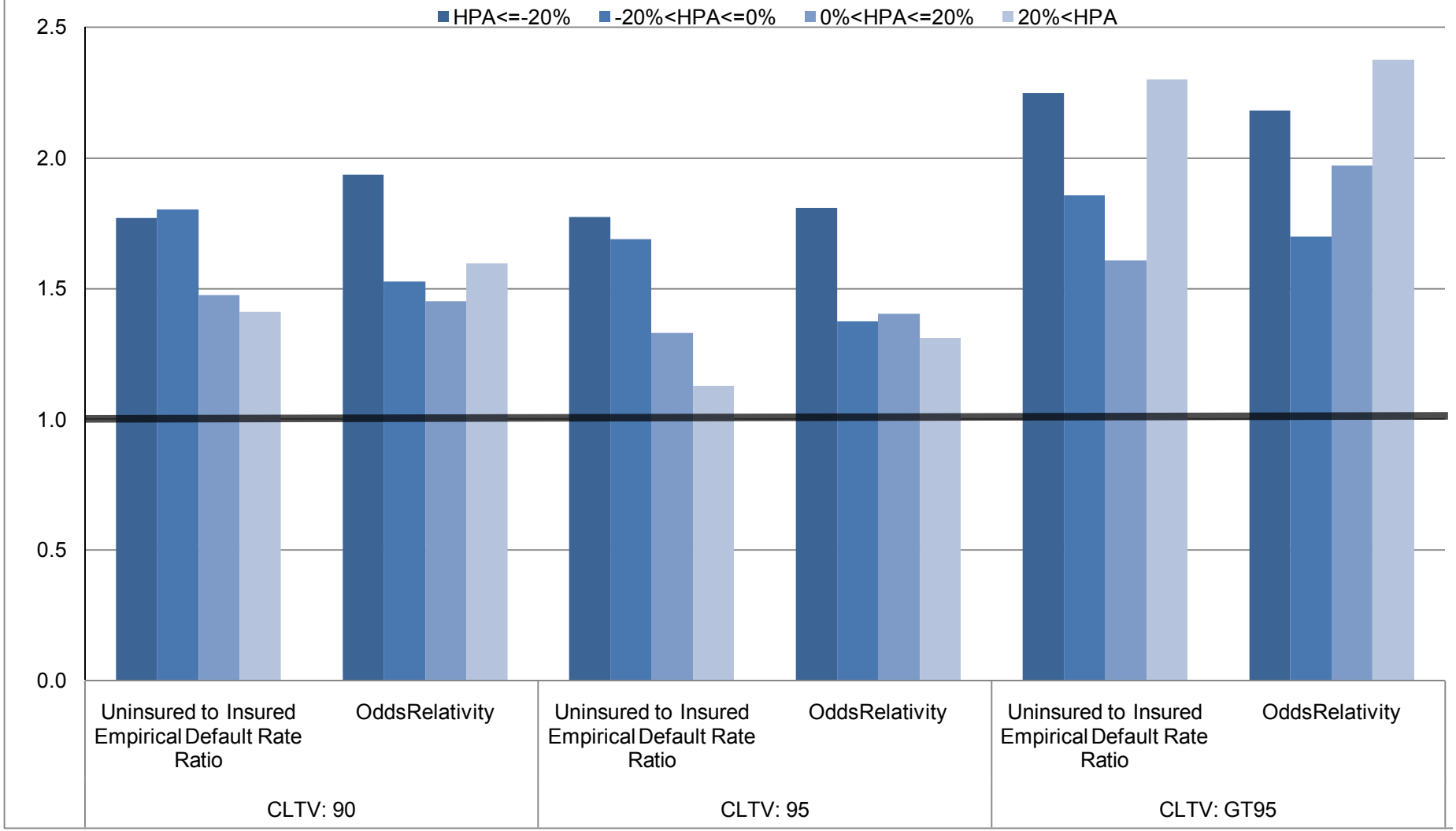
Mortgage Insurance Companies of America
Logistic Model Contrasts and Significance
95 CLTV - Insurance Variable
Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE
Terminated Loans

| | | 95 Uninsured | | | 95 Insured | | | Empirical Default | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Response | HPA Bucket | Loans | Defaults | Default Rate | Loans | Defaults | Default Rate | Relativity | Odds Relativity | p-value |
| Default_NC | HPA<=-20% | 152 | 62 | 40.8% | 471 | 59 | 12.5% | 3.256 | 3.785 | < 0.0001 |
| | -20%<HPA<=0% | 688 | 50 | 7.3% | 2,031 | 69 | 3.4% | 2.139 | 1.909 | 0.0012 |
| | 0%<HPA<=20% | 1,112 | 39 | 3.5% | 8,430 | 135 | 1.6% | 2.190 | 1.845 | 0.0013 |
| | 20%<HPA | 220 | 3 | 1.4% | 9,586 | 166 | 1.7% | 0.787 | 0.617 | 0.4194 |
| Default_90 | HPA<=-20% | 152 | 63 | 41.4% | 471 | 59 | 12.5% | 3.309 | 4.092 | < 0.0001 |
| | -20%<HPA<=0% | 688 | 50 | 7.3% | 2,031 | 75 | 3.7% | 1.968 | 1.771 | 0.0036 |
| | 0%<HPA<=20% | 1,112 | 39 | 3.5% | 8,430 | 157 | 1.9% | 1.883 | 1.609 | 0.0111 |
| | 20%<HPA | 220 | 4 | 1.8% | 9,586 | 207 | 2.2% | 0.842 | 0.659 | 0.4221 |
| | | Defaults | Cures | Cure Rate | Defaults | Cures | Cure Rate | | | |
| Cure | HPA<=-20% | 63 | 4 | 6.3% | 59 | 0 | 0.0% | na | na | na |
| | -20%<HPA<=0% | 50 | 2 | 4.0% | 75 | 7 | 9.3% | 0.429 | na | na |
| | 0%<HPA<=20% | 39 | 5 | 12.8% | 157 | 32 | 20.4% | 0.629 | na | na |
| | 20%<HPA | 4 | 1 | 25.0% | 207 | 63 | 30.4% | 0.821 | na | na |

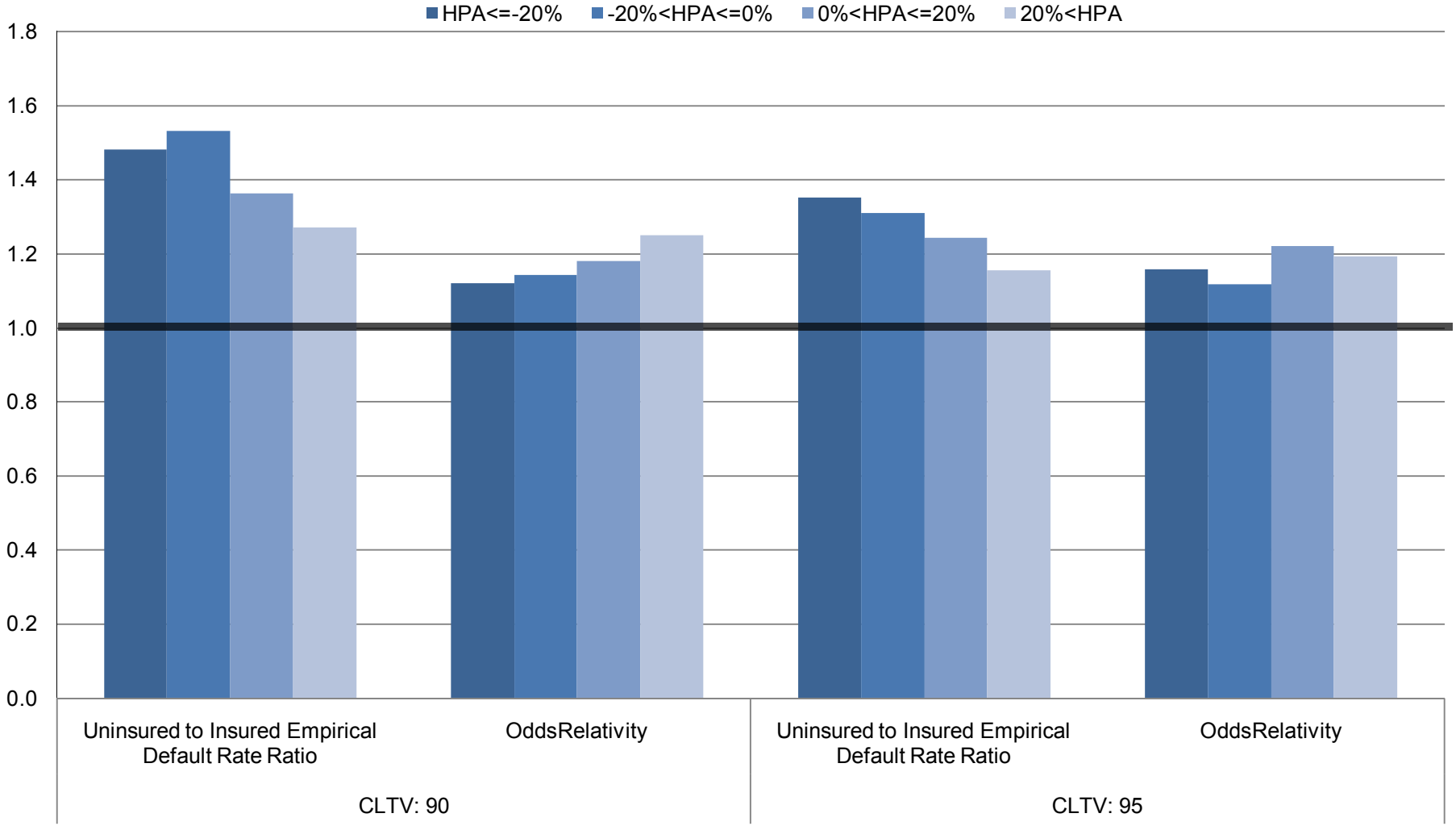
**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 1: All loans**
**Terminated and Active Loans**
**Modeled Default Rate: Default_NC**



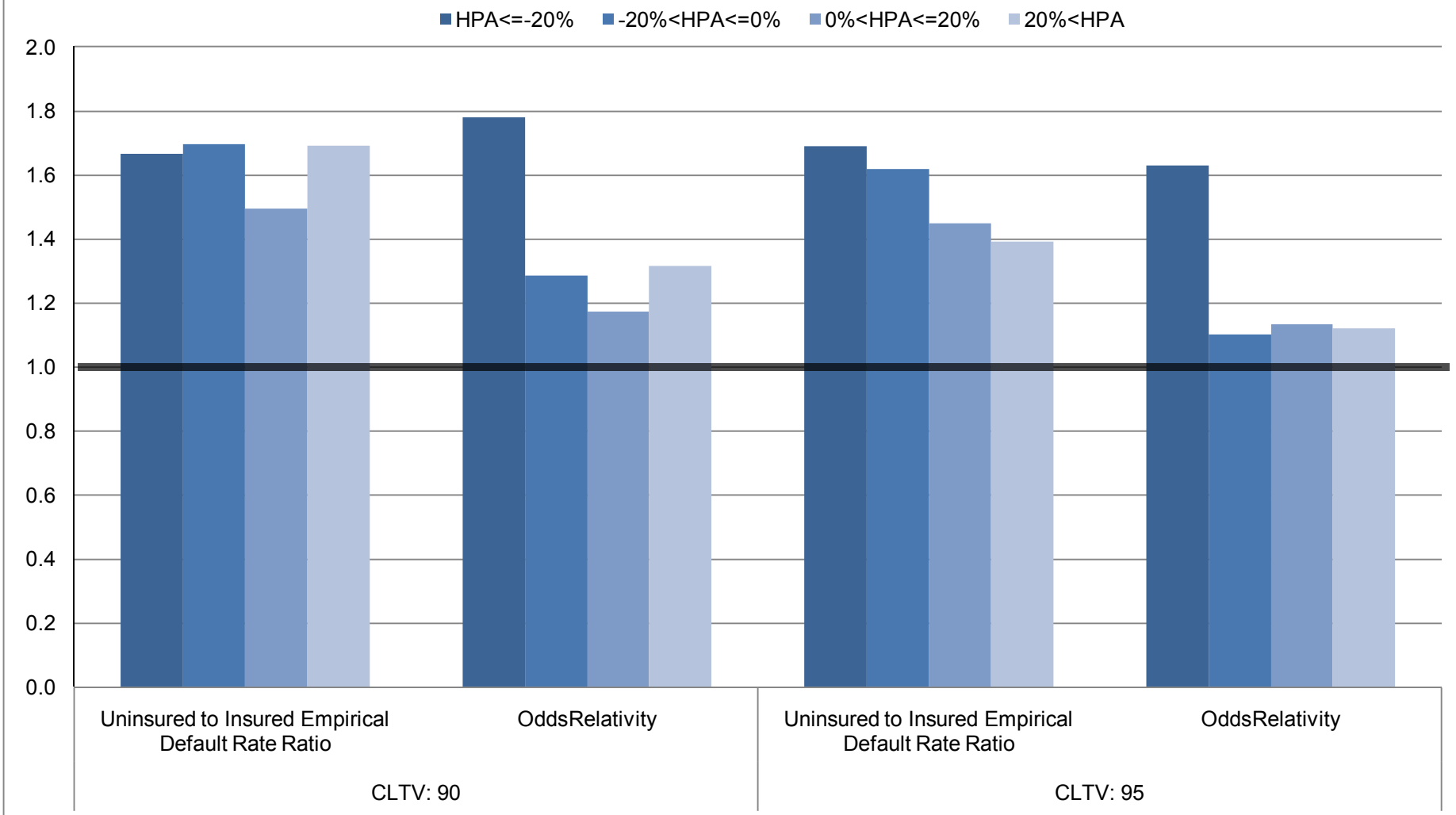
**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 1: All loans**
**Terminated Loans**
**Modeled Default Rate: Default_NC**



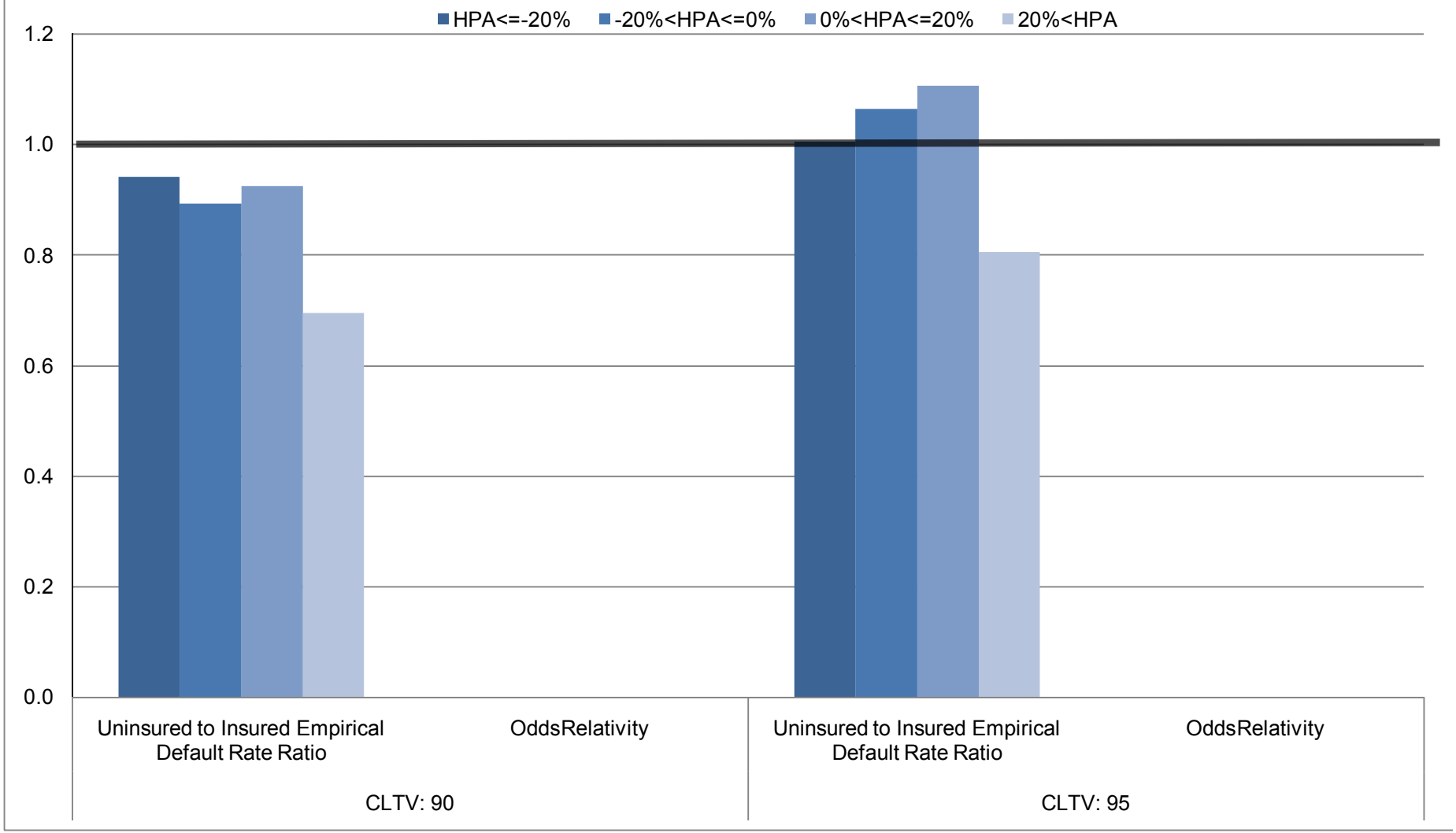
**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 2: All loans excluding FHA and GT95 CLTV**
**Terminated and Active Loans**
**Modeled Default Rate: Default_NC**

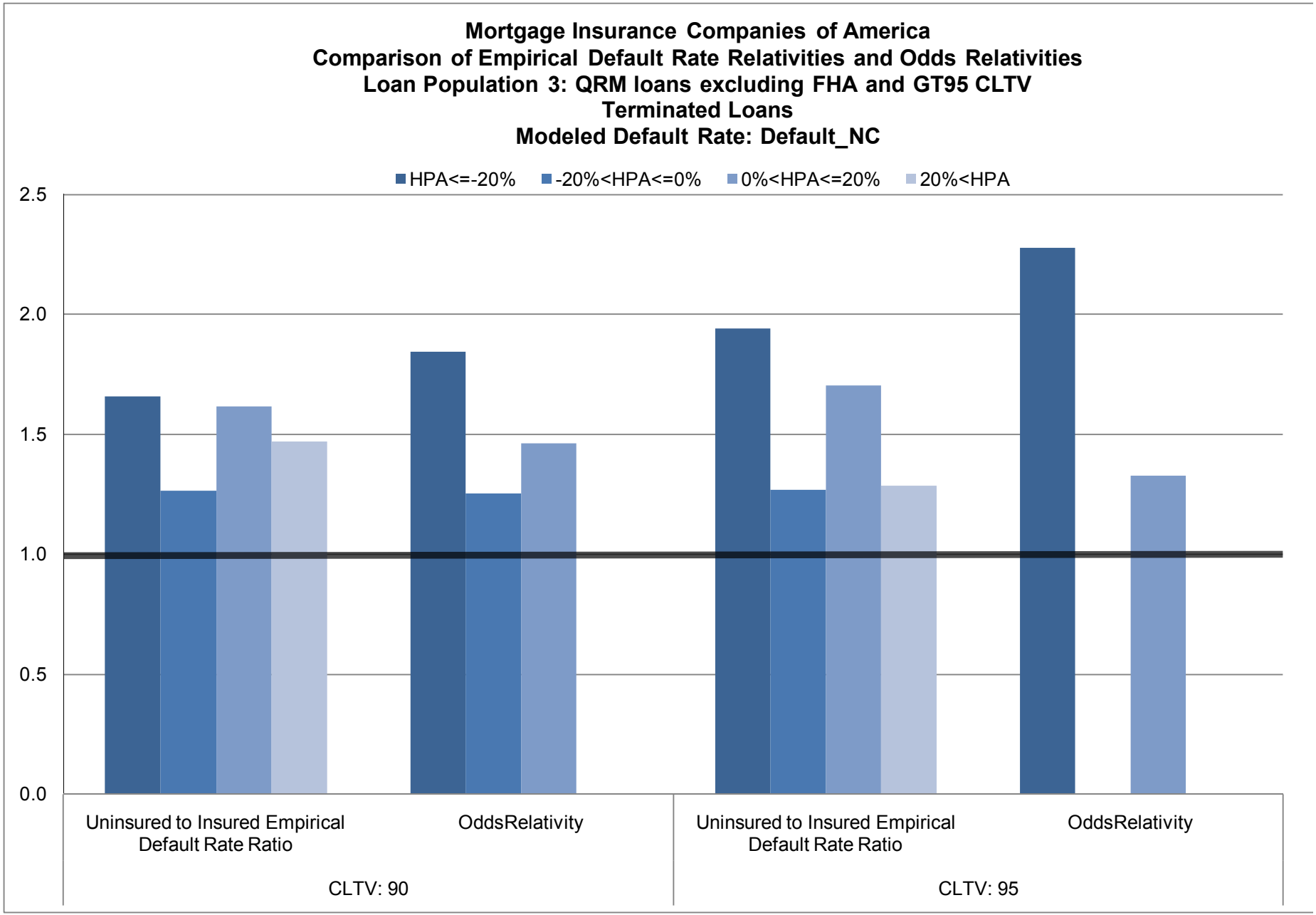


**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 2: All loans excluding FHA and GT95 CLTV**
**Terminated Loans**
**Modeled Default Rate: Default_NC**

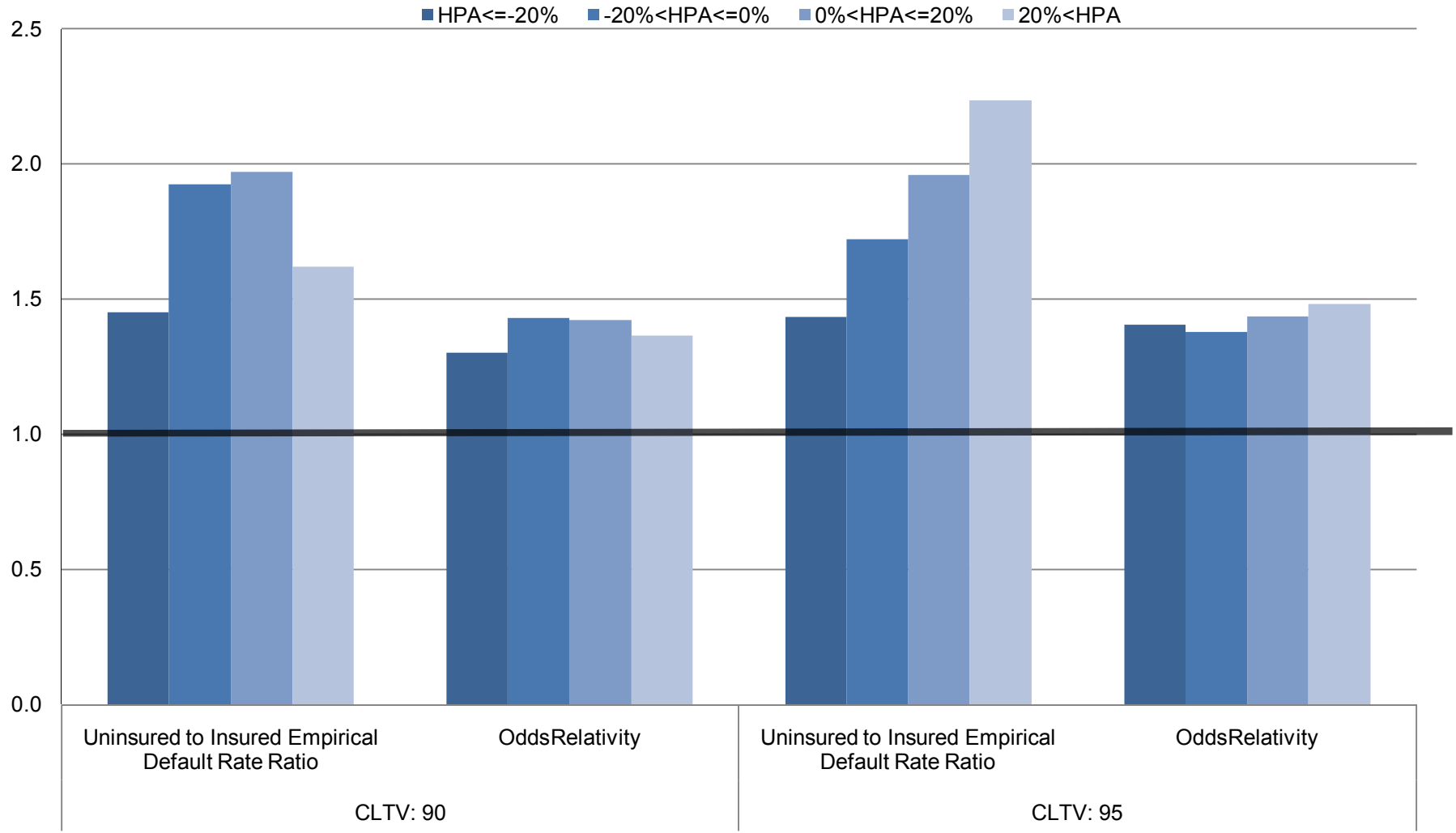


**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 3: QRM loans excluding FHA and GT95 CLTV**
**Terminated and Active Loans**
**Modeled Default Rate: Default_NC**

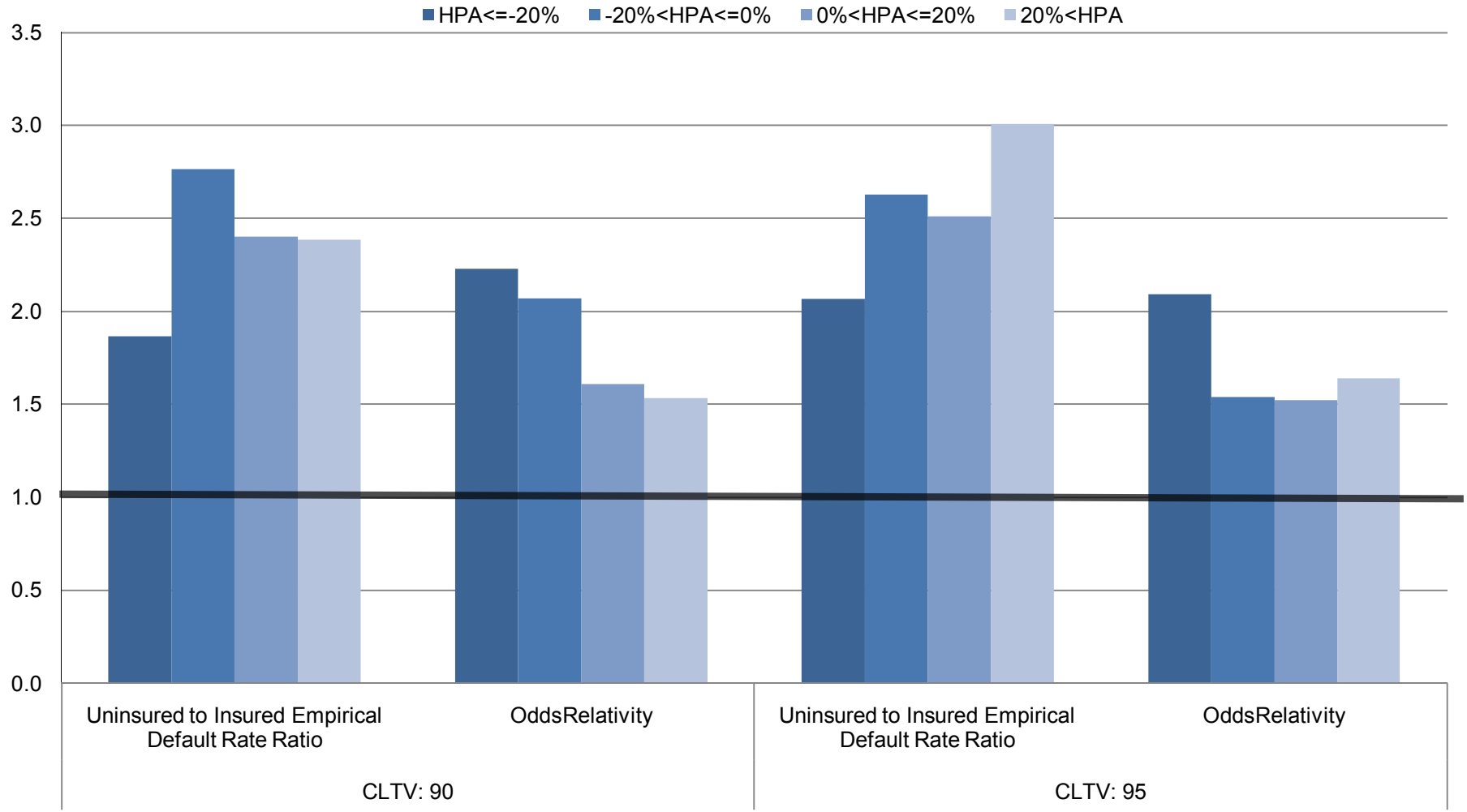



Mortgage Insurance Companies of America
Comparison of Empirical Default Rate Relativities and Odds Relativities
Loan Population 3: QRM loans excluding FHA and GT95 CLTV
Terminated Loans
Modeled Default Rate: Default_NC
HPA<=-20%
-20%<HPA<=0%
0%<HPA<=20%
20%<HPA
2.5
2.0
1.5
1.0
0.5
0.0
Uninsured to Insured Empirical Default Rate Ratio
OddsRelativity
CLTV: 90
Uninsured to Insured Empirical Default Rate Ratio
OddsRelativity
CLTV: 95

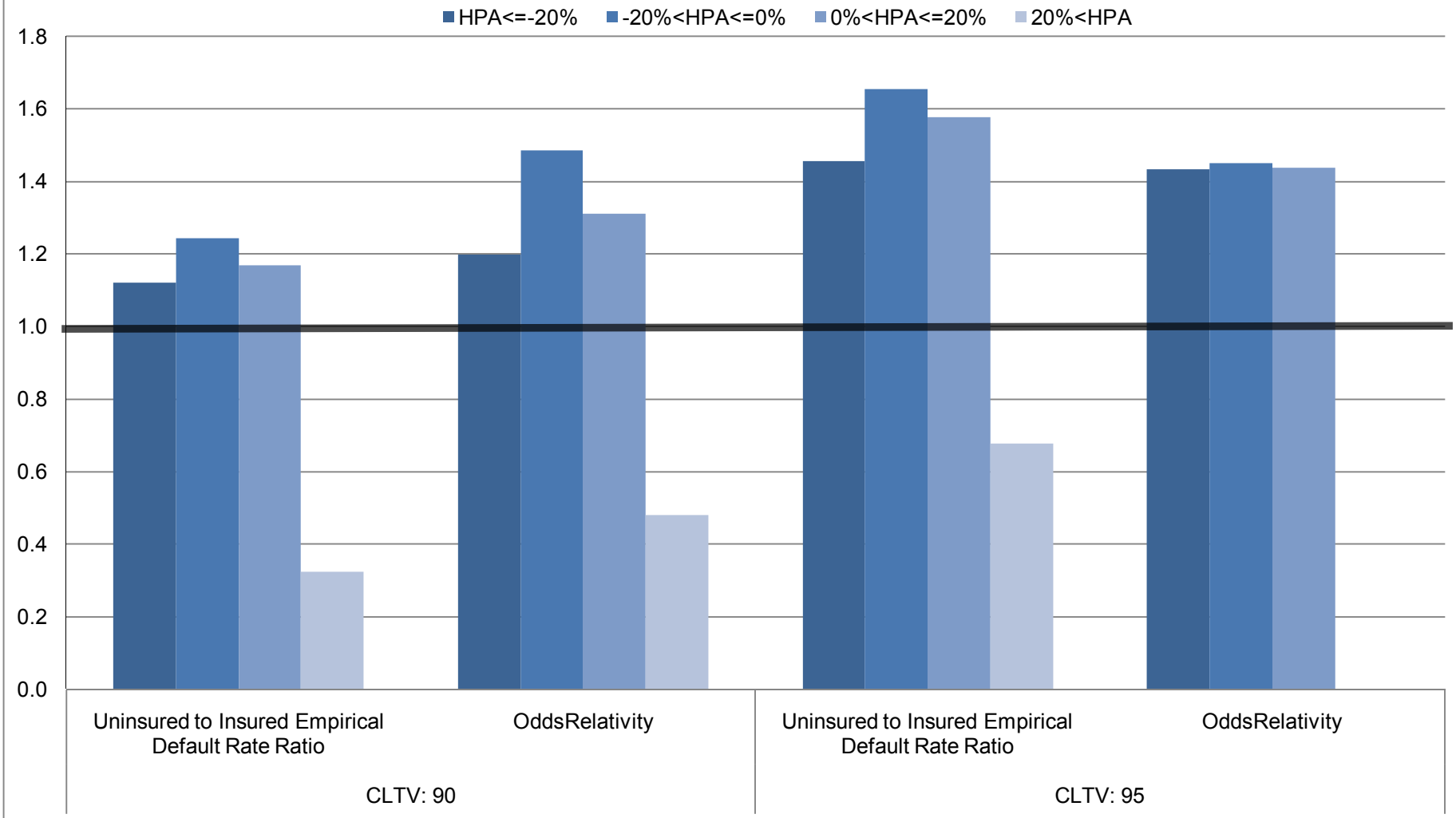
**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE**
**Terminated and Active Loans**
**Modeled Default Rate: Default_NC**



**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 4: All loans excluding FHA, GT95 CLTV, and GSE**
**Terminated Loans**
**Modeled Default Rate: Default_NC**



**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE**
**Terminated and Active Loans**
**Modeled Default Rate: Default_NC**



**Mortgage Insurance Companies of America**
**Comparison of Empirical Default Rate Relativities and Odds Relativities**
**Loan Population 5: QRM loans excluding FHA, GT95 CLTV, and GSE Terminated Loans**
**Modeled Default Rate: Default_NC**