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MORTGAGE INSURANCE: A CASE FOR QRM- ELIGIBILITY

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Executive Summary

Section 15G of the Securities and Exchange Act of 1934 added by section 941 of the Dodd-Frank Wall Street Reform and Consumer Protection Act includes provisions to exempt certain mortgages otherwise subject to the risk retention rules, referred to as Qualified Residential Mortgages (QRM). Congress defined QRM-eligibility on the basis of risk attributes that would reduce the risk of mortgage default. Mortgage insurance was excluded from QRM-eligibility in the proposed rule and this study outlines the case for why mortgage insurance should be included in the final QRM rule.

Effective risk management entails addressing both components of a mortgage loss; i.e., the likelihood of default as well as loss severity. Establishing product and borrower underwriting risk limits as described in QRM is an appropriate way of controlling risk upfront; however, managing those risks once originated is also critical. The use of credit enhancements such as private mortgage insurance (MI) is a well-accepted portfolio risk management practice for redistributing risk. As policymakers look toward private capital solutions to reduce government involvement in housing finance, private mortgage insurance controls risk while allowing many otherwise well-qualified borrowers to obtain mortgage financing at reasonable costs.

Unfortunately in the proposed rule, the regulators only looked at whether MI reduces default incidence and did not find evidence that it did so despite the fact that mortgage insurance provides a second level of review to the underwriting process. This was the wrong question because frequency of default represents only part of the credit loss outcome. Once a loan defaults, limiting the severity of loss is critical, and this is where mortgage insurance on higher LTV loans plays a significant role in mitigating credit losses.. Regarding default incidence, the regulators drew the wrong conclusions because they failed to recognize how a number of key participants during the boom adversely selected the GSEs and mortgage insurance companies. In this situation, the potential benefit from a dual underwriting review via MI would have been muted during the boom years. Poor regulatory oversight allowed the mortgage industry to consolidate in the years leading up to the crisis in a way that concentrated the market power of large mortgage originators. Over time this allowed them to adversely select the GSEs, resulting in riskier loans being sold to Fannie Mae and Freddie Mac than what lenders were willing to hold on their own balance sheets. Moreover, with the advent of automated underwriting, the growing market power of the GSEs in the mid- to late-1990s put pressures on MI companies to endorse GSE automated underwriting decisions. As a result, this study makes the case that using mortgage data of largely GSE loans would likely yield a finding that MI has limited or no

statistical effect on reducing default incidence. In some instances it could even be possible controlling for other risk attributes to find higher risk which would be indicative of adverse selection theorized by number of researchers and empirically identified by others. Alternatively, it is conceivable that the so-called “second pair of eyes” effect of MI could be found in an appropriately specified statistical model that uses data from private-label securities. Such data would isolate the adverse selection/market power issues that may otherwise provide misleading results on the MI effect on default frequency.

Importantly, such a finding that MI has limited or no effect on reducing default rates does not imply that mortgage insurance is not a viable candidate for QRM-eligibility. In fact, the foundation for strong mortgage risk discipline exists in the mortgage insurance industry by its countercyclical capital reserving practices and deep mortgage credit risk expertise. Moreover, mortgage insurance provides first loss coverage to investors in the event of default. MI also provides diversification benefits that otherwise would prove potentially hazardous to holders of credit risk if geographic and/or product concentrations build to abnormally high levels. In fact, redistributing high LTV credit risk across a number of privately capitalized MI companies mitigated the systemic risk exposure to the taxpayer from the GSEs. Regulatory agencies already recognize the benefits of MI in mortgage risk management as reflected in bank capital requirements and even in the proposed QRM rule. For example, the proposed rule highlights an alternative approach that regulators are considering that would allow MI to be featured as an appropriate risk offset for a set of expanded LTVs in determining QRM-eligibility.

Regulatory authorities must strike a delicate balance between setting prudent mortgage risk underwriting standards and excluding a large segment of well-qualified borrowers simply because they do not have 20 or 30% to put down on a home. Mortgage insurance mitigates credit and systemic risk while permitting homeownership to a historically important segment of the housing market and thus warrants inclusion in the final rule for QRM-eligibility.

Study Overview¹

In response to massive credit losses sustained in the mortgage industry starting in 2007, Congress set in motion a set of sweeping changes to limit buildups of credit risk that contributed to the housing crisis. Within the Dodd-Frank Act are provisions outlining risk retention rules for firms engaged in mortgage securitization (Section 941). These provisions require such firms to retain a portion of the credit risk associated with a securitized transaction unless the underlying loans qualify for exemption under a set of rules known as the Qualified Residential Mortgage (QRM) provisions. Congress defined QRM-eligibility on the basis of risk attributes that would reduce the risk of mortgage default. Mortgage insurance was excluded from QRM-eligibility in the proposed rule and this study outlines the case for why mortgage insurance should be included in the final QRM rule.

Mortgage insurance has long been an integral component of the conventional conforming loan market given the requirements of the two government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac to obtain MI on any loans with loan-to-value (LTV) ratios over 80%. The provision of MI has over a long period of history provided an effective means for redistributing a portion of credit risk on such loans using private capital. The omission of MI from the QRM provisions is what this study is about. The paper focuses on two themes: (1) that the proposed QRM standard's requirements to link QRM-eligibility only to lower default incidence is too narrow; and (2) that efforts to detect an MI effect on default risk are fraught with limitations due to adverse selection in the market during the boom. The first theme centers on the benefits of MI in mitigating loss exposure. Effective risk management entails addressing both components of a mortgage loss; i.e., the likelihood of default as well as loss severity. Helping to frame that discussion, the mechanics of a representative MI structure is examined along with a review of aspects of such contracts to mitigate risk. This includes a discussion of risk diversification and redistribution effects, systemic risk mitigation, risk transfer, and quality control processes.

¹ The views expressed in this study are those of the author solely and do not represent those of the Robert H. Smith School of Business or the University of Maryland. Support for this study was provided by Radian Guaranty, Inc.

The second theme describes how adverse selection took place in mortgage markets, as well as how studies of MI effects on default frequency would be affected. Entwined in this discussion are several structural changes in mortgage origination occurring during the boom such as the prominence of automated underwriting systems (AUS) by the GSEs and major loan originators, the appearance of simultaneous 2nd lien mortgages (piggyback 2nds) as a mechanism for bypassing the need for MI, mass marketing of nontraditional mortgage such as option ARMs and associated product morphing of standard loans via risk layering. Together with growing market power of large originators, these events laid the groundwork for adverse selection that resulted in high losses sustained by GSEs and MI companies. The study examines the theoretical and empirical literature for how large mortgage originators adversely selected the GSEs and in turn the MIs over time. An important conclusion from this analysis is that due to adverse selection and market power issues it is possible that controlling for other risk attributes the effect of MI on lowering default incidence would be small or statistically insignificant. However, such a result would not be robust if these market-effects cannot be disentangled from the MI effect.. Thus, any statistical analysis of this issue must take great care in identifying mortgage data that has less potential to be affected by adverse selection and market power. Isolating data to just private-label securities that is unencumbered from any GSE effects and where greater flexibility for MI companies to impose underwriting discipline was possible might render a different statistical outcome. Still, this is an open question as this study does not conduct any statistical analysis of this issue but rather assesses the validity of analyses supporting the lack of evidence of an MI effect on default incidence.

The study also reviews analysis relied upon by the regulators in developing the proposed QRM rule. That study was conducted by the Federal Housing Finance Agency (FHFA) and explored the incremental effect of higher LTVs on delinquency rates holding other QRM-eligible risk attributes constant. This analysis acknowledges the impact that MI would have on losses but finds that higher LTVs contribute to increased default rates which is a well-known fact in mortgage default modeling. However, the study is silent on the MI issue altogether and marshals no empirical fact either way for excluding MI from QRM-eligibility. Further, it ignores other

important risk attributes that contributed to adverse selection and higher default risk such as sourcing channel. Correspondent and broker-originated loans reflect adverse selection taking place among third-party originators and aggregators resulting in higher credit risk, controlling for other factors but this is missing from the FHFA study and the proposed QRM standards.

With these broad themes in mind, bank regulatory agencies should reconsider including MI as a QRM-eligible feature for the final rulemaking on these provisions. The basis for this conclusion is the following:

- Focusing only on default incidence and not loss ignores the importance of using well-established risk management practices such as MI to prudently manage, transfer and mitigate credit exposures.
- Any statistical analysis of the impact of MI on default incidence must be mindful of adverse selection by large mortgage originators and market power of the GSEs during the mortgage boom period. These effects would likely mute any MI effect . Rather than being evidence against the value of MI to effectively manage credit risk, it reflects regulatory deficiencies and moral hazard issues at work during that period.
- For decades leading up to the crisis, mortgage insurance has provided holders of credit risk an effective credit enhancement. The ability to readily transfer a first loss portion to private mortgage insurance companies provides important risk diversification benefits, and reduces systemic risk by way of redistributing risk among a number of privately capitalized firms while allowing a large segment of well-qualified borrowers to obtain reasonably priced mortgage credit.

The QRM Issue for Mortgage Insurance

In framing the risk retention and QRM provisions within Section 15G of the Dodd-Frank Act, Congress required regulators to consider, “underwriting and product features that historical loan

performance data indicate in a lower risk of default.”² Unfortunately, the regulators narrowed the focus of credit risk to mean the incidence of default rather than credit loss, to the detriment of effective credit risk management. The latter term in the management of credit risk refers to the product of default incidence or the percentage of defaults in a mortgage portfolio and loss severity, or the percentage of dollar loss on the loan once a borrower defaults.

In tacit acknowledgment of the limitations of such an interpretation, the regulators also directly call out the merits of mortgage insurance as a mechanism to “likely lower the credit risk faced by lenders or purchasers of securities because they typically pay out when borrowers default.”³ For years, the effectiveness of MI in managing risk has been widely accepted by regulators in various ways. Under Basel risk-based capital standards, residential mortgage loans receive differential risk weights depending upon several factors. For high LTV loans that are shown to have been prudently underwritten, mortgage insurance could lower a loan’s risk weight to 50% from 100%, thus reducing the amount of capital required to be held by the institution. In addition to capital requirements, the regulatory agencies provide direction in their guidance on high LTV mortgage lending by requiring that mortgages having LTVs over 90% cannot exceed 100% of a bank’s capital. The agencies allow for high LTV loans having mortgage insurance or other acceptable forms of credit enhancement to be excluded from the 100% of capital limit.⁴

A misplaced focus on default incidence only in the proposed rule, coupled with market failures during the boom distorting the MI effect, minimize the important role MI plays in effective credit risk management. And excluding MI in the QRM provisions could have unintended consequences on the market going forward. For instance, it acts to constrain credit for mortgage borrowers by limiting purchase money mortgages to 80% LTV. In testimony to Congress on this subject, Acting Assistant Secretary for Housing and FHA Commissioner Bob Ryan outlined his concerns that the proposed QRM provisions would limit credit availability:

² US Treasury, Office of the Comptroller of the Currency, Proposed Rule, Credit Risk Retention Requirements, 12 CFR Part 43, April 2011, p. 106.

³ US Treasury, Proposed Rule, Credit Risk Retention Requirements, p. 112.

⁴ Office of the Comptroller of the Currency, Federal Reserve Board, Federal Deposit Insurance Corp., and the Office of Thrift Supervision, Interagency Guidance on High-LTV Residential Real Estate Lending, October 3, 1999.

“While QRM is designed to create a class of loans that have a lower likelihood of default, in its proposed definition it has the potential to exclude a number of buyers. Stated another way, this definition has the potential to create false positive situations that deny creditworthy borrowers affordable loans in this class.”⁵

Allowing MI in the definition of a QRM loan would permit high quality expanded LTV loans to be originated while effectively managing default and loss severity combined. In fact, the proposed QRM rules permit GSE qualifying loans with LTVs beyond 80% to be QRM-eligible as long as Fannie and Freddie are in conservatorship. Thus, loans with LTVs exceeding the QRM standards and having the GSE credit guarantee, would qualify for exemption from risk retention provisions. And yet the GSEs are required by charter to guarantee the credit risk of loans with LTVs over 80% only if they have appropriate mortgage insurance. Thus, there seems to be an inconsistency between proposed QRM rules and GSE policy.

Fortunately the regulators acknowledge the delicate balance needed between satisfying the Act’s specific requirements for QRM characteristics that reduce default risk and overly constraining credit markets for mortgages by disallowing higher LTVs for well qualified borrowers. An alternative approach to QRM is positioned in the proposal that effectively trades off more restrictive forms of risk retention for an expanded set of risk characteristics that would qualify for QRM eligibility.⁶ In this alternative, LTVs on purchase loan transactions would be allowed up to 90% and mortgage insurance could be a factor in determining QRM eligibility. As will be seen in the section discussing the merits of MI as an effective credit enhancement, from a public policy perspective, the inclusion of MI as a factor determining QRM-eligibility would align with GSE practices regarding MI that have historically provided broader credit availability than the proposed QRM rules would allow while prudently managing overall credit risk exposure. Moreover, there is no reason that loans with an even higher LTV could not be included as a QRM assuming sufficient MI.

⁵ Testimony of Acting Assistant Secretary for Housing and FHA Commissioner Bob Ryan, U.S. Department of Housing and Urban Development (HUD) Hearing before the House Financial Services Committee Subcommittee on Capital Markets and Government Sponsored Entities on Understanding the Implications and Consequences of the Proposed Rule on Risk Retention, Thursday April 14, 2011.

⁶ US Treasury, Proposed Rule, Credit Risk Retention Requirements, p.153.

Mortgage Insurance Mechanics

To better understand why MI is an effective credit enhancement to mortgage risk managers, a brief overview of the mechanics of MI is instructive. Consider a conforming conventional mortgage loan guaranteed by one of the GSEs that has at origination a 90% LTV and the underlying property is valued at \$100,000. For simplicity assume that the loan is an interest-only adjustable rate mortgage (ARM) and that the borrower pays only interest during the period leading up to default (i.e., interest-only mortgage). Typical mortgage insurance to the holder of this loan would cover 25% of the total eligible claim amount net of escrow balances and other cost offsets such as rental income. Table 1 highlights the calculations for MI proceeds for this simple example.

At default the property value has declined 20% to \$80,000 rendering the updated or current LTV to be 112.5%. At this point the borrower is subject to negative equity in the property and so exercises their default option to the holder of the note leaving the unpaid principal balance at \$90,000. That the borrower has not made a mortgage payment for several months allows the owner of the loan to count delinquent interest toward the claim amount. Other expenses incurred such as attorney fees, property maintenance costs, and unpaid taxes and insurance are included and offset by any escrow balances or rental income for example. The net claim amount would be \$103,200 against which the MI would pay 25% of this amount to the mortgage owner, or \$25,800. Once the calculation is made, the MI company makes a decision whether to pay the claim amount submitted to them (in this case \$25,800), or pay the total claim amount and take the property. This calculation entails computing the difference between the total claimable costs of \$103,200 and the realizable net proceeds from the sale of the property against the MI payment amount of \$25,800. If the MI payment is less, then the MI company would not take ownership of the property.

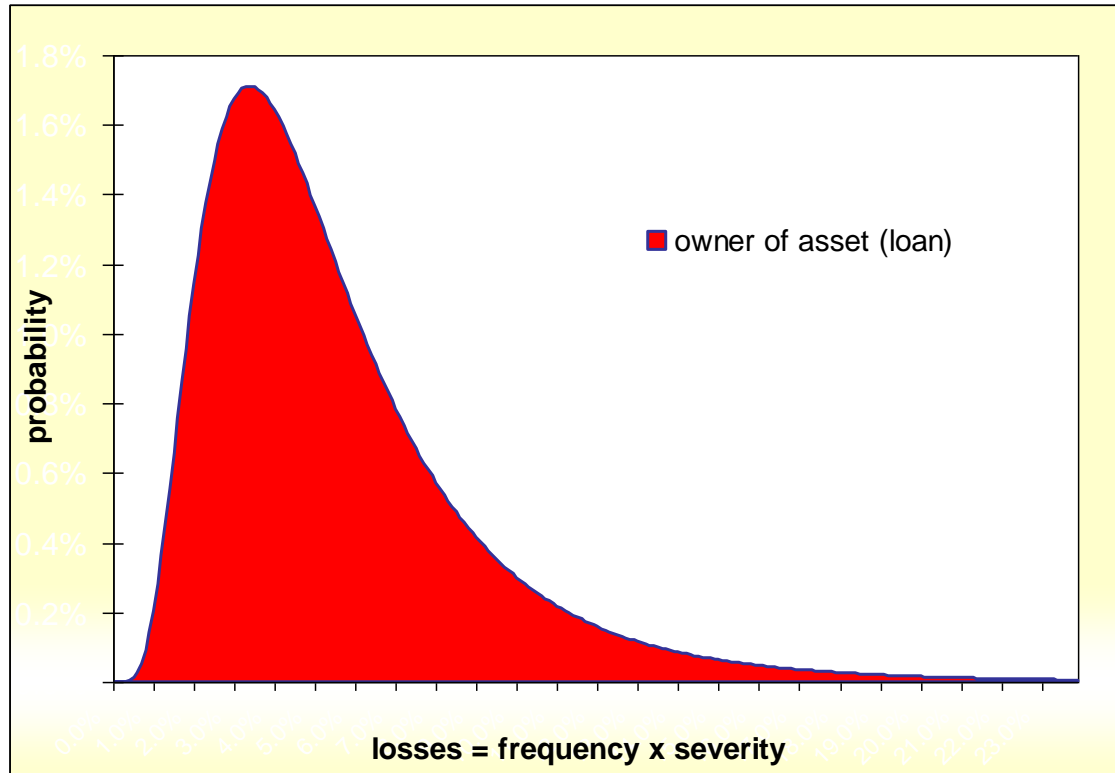
Historically, MI coverage percentages differ based on LTV. Loans greater than 80% and less than or equal to 85% LTV carry 12% MI coverage, loans between 85% and 90% have 25% MI, and loans over 90% require 30% coverage. In the example above the effectiveness of MI was to directly reduce the severity of loss to the lender/investor (i.e., by the amount of the MI payment). In return for this payment in the event of default, MI premiums (either borrower or lender-paid) cover the expected loss to the MI on a pool of loans plus provides a fair rate of return to the MI

Table 1

Mortgage Insurance Coverage Example	
At Origination Assumptions	
Original Home Value	\$100,000
Original Loan Amount	\$90,000
Original LTV	90%
MI Coverage Percent	25%
At Default Assumptions	
House Value	\$80,000
Unpaid Principal Balance	\$90,000
Current LTV	112.5%
Claimable Costs	
Delinquent Interest	\$9,000
Attorney Fees	\$2,500
Property Taxes	\$1,000
Hazard Insurance	\$400
Property Maintenance	\$1,000
Other Offsets	\$0
Escrow Balance	(\$700)
Net Rental Proceeds	\$0
Net Claim Amount	\$103,200
Covered Amount at 25%	\$25,800

Figure 1

Distribution of Mortgage Portfolio Losses Without MI



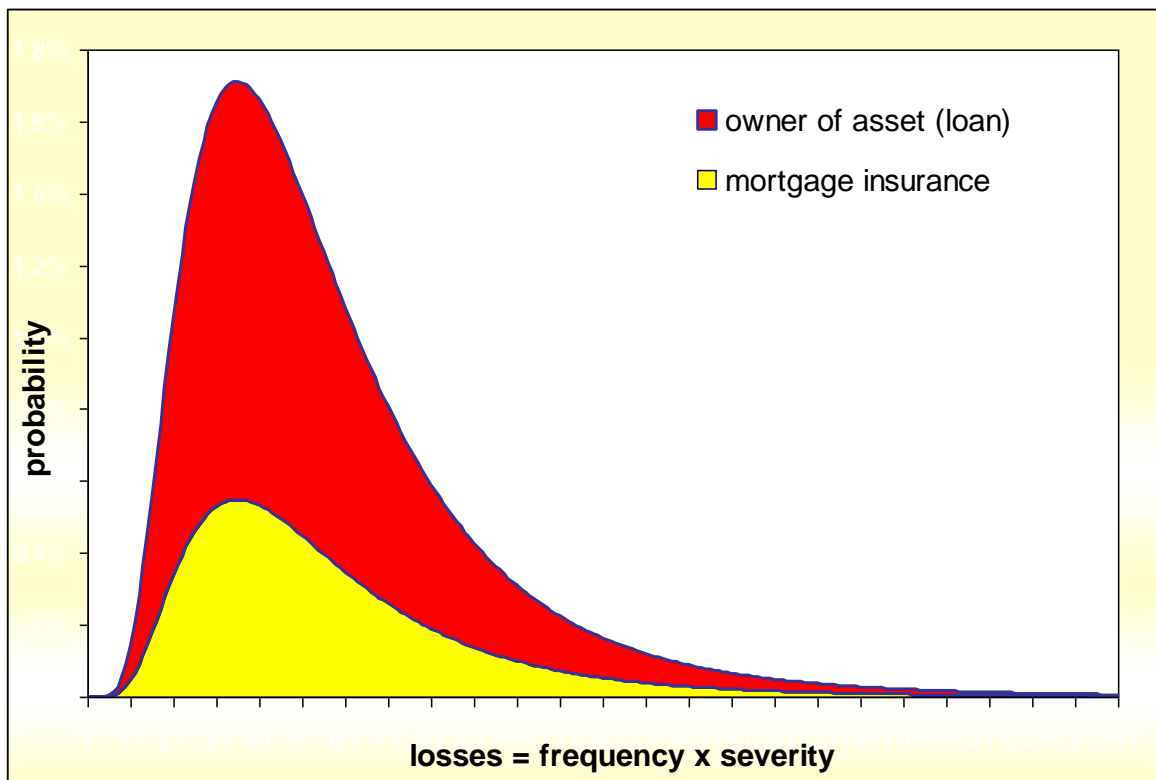
company. Typically the MI company is presented with the claim request once the property has completed foreclosure and after REO liquidation. At a portfolio level, one way to visualize the effect of MI on an investor's credit risk exposure is shown in Figures 1 and 2.

In Figure 1, a representative loss distribution is shown on a portfolio of mortgage loans where no MI is provided. Assume that this could be a pool of high LTV loans such as an 80-10-10 loan represented by an 80% first lien mortgage with a 10% simultaneous 2nd lien. The loss distribution is asymmetric, in that it has a long right-hand tail of credit risk. This means that there is a low probability of outcomes resulting in high losses (far right of the distribution) and a high probability of low severity events. But in any case, the investor would be entirely responsible for the losses sustained under any scenario.

Contrast Figure 1 with what is shown in Figure 2 and it is clear that mortgage insurance provides considerable protection across economic scenarios for the portfolio investor. In this case, the MI company is effectively in a first loss position, absorbing any losses up to the contractual MI coverage level after which the investor would be responsible for remaining losses. This relationship illustrates the effectiveness of MI as a credit enhancement.

Figure 2

Distribution of Mortgage Portfolio Losses With MI



Mortgage Insurance, Adverse Selection and Implications for QRM

Aside from the issue that the proposed rule only focuses on default incidence rather than loss, whether MI does or does not lower default incidence must remain mindful of potential data challenges due to a variety of factors present in the mortgage market prior to the crisis. Central

to this theme is the role that the GSEs and largest mortgage originators played in the process by way of extraordinary market power exerted over mortgage insurance companies. Coupled with the advent of automated underwriting systems in the latter part of the 1990's, mortgage insurance companies also moved to a delegated underwriting model that relied on an originator's underwriting staff to make credit decisions, but only after extensive on-site due diligence of underwriting processes, controls and periodic loan review. In order to determine whether MI results in a lower default rate, a statistical model controlling for various risk factors could be estimated from historical loan level mortgage data.⁷ In theory, after controlling for various product and borrower risk attributes (the X 's), a statistically significant MI effect showing better default performance (i.e., $\psi < 0$) than other loans of comparable risk could indicate the presence of some intrinsic aspect of MI such as the "second pair of eyes" effect some proponents of MI might contend. However, there are two issues that could limit the likelihood and validity of such an outcome over the recent time period. First, the reliance of MI companies on delegated underwriting and their adoption of the GSE automated underwriting processes, as will be reviewed in more detail below, makes it difficult to disentangle intrinsic MI effects from GSE underwriting practices, in effect during the period. This results from the fact that the MI variable is established as a simple binary indicator (either the loan has MI (set to 1) or does not (set to 0)). Consequently, without controlling somehow for GSE underwriting practices or pressures exerted by mortgage originators on MIs, the fixed-effect will build in a blended view of these factors. Second, adverse selection manifested in a variety of ways could cause the MI fixed-effect to be positively related to default risk due to riskier loans being directed toward the MIs. This broad characterization of the adverse selection issue does not imply that there may not be any market subsets where MI contributes to lower default incidence (such as private label securities), but such a finding would still need to be validated against the adverse selection hypothesis outlined

⁷ Specifically, PD_i represents the probability of default for borrower i , where

$$PD_i = \frac{1}{1 + e^{\alpha + \sum \beta_i X_i + \psi MI}}$$

The expression on the right side of the equal sign reflects a logistic regression function that maps a set of risk attribute variables X (e.g., FICO, LTV, documentation type, etc.) and an MI fixed-effect (designated as a binary variable for whether the loan had MI (1) or not (0)).⁷ The parameters α , β , ψ are estimated.

above. Whether or not such an effect exists would need to be tested in a multivariate statistical model controlling for various risk attributes and using data more likely to isolate any market-based effects on MI companies.

A major contention by the MI industry is the value that dual underwriting brings to the origination process in providing additional scrutiny. The problem facing the mortgage insurer is one of adverse selection as characterized by Akerlof (1970).⁸ MI companies historically have set their own underwriting standards for mortgages. An integral part of this exercise has been performing loan underwriting functions independently at times from the loan originator. In this fashion, mortgage insurance companies have a mechanism for direct screening upfront of the quality of mortgages that they would be insuring. Detractors of this position maintain that this is a hollow argument since the MI companies migrated toward a delegated underwriting model and adoption of GSE automated underwriting systems (AUS).⁹ A closer look at the MI underwriting process and what changes occurred during the housing boom offer some insight into the relationship of MI and default risk during that period and why it is inappropriate to focus only on the default incidence issue.

The advent of automated underwriting models facilitated the movement of MI companies toward a delegated underwriting model. In 1996, Freddie Mac introduced Loan Prospector, followed closely by Fannie Mae's Desktop Underwriter. At the heart of these systems were statistical models that assigned a score to each loan based on the individual risk attributes of the borrower(s), product and collateral features. Loans having scores exceeding a prescribed cutoff were deemed acceptable risk and did not require a human to underwrite the loan so long as the lender submitted loan information required by the GSEs. Loans falling below the cutoff were

⁸ George Akerlof, "The Market for Lemons: Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics* (The MIT Press) **84** (3): 488–500

⁹ The ability to screen loan quality is just one of several means to control the "lemons problem". Other approaches include required representations and warranties and/or strong back-end quality control monitoring processes. In addition, once a loan defaults and is presented to an MI for a claim, it is reviewed to make sure the loan was underwritten according to the terms of the MI agreement. Underwriting defects that fall outside the agreement could wind up as loan rescissions. This provides the MI with an alternative, albeit late stage control of the adverse selection problem.

not rejected, but were reviewed at that point by an underwriter to take a closer look at the loan file. Touting the virtues that a model could make more consistent and objective underwriting decisions than a human, these systems grew in their importance over time leading up to the crisis.

Coupled with these technological advances was the growing market share of both GSEs. In 1995, for example, the combined share of the GSEs of total mortgage originations was about 36%.¹⁰ By 2003, this percentage climbed to 57%. From a strategic perspective, automated underwriting played a pivotal role for the GSEs and so gaining the support of the MI industry was critical. Although the GSEs AUS became virtually ubiquitous in the mortgage industry, it should be noted that some MI companies already had their own AUS models in place.¹¹ Thus, given the requirements for MI on loans over 80% LTV, the GSEs worked toward gaining acceptance by the MI companies over both systems early in their development. Differences between the GSE and MI scoring systems were assessed and in time, the MI companies came to support the underwriting decisions of these models albeit with modifications to their pricing of insurance for areas of risk the MIs deemed to be outside their risk tolerance. While an independent assessment of risk was conducted by each MI company, the growing influence of the GSEs at this time affected MI acceptance of the GSEs automated underwriting decisions. The adoption of the GSE AUS models would over time pose higher risks to the MIs from three possible sources: greater GSE risk tolerance due to inclusion of MI coverage in setting AUS cutoffs, expansion of GSE underwriting guidelines and adverse selection of the GSEs by loan originators.

AUS systems were designed to determine the probability that a borrower would default on their mortgage rather than the loss sustained once it entered default. But these models also could be used in maximizing the profitability of loans scored under an AUS, applying such metrics as total expected loss plus capital costs inclusive of MI offsets. However, moving to a loss-based cutoff taking mortgage insurance into account would certainly have facilitated higher risk loans

¹⁰ Inside Mortgage Finance Yearbook for 2007, p. 3; 2008 and also "Stabilizing the Mortgage Market" by James B. Lockhart III, speech given before the Urban Land Institute Terwilliger Center Annual Forum.

¹¹ PMI for example, had their automated underwriting scoring system called Aura, among others.

to be originated and covered by MI than without consideration of the offset from mortgage insurance. Herein lies a problem that with much of the MI premium structure under a borrow-paid MI model, the true costs associated with obtaining mortgage insurance would not be accurately captured in the GSE risk targets.

Compounding the effect would be the motivations by originators to adversely select the GSEs as noted by a number of researchers. For instance, Cutts, Van Order and Zorn (2001) offer a model for how GSEs would be adversely selected based on information asymmetries.¹² In particular, banks have an information advantage over the GSEs surrounding both the quality of the borrower and the value of the underlying collateral that the GSEs lack. This coupled with a flat-pricing structure by the GSEs drives riskier mortgage assets to securitization markets. Empirical evidence of this effect was found by Elul (2009).¹³ Examining securitized and nonsecuritized loans between 2003-2007, Elul found that securitized loans exhibited greater delinquency rates than nonsecuritized loans, holding a variety of risk factors constant. Passmore and Sparks describe a variant on the adverse selection problem that arises from automated underwriting processes.¹⁴ According to their model, underwriting costs (screening costs) from such systems are driven downward at first, allowing originators to screen more mortgage applicants and retain a greater share of less risky borrowers for their own portfolios at the expense of raising the risk profile of securitizers.

The theory and evidence suggests that originators were adversely selecting the GSEs and that the GSEs inadvertently promoted opportunities by originators to engage in this activity through the development of automated underwriting capabilities. Endorsement of these systems by the MIs coupled with greater emphasis on delegated underwriting by mortgage insurance companies

¹² Amy Crews Cutts, Robert A. Van Order and Peter M. Zorn, Adverse Selection, Licensing and the Role of Securitization in Financial Market Evolution, Structure and Pricing, Freddie Mac, White Paper, July 2001.

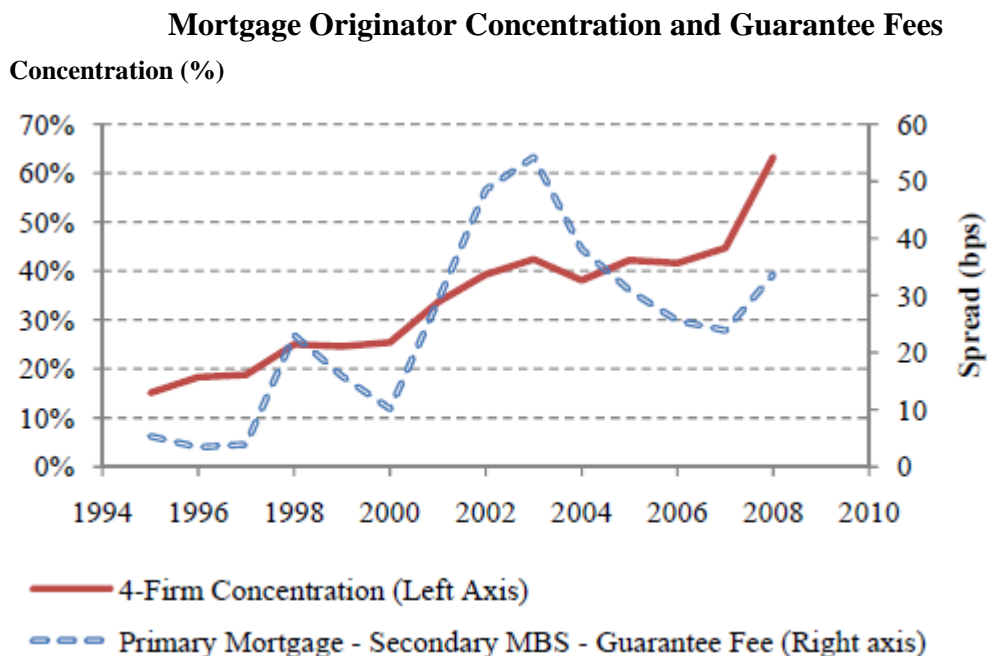
¹³ Ronel Elul, Securitization and Mortgage Default: Reputation Vs. Adverse Selection, Working Paper, No. 09-21, Federal Reserve Bank of Philadelphia, September 2009.

¹⁴ Wayne Passmore and Roger Sparks, The Effect of Automated Underwriting on the Profitability of Mortgage Securitization, White Paper, 1997.

limited the ability of these companies to perform sufficient screening to avert adverse selection. Moreover, the primary mortgage market was undergoing significant consolidation in origination and servicing such that it enabled several of the largest originators to wield considerable market power over the GSEs and mortgage insurance companies (Figure 3). Scharfstein (2011), for instance highlights the trend in originator concentration and guarantee fees over time.¹⁵

Certainly the MI companies bear some responsibility over their actions to move to delegated underwriting and GSE AUS endorsement; however, market concentration certainly imposed extraordinary pressures onto the MI companies. This does not imply that mortgage insurance is of limited value as an effective risk mitigant, rather it implies that a lack of strong oversight of the GSEs and originators imposed unnecessary costs onto the MI industry.

Figure 3



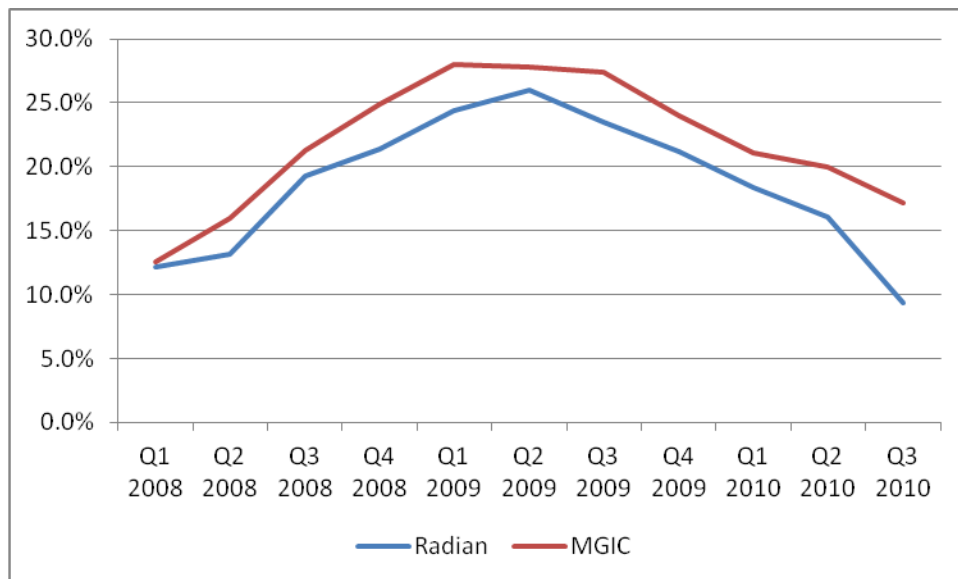
Source: Scharfstein (2011).

¹⁵ David Scharfstein, The Economics of Housing Finance Reform, Privatizing, Regulating and Backstopping Mortgage Markets, White Paper, February 2011.

To gain additional insight into adverse selection against MI companies, rescission rates by these firms over time have trended considerably higher than historically which according to one analyst had been about 7% (Figure 4).¹⁶ Unusually high rescission rates by these MI companies are consistent with widespread underwriting and collateral deficiencies during the housing boom¹⁷ While a combination of factors could trigger an MI’s rescission to pay a claim, in most instances it arises due to defects in the appraisal at the time of origination and/or underwriting negligence. Cutts, Van Order and Zorn acknowledge the appraisal issue as an example of adverse selection by originators:

Figure 4

Rescission Rates: Radian and MGIC



Source: Radian and MGIC public disclosures, 2011.¹⁸

¹⁶ Aleksandra Simanovsky, Moody’s Investors Service “ResiLandscape”, 2010. Declining rates shown in Figure 4 in more recent quarters may not fully characterize eventual rescission rates due to limited seasoning for claim submission.

¹⁷ Clifford V. Rossi, Anatomy of Risk Management Practices in the Mortgage Industry: Lessons for the Future, Research Institute for Housing America, May 2010.

¹⁸ Only Radian and MGIC publicly disclose their rescission rates.

“Banks are assumed to know the true value of the underlying collateral, and hence the true loan to-value (LTV), of the collateral, but SM knows only the appraisal of the value of any specific collateral, which is subject to error and manipulation. However, SM knows the distribution of true value given the appraisal. Hence, the banks can select against the *SM* by delivering loans with high appraisals relative to value.”¹⁹

At other times the rescission debate centers on whether the borrower misrepresented their profile in some way and whether or not the underwriter identified it. These issues are sometimes subtle in nature; however, they form the basis for vast differences in opinion between the insured and the MI company. Standard MI agreements provide an incontestability clause relating to borrower fraud that MI cannot be rescinded on the basis of misrepresentations made by the borrower during the origination process. However, the MI company may be able to put the loan back to the originator should the evidence show the underwriter was negligent in identifying the misrepresentation. In such cases, underwriters would have in some way neglected to follow the guidelines established for underwriting the loan which could include inconsistencies with other documents such as IRS 4506 tax statements, among others.²⁰ Some argue that elevated MI rescission rates reflect the MI company’s unwillingness to accept the underwriting practices covered in their agreements over the years; however, this assertion completely misses the impact that deficient originator underwriting promoted by advances in automated underwriting, adverse selection, regulatory practices and market power played in the process at that time. The fact that forensic loan reviews find considerable evidence of underwriting and collateral deficiencies today is consistent with other studies of underwriting practices at the time leading up to the mortgage crisis.²¹

The QRM provisions also overlook a major risk factor in their assessment of default incidence also contributing to adverse selection; namely channel risk. Specifically, many loan originators are exposed to varying degrees of loan sourcing or channel risk (sometime referred to as third-party originations (TPOs)) associated with a variety of process weaknesses and moral hazard

¹⁹ Cutts, Van Order and Zorn, p.7 where SM refers to the securitizer.

²⁰ Justin Vedder, MBA Repurchase Forum, presentation, September 22, 2010.

²¹ Rossi, Anatomy of Risk Management Practices in the Mortgage Industry: Lessons for the Future, Research Institute for Housing America, May 2010.

issues. How mortgages are sourced presents a major credit risk to the lender, investor and MI company (when applicable). Loans that are originated by the lender directly using internal underwriters, referred to as retail originations, have historically performed better than mortgages with the same characteristics but originated in either correspondent, mortgage broker or bulk purchase channels. Although correspondent lenders originate to guidelines of the loan aggregator, there may be deficiencies inherent in the processes that are not revealed until after the loan has been purchased by the aggregator. Moreover, mortgage brokers had little financial incentive to originate high quality loans as their business model and compensation structure was inherently production oriented. Jiang, Nelson and Vytasil (2009) for example, found that loans originated in TPO channels performed 50% worse than retail-originated loans.²² Decomposing this further, the authors found that 25% of the difference in performance was attributed to unobserved heterogeneity that could potentially reflect adverse selection on the part of the TPO. That adverse selection against large loan aggregators, the GSEs and mortgage insurance companies is apparent from the theory and empirical research. In that regard, caution must be exercised when drawing conclusions about MI credit effects at a time characterized by widespread moral hazard.

QRM, Default Incidence and the Effect of Mortgage Insurance

Adverse selection in mortgage markets during the mortgage boom as described in the previous section unfortunately renders the data from that period of limited value at least in some segments of the market to make a definitive case that mortgage insurance processes lead to statistically lower default rates than loans without MI. That does not imply that MI is not critical to strengthening mortgage risk management practices across the industry, but reflects a limitation of the data. At the same time, the analysis of volume and delinquency of mortgage loans by the FHFA also suffers from significant problems and hardly justifies a conclusion requiring a 20% down payment. Importantly, that study did not address at all the role of MI.

²² Jiang, Nelson, and Vytasil, Effects of Origination Channel and Information Falsification on Mortgage Delinquency, Working Paper, 2009.

The FHFA looked at loan level data from 1997-2009 from the two GSEs in examining the impact QRM risk factors would have on default frequency. Specifically, the FHFA examined credit score, LTV, product types, and debt ratios (front- and back-end ratios). The analysis assigned loans into cohorts according to the proposed QRM standards for each risk attribute. A comparison of the volume and delinquency effects between QRM and Non-QRM factors was then made showing that QRM-eligible loans outperform non-eligible loans by a wide margin. Holding the other risk factors constant, the FHFA then examined the incremental risk of relaxing QRM attributes one at a time, and showing incremental effects on delinquency rates and volume. Note that the existence of MI was not considered. Nor was the aggregate effect of incremental risk layering.

For LTV, the FHFA expanded the QRM limit from 80% on purchase money mortgages to 90%.²³ Figure 7 presents the results of this for purchase money mortgages. The effect that higher LTVs have on raising ever-90 day default rates is apparent in this data. LTVs between 80-90% default at rates between 2-2.5 times those of LTVs below 80% -- even though the absolute levels are low. This is not surprising since it is a well-established result in the mortgage default literature that the LTV – default relationship is nonlinear in LTVs above 80% due in large measure to the impact of negative equity on the mortgage default option.²⁴

Another way to view these results from the FHFA study is to observe their incremental effect on default rate against volume. Figure 8 compares the ever-90 day delinquency rates of QRM eligible loans (LTVs below 80%) versus the incremental effect on ever-90 day delinquency rates from allowing 80-90% LTV mortgages to be QRM-eligible. Weaknesses in underwriting taking place during the mortgage boom are apparent from about 2004-2008. Note, however, that the incremental effect of higher LTVs on QRM delinquency rates is more muted in the years before 2004, a period vastly different in underwriting standards and reflected by credit performance.

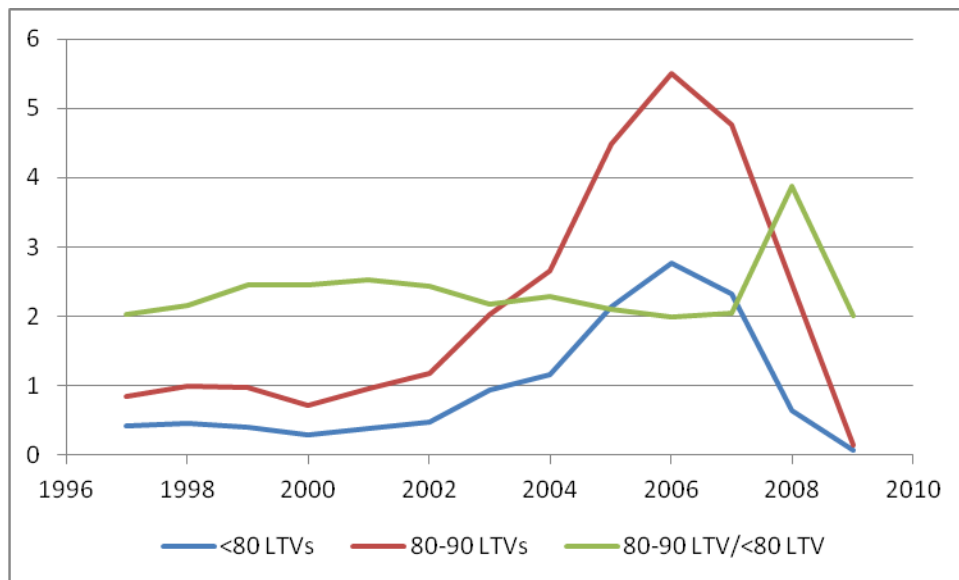
²³ The analysis also expanded LTVs for rate and term refinance loans from 75% to 85% and cash-out refinances from 70% to 80%.

²⁴ Foster, C., and Van Order, R. "An Option-Based Model of Mortgage default," *Housing Finance Review* 3 (4): 351-372, 1984.

Another feature of underwriting during that boom and completely ignored in the QRM proposal and the FHFA’s analysis is the impact that risk layering had on accentuating default rates during this period. That is, while the individual effects of one risk attribute such as LTV holding all others constant can be identified, the incremental risk may be magnified through the combination and interaction of other risk attributes. For example, borrower selection may dramatically alter

Figure 7

Ever-90 Day Delinquency Rates (%): <80% LTV and 80-90% LTV Purchase Loans (%)



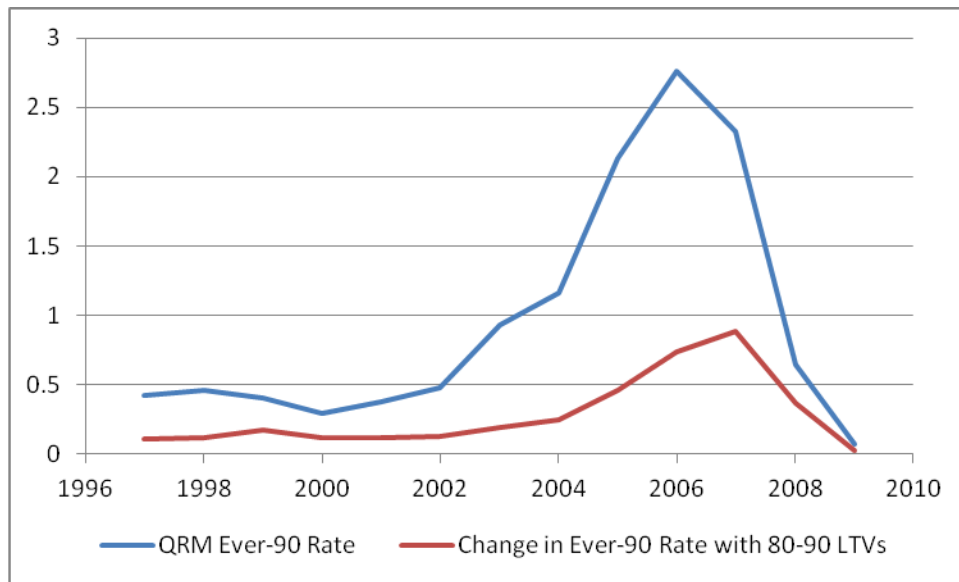
Source: FHFA data, Mortgage Market Note 11-02, April 11, 2011.

standard historical default relationships as may be reflected in the years leading up to the boom in Figure 8. A borrower obtaining a 90% LTV insured loan with a strong credit profile, fully documenting their income and managing their debt load to historically manageable levels may present a completely different risk profile than a borrower with a more complex risk profile

layering in marginal credit with higher debt, a 2nd lien mortgage and stating their income. Some evidence of this effect was presented by the GAO as shown in Figure 9.²⁵

Figure 8

Comparison of QRM-Eligible Delinquency Rates to Loans with LTVs 80-90% (%)



Source: Source: FHFA data, Mortgage Market Note 11-02, April 11, 2011.

In Figure 9, the incremental risk of the piggyback and low documentation present together in a loan is higher than the sum of the individual risks. The point is that during the boom, pervasive relaxation of underwriting standards led to significant risk layering which is embedded in the delinquency statistics reported by the FHFA. Without the historical experience to understand the risk trade-offs between factors, this product morphing greatly increased default risk and loss. In this case compensating factors for higher risk attributes were understated as effective risk offsets. Under the QRM proposal, the much tighter eligibility criteria for individual attributes appear to have swung in an opposite direction which may also pose unintended consequences on the

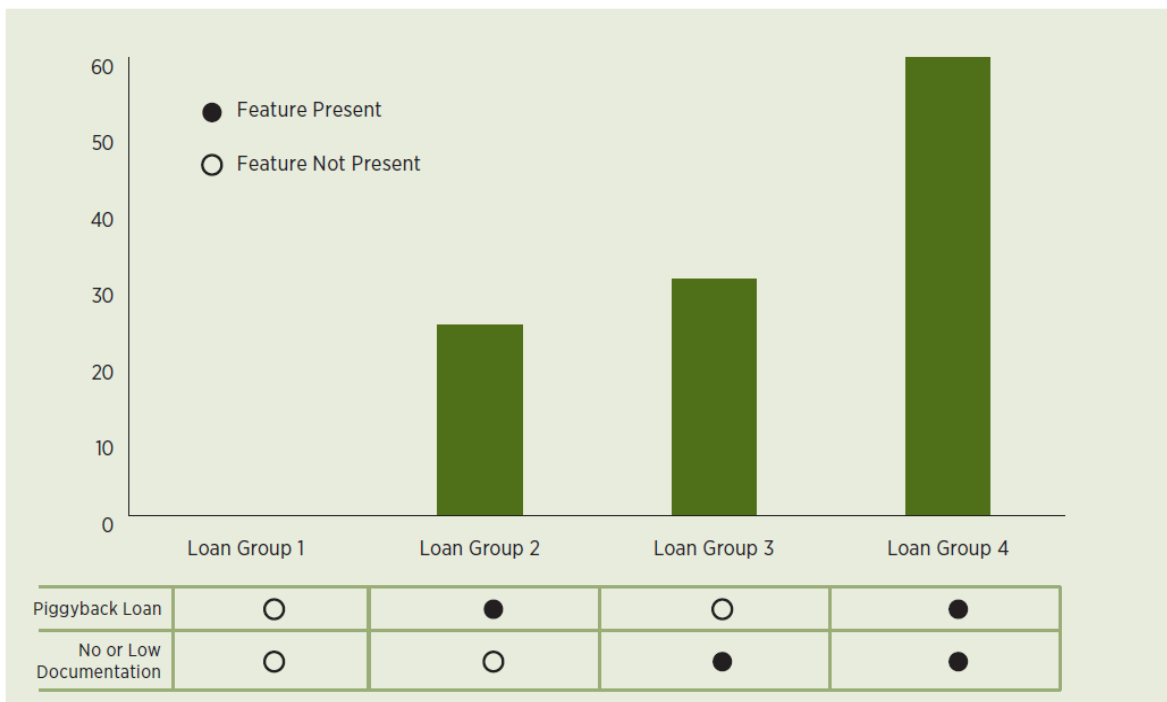
²⁵ General Accountability Office, Home Mortgage Defaults and Foreclosures, Recent Trends and Associated Economic and Market Developments, Briefing to the Committee on Financial Services, U.S. House of Representatives, October 10, 2007.

mortgage market and prospective homeowners in particular. As it relates to LTVs over 80%, the concept of requiring compensating factors held up well leading up to the mortgage boom (i.e., prior to 2004) as evidenced by the relative small effect on delinquency rates shown in Figure 8.

It is important then to distinguish risk factors that had never been seen before and broadly marketed versus risk factors that have a long track record of manageable default performance. In other words, LTVs above 80% while posing higher credit default risk have historically been manageable risk factors, particularly when coupled with mortgage insurance. However, exotic

Figure 9

Relative Increase in 60+ Delinquency Rates (%)



Source: Fitch Ratings

products and low documentation loans by contrast greatly changed borrower behavior and clearly the risk profile of the loan. The point is that underwriting practices from 2004-2008 were

not normal and hence a more appropriate period for understanding high LTV effects would be from years before when credit guidelines were far tighter than during the boom period.

Severely ratcheting back on LTV under the QRM proposal would significantly reduce the availability and/or cost of credit to a large segment of prospective homeowners. This is illustrated in Figure 10, where the percent increase in mortgage volume is depicted if loans between 80-90% LTV were QRM-eligible. To get some perspective of the magnitude of this restriction, consider the FHFA's analysis showing that relaxing QRM-eligibility for LTV to 90% for purchase mortgages, 85% for rate and term refinances and 80% for cashout refinance mortgages would increase the percentage of QRM-eligible volume for 2009 by more than 12%.²⁶ Applied against the total volume and assuming average loan balances in that year, allowing higher LTVs to qualify as QRMs would give approximately 450,000 more borrowers access to credit to buy or lower the cost of their existing mortgage.²⁷ By comparison, the impact of the first-time homebuyer tax credit increased the number of new buyers by 200,000-400,000.²⁸ In the short-term, expanding LTVs for high quality borrowers would help stabilize housing markets suffering from weak demand and oversupply. Over the long-term, excluding the period from 2004-2008 when layering of risk attributes was prevalent in the industry, expanded LTVs largely performed in line with expectations due in large measure to sound underwriting practices that limited the buildup of risk attribute combinations having little historical performance history. As discussed earlier, the QRM proposal's narrow view of risk defined as default incidence undermines good risk management practices and in the process is likely to impose higher costs on borrowers and prevent otherwise qualified borrowers from obtaining mortgage credit.

Here we have shown that the focus on default incidence also appears to overemphasize a period of time marked by underwriting excess, risk layering and adverse selection rather than focusing on appropriate risk mitigants that prudently manage credit risk while balancing the needs for

²⁶ FHFA Mortgage Market Note, Qualified Residential Mortgages, April 11, 2011, p. 4 and 17.

²⁷ The average loan amount in 2009 was \$202,330 according to FHFA Average Loan Size Files, Q4 2009.

²⁸ Harvard University, The Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing, 2010, 2010, p. 18.

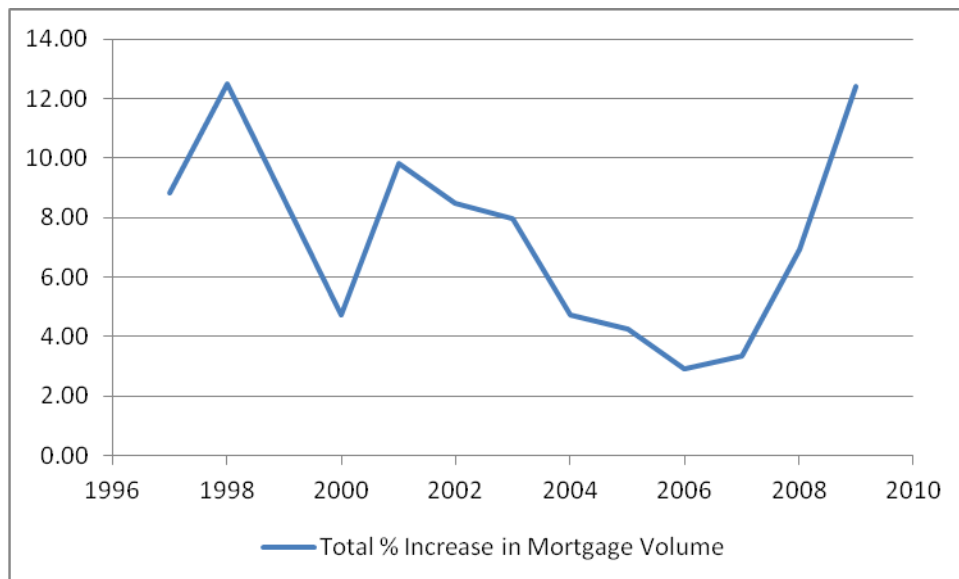
credit of well-qualified borrowers. The framers of QRM did not fully recognize the limiting effect of a default incidence criterion for QRM-eligibility. While the FHFA acknowledges the role that MI has in reducing default costs, the next section of the paper puts the risk mitigant feature of mortgage insurance squarely into clear focus.

Mortgage Insurance as an Effective Risk Mitigant

Mortgage insurance has been around for decades and historically has been an effective credit enhancement for mortgage loans. Among its benefits are an ability to diversify risk, mitigate systemic risk by infusing the mortgage market with private capital supported by strong countercyclical reserves, effective risk transfer and balance sheet management capabilities and strong quality control review processes. By far the majority of mortgage insurance contracts are

Figure 10

Percent Increase in Mortgage Volume if 80-90% LTV Loans are QRM-Eligible



Source: Source: FHFA data, Mortgage Market Note 11-02, April 11, 2011.

structured as borrower-paid (BPMI) at the individual loan (flow) level, however, the use of other arrangements such as pool level MI on loan portfolios provides risk managers with effective tools to dynamically adjust portfolio risk to established tolerances. Another important feature of mortgage insurance is its ability to diversify product and geographic risk. Lenders with a concentrated footprint geographically can rely on mortgage insurance to provide some measure of loss protection in the event of a downturn in that market up to certain concentration limits imposed on the contract. In addition, due in large measure to contingency reserving requirements imposed on the industry, mortgage insurance is inherently countercyclical. To gain a better perspective on this phenomenon, consider Figures 11 and 12.

Managing credit risk entails ensuring that the loans underwritten are of sufficient quality to perform both in normal environments but also in times of stress. Mortgage insurance companies are generally subject to strict capital standards. As a result, MI companies usually have a maximum risk-to-capital ratio of 25:1. The industry is required to hold three types of reserves although the contingency reserve is the more significant in terms of providing a capital cushion. The contingency reserve requires MI companies to set aside 50% of each dollar of premium for a period of 10 years for severe market events. Only if losses exceed 35% of premiums can the contingency reserve be tapped before the end of 10 years. In this fashion, the contingency reserve acts as a countercyclical buffer for MI companies as it builds this reserve in good economic periods and releases when needed during times of economic stress. Figure 11 illustrates both the countercyclical nature of these reserves and the capital buffer that exists for the industry. For example, in 2005 during the peak of the mortgage boom, the industry set aside its highest level of capital in the last 30 years. By comparison, Figure 12 shows inherent procyclicality of bank loan loss reserves over time. Specifically, bank loan loss reserve accounting policy promotes the buildup of smaller reserves during good economic periods and higher reserves during periods of higher losses. This reserving practice is inherently procyclical and can lead to credit distortions. Recently, countercyclical reserving strategies such as dynamic provisioning have attracted regulatory attention as potential methods to smooth out the abnormal

Figure 11

Mortgage Insurance Risk to Capital Trends

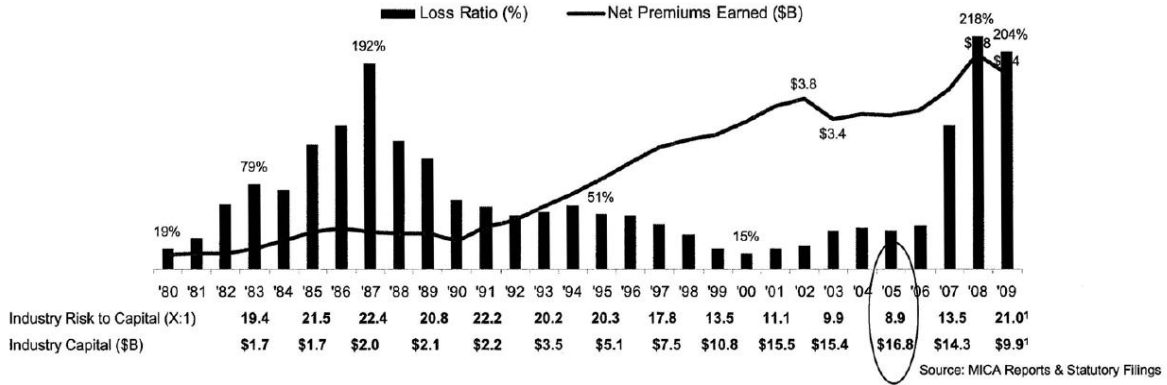
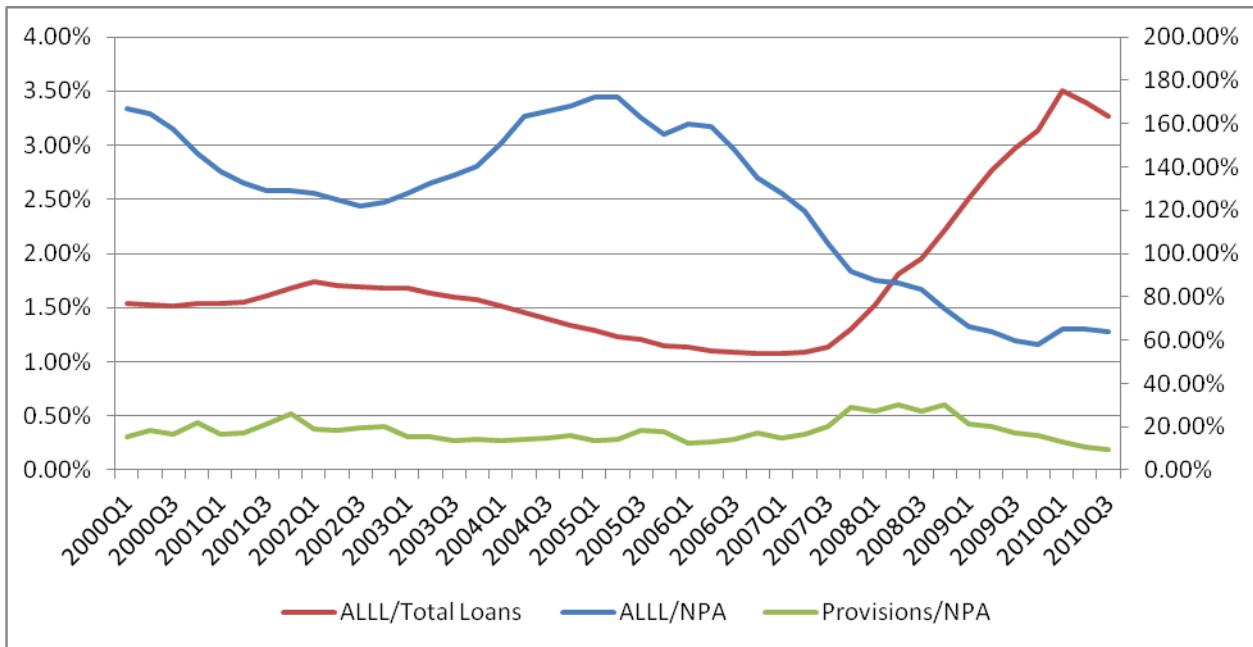


Figure 12

Commercial Bank Allowance for Loan and Lease Losses (ALLL) and Provision Trends
2000-2010



Source: FDIC Call Report Data. Note: Left axis references ALLL/Total Loans and right axis references ALLL/Total Loans and Provisions/NPA

swings in reserving activity. Contingency capital acts in a similar way as a form of dynamic provisioning to ensure prudent capital buffers are built in good economic periods.²⁹

While MI companies continue to operate under a delegated underwriting model, the quality control review of loans subject to insurance contracts has strengthened, becoming a critical post-origination risk management monitoring and control process to enforce discipline on the market. Through robust sampling of loans representative of insured risks, the quality control functions establish specific metrics of performance against which MI companies periodically review the results of lender performance relative to industry peers. Vigilant quality control processes are industry best practices that were not used as extensively during the mortgage boom as they should have been. In part the ascendancy of statistically-based underwriting processes marginalized the need for robust loan review functions. But quantitative-based risk measurement cannot substitute for expert review of loan files, particularly for loan products with limited performance history as was the case for nontraditional mortgages and those with high degrees of risk layering.

Conclusions and Summary Observations

The risk retention and QRM provisions in the Dodd-Frank Act were enacted as a well-intentioned response to a fundamental breakdown of prudent risk management processes of mortgage originators, adverse selection, a flawed GSE structure and weak oversight performed by safety and soundness regulators during the period. This led to considerable risk-taking in the form of untried nontraditional mortgage products marketed on a mass scale coupled with excessive risk layering. The advent of automated underwriting promoted greater reliance on quantitative estimates of risk than on fundamental principles of prudent underwriting. A flawed private-public mission GSE operating and regulatory model provided the vehicle for loan

²⁹ Balla, Eliana and Andrew McKenna, “Dynamic Provisioning: A Countercyclical Tool for Loan Loss Reserves, *Economic Quarterly*, Richmond Fed, Vol. 95, No. 4, Fall 2009.

originators to adversely select Fannie Mae and Freddie Mac. Increased market power exerted by both the largest originators and the GSEs contributed to pressures on the MI industry to delegate underwriting and adopt automated underwriting systems.

Unfortunately, the Congressional sponsors of QRM did not explicitly state that credit risk means reducing the incidence of default and reducing default loss even though this is well understood in the private sector. The regulators did not fully appreciate the value of mortgage insurance as an effective credit enhancement to mitigate risk broadly across the mortgage industry. Instead they limited their inquiry to default incidence. However, due to adverse selection and GSE market power experienced by MI companies in the years leading up to the crisis, any MI effect on default incidence using GSE loans is likely to yield limited to no statistical effect. Inferences drawn regarding the importance of MI from such analysis would be suspect as the MI variable may be reflecting adverse selection and market power effects. Instead future analytics should focus on isolating mortgage data that has less potential to be affected by these issues.

A decision to exclude mortgage insurance from QRM-eligibility ignores the value that it has had over a long period of time as an effective credit enhancement recognized by regulators, among others and supported by private capital. Risk needs to be framed by the totality of the exposure to the holder of the risk; namely both incidence and loss severity. Mortgage insurance provides ample diversification benefits for active and well-controlled risk transfer strategies that could be marginalized if mortgage insurance is not considered to be QRM-eligible. The mortgage crisis highlighted the flaws in the GSE structure that posed significant systemic risk by allowing Fannie Mae and Freddie Mac to grow well beyond reasonable levels. Mortgage insurance softened the systemic risk effects of the GSEs by absorbing significant losses on high LTV mortgages.

Loans with LTVs over 80% and covered by mortgage insurance enjoyed a strong track record leading up to the mortgage boom. A real danger now exists to exclude a large segment of well-

qualified borrowers should MI be omitted as a QRM-eligible factor. QRM is in large measure about reining in excessive credit risk. Important building blocks for strong risk discipline such as countercyclical capital and credit risk expertise exist in the mortgage insurance industry. Addressing market failures during the boom that undermined the structural benefits of mortgage insurance, position MI going forward as a substantive and highly qualified risk mitigant. With these changes, including mortgage insurance for expanded LTVs to at least 90% strengthens mortgage credit risk discipline and mitigates systemic risk exposure while serving the needs of a large segment of high quality borrowers.

References

1. Akerlof, George, "The Market for Lemons: Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics* (The MIT Press) **84** (3): 488–500.
2. Balla, Eliana and Andrew McKenna, "Dynamic Provisioning: A Countercyclical Tool for Loan Loss Reserves, *Economic Quarterly*, Richmond Fed, Vol. 95, No. 4, Fall 2009.
3. Calhoun, Charles A., *The Hidden Risks of Piggyback Lending*, White Paper, June 2005.
4. Cordell, Larry and Rob Dittmar, *Private Capital and Private Mortgage Insurance*, Federal Reserve/FDIC Conference, *The Future of Housing Finance*, presentation, October 2010.
5. Crews Cutts, Amy, Robert A. Van Order and Peter M. Zorn, *Adverse Selection, Licensing and the Role of Securitization in Financial Market Evolution, Structure and Pricing*, Freddie Mac, White Paper, July 2001.
6. Elul, Ronel, *Securitization and Mortgage Default: Reputation Vs. Adverse Selection*, Working Paper, No. 09-21, Federal Reserve Bank of Philadelphia, September 2009.
7. Federal Housing Finance Agency, *Qualified Residential Mortgages, Mortgage Market Note*, 11-02, April 11, 2011.
8. Foster, C., and Van Order, R. "An Option-Based Model of Mortgage default," *Housing Finance Review* 3 (4): 351-372, 1984.
9. General Accountability Office, *Home Mortgage Defaults and Foreclosures, Recent Trends and Associated Economic and Market Developments*, Briefing to the Committee on Financial Services, U.S. House of Representatives, October 10, 2007.
10. Harvard University, *The Joint Center for Housing Studies of Harvard University, The State of the Nation's Housing*, 2010, 2010.
11. *Inside Mortgage Finance Yearbook for 2007*, p. 3; 2008 and also "Stabilizing the Mortgage Market" by James B. Lockhart III, speech given before the Urban Land Institute Terwilliger Center Annual Forum.
12. Jiang, Nelson, and Vytasil, *Effects of Origination Channel and Information Falsification on Mortgage Delinquency*, Working Paper, 2009.
13. Office of the Comptroller of the Currency, Federal Reserve Board, Federal Deposit Insurance Corp., and the Office of Thrift Supervision, *Interagency Guidance on High-LTV Residential Real Estate Lending*, October 3, 1999.
14. Passmore, Wayne and Roger Sparks, *The Effect of Automated Underwriting on the Profitability of Mortgage Securitization*, White Paper, 1997.

15. Rossi, Clifford V., Anatomy of Risk Management Practices in the Mortgage Industry: Lessons for the Future, Research Institute for Housing America, May 2010.
16. Scharfstein, David, The Economics of Housing Finance Reform, Privatizing, Regulating and Backstopping Mortgage Markets, White Paper, February 2011.
17. Testimony by Kevin Schneider before the Committee on Capital Markets and Government Sponsored Enterprises of the House Committee On Financial Services April 14, 2011.
18. Simanovsky, Aleksandra, Moody's Investors Service "ResiLandscape", 2010
19. Testimony of Acting Assistant Secretary for Housing and FHA Commissioner Bob Ryan, U.S. Department of Housing and Urban Development (HUD) Hearing before the House Financial Services Committee Subcommittee on Capital Markets and Government Sponsored Entities on Understanding the Implications and Consequences of the Proposed Rule on Risk Retention, Thursday April 14, 2011.
20. US Treasury, Office of the Comptroller of the Currency, Proposed Rule, Credit Risk Retention Requirements, 12 CFR Part 43, April 2011.
21. Vedder, Justin, MBA Repurchase Forum, presentation, September 22, 2010.

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Dr. Rossi is Executive-in-Residence of the Center for Financial Policy and Tyser Teaching Fellow at the Robert H. Smith School of Business, University of Maryland. Prior to entering academia, Dr. Rossi had nearly 25 years' experience in banking and government, having held senior executive roles in risk management at several of the largest financial services companies.

His most recent position was Managing Director and Chief Risk Officer for Citigroup's Consumer Lending Group where he was responsible for managing the risk of a \$300+B global portfolio of mortgage, home equity, student loans and auto loans with 700 employees under his direction. While there he was intimately involved in Citi's TARP and stress test activities. He also served as Chief Credit Officer at Washington Mutual (WaMu) and as Managing Director and Chief Risk Officer at Countrywide Bank.

Previous to these assignments, Dr. Rossi held senior risk management positions at Freddie Mac and Fannie Mae. He started his career during the thrift crisis at the U.S. Treasury's Office of Domestic Finance and later at the Office of Thrift Supervision working on key policy issues affecting depositories. Dr. Rossi was also an adjunct professor in the Finance Department at the Robert H. Smith School of Business for eight years and has numerous academic and nonacademic articles on banking industry topics. Dr. Rossi is frequently quoted on financial policy issues in major newspapers and has appeared on such programs as C-SPAN's *Washington Journal* and CNN's *Situation Room*. He is currently writing a book, *Fundamentals of Risk Management* for John Wiley & Sons, Inc.