THE U.S. HOUSING FINANCE DEBACLE, MEASURES TO ASSURE ITS NON-RECURRENCE AND REFORM OF THE HOUSING GSEs

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Abstract

We provide another perspective regarding Fannie Mae’s and Freddie Mac’s impact on the recent financial crisis and conclude that the crisis and the GSEs being placed into conservancy was primarily caused by the proliferation of below prime mortgages, which led to their sustaining significantly higher default losses. We posit that the GSEs have unfairly served as scapegoats; whereas, the crisis was largely caused by the proliferation of private label subprime mortgage instruments and by Congress implementing social policies thru the GSEs without adequate default risk provisions. Our recommendations provide guidelines that may reduce the likelihood of a future similar crisis.
1. Introduction

A recent Federal Reserve survey found that the median family's net worth decline of 38.8% during the three-year period from 2007 to 2010 was driven largely by a broad collapse in house prices. It is also generally agreed that the housing price collapse resulted from the housing finance debacle. A number of studies and commissions have investigated the causes of the debacle and concluded that a primary contributing factor was lax government regulation and oversight in the mortgage and mortgage-backed securities market accompanied by low interest rates and easily attainable credit.\(^1\) Some studies also laid much of the blame for the housing finance crisis on the government sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, essentially using them as scapegoats because of their substantial involvement in subprime and Alt-A mortgages\(^2\) and their subsequent insolvency, which necessitated their being placed under conservatorship. Thus Congress, government officials and others were able to deflect a major part of the blame for the crisis on the structure of GSEs. This resulted in a request from the U.S. Department of the Treasury that Congress pass legislation to dissolve Fannie Mae and Freddie Mac and essentially eliminate government support of the nation's mortgage GSEs.\(^3\) An implicit assumption underlying the proposal for dissolution of the housing GSEs is that the free market will provide similar stability, liquidity, efficiency and standardization in housing finance to that provided by the GSEs during the past several decades. This may or may not occur; however, it is obvious, as may be observed from the structure of housing finance in Europe, that the housing finance market would change significantly if Freddie and Fannie are dissolved.\(^4\)

We suggest that the inherent structure of the housing GSEs is not flawed, and that given new operating guidelines their continued existence will provide needed future stability, liquidity, efficiency and standardization to the housing finance market. We posit that the housing GSEs’ insolvency resulted from their being directed to support affordable housing goals by politicians
promoting social agendas that conflicted with the historical GSE market roles. It is our contention that Fannie and Freddie began their march toward conservatorship with the passage and implementation of provisions of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA). The act directed U.S. Department of Housing and Urban Development (HUD) to require the two GSEs to purchase mortgages supporting HUD’s affordable housing mission, thus providing the initial market for subprime mortgages. The proliferation of subprime and Alt-A mortgages resulted from the pent-up demand from individuals who previously were unable to qualify for mortgages given traditional underwriting standards. The GSEs were strongly encouraged, if not formally compelled, to significantly increase their purchase of these mortgages and their derivatives to promote the social agenda of creating affordable housing and greater home ownership.

Our position regarding the GSEs is supported by a number of studies including LaCour-Little (2009) who observed that mortgage brokers grew in importance in the home mortgage origination process just prior to the mortgage crisis and has been linked to the surge in mortgage defaults and foreclosures. He also observed that mortgage loans originated by brokers cost borrowers about 20 basis points more, on average, than retail loans and that this premium is higher for lower income and lower credit score borrowers.

Jaffee, Richardson, Nieuwerburgh, White and Wright (2009) observe that the cause for the GSEs being placed into conservatorship were expanding credit losses and expected losses on their retained mortgage portfolios, primarily from their subprime and Alt-A positions. This is also supported by Ding, Quercia, and Ratcliffe (2010) who find significantly higher default rates for subprime mortgages. In their study focusing on a segment of low to middle income borrowers served by requirements of the Community Reinvestment Act, they observe that the neighborhood concentration of subprime lending is positively associated with the probability of
default and the resulting clusters of foreclosed properties reduce neighborhood property values and increased price volatility. It is rational that foreclosures and defaults are not only impacted by below prime mortgages but also by the neighborhood. For example, Rogers and Winter (2009) found that foreclosures likely have little neighborhood impact if there are few foreclosures in a neighborhood and the foreclosed housing can resell quickly. However, when there are many foreclosures along with a sluggish housing market, foreclosures can lead to neighborhood destabilization, and cause house prices to further fall. Their results show an expected decline in the sales price of neighboring sales but the marginal impact of foreclosures declines with an increase in the number of foreclosures.

The remainder of the paper is divided into seven sections. Section 2 identifies the GSEs relationship with the Housing Finance Crisis, Section 3 provides a background and causes of the financial crisis, Section 4 reports on the United States Financial Crisis Inquiry Commission Report, Section 5 develops the actuarial model that will be used to calculate default losses for both Fannie and Freddie, Section 6 discusses the default impact of below prime mortgages in GSE Portfolios, Section 7 covers the relationship between default losses and LTV ratios, and Section 8 contains the Conclusions and Recommendations for policy considerations and further work in this area.

2. GSEs and the Housing Finance Crisis

The housing GSEs have been the largest players in the U. S. housing finance system for several decades. They, along with Ginnie Mae, have facilitated standardization of mortgage contracts, liquidity, stability and efficiency in the mortgage market, and have provided effective mortgage financing for many millions of Americans primarily in the moderate to lower income brackets. On the other hand, any long-term plan for the housing GSEs must consider that they have already received government bailouts of $317 billion so far (Congressional Budget Office,
2011). Also, the government has purchased from the GSEs almost $800 billion of mortgage-backed securities, and the Federal Reserve recently announced Quantitative Easing III specifically targeting housing finance that proposes to purchase indefinitely, $40 billion per month of mortgage backed securities (MBSs). For additional evidence regarding the Federal Reserve’s role in creating the housing bubble, see Miles (2013 forthcoming).

Beginning in December 2007 and throughout the worst period of the financial crisis, most banks severely constricted their mortgage lending. However, despite the Department of the Treasury subsequently calling for the dissolution of Fannie and Freddie, the Office of Federal Housing Enterprise Oversight reports that the GSEs provided needed liquidity to the housing finance market by increasing rather than reducing mortgage lending (Office of Federal Housing Enterprise Oversight, 2008). They were responsible for approximately 90% of all mortgages being originated. Thus, at the beginning and throughout much of the mortgage crisis, liquidity provided by banks was in essence nonexistent. Thus the GSEs provided much of the needed liquidity, functioning essentially as lenders of last resort. Arguably, the mortgage market liquidity provided by Fannie and Freddie reduced the severity of the crisis rather than causing or adding to the crisis. It is debatable whether a proposed private lender cooperative model for residential mortgage would, in the event of a future crisis, provide the same degree of liquidity to stabilize the market.8

Proposals by The Redwood Trust plan (2011 and 2010) and the Federal Reserve Bank of New York (2010) both suggest the creation of a lender cooperative utility model to substantially reduce government’s participation in the residential mortgage market. In this model, securitization would be carried out by a mortgage cooperative mutually owned by financial institutions engaged in residential mortgage lending. This organizational form, however, is similar to the defacto organizational form that existed in the Federal Home Loan Bank Board
(FHLBB) System that regulated and provided oversight to the savings and loan industry. The FHLBB also oversaw the deposit insurer for savings and loans, the Federal Savings and Loan Insurance Corporation (FSLIC). In this structure, the savings and loan association members exerted significant real and political control over the FHLBB, which resulted in forbearance policies and other actions, which arguably exacerbated the severity of the savings and loan crisis of the 1980s and early 1990s. The parallel between the lender cooperative utility model and the defacto organizational structure of the FHLBB creates a situation where, again, the industry would have substantial real and political control of the cooperative, somewhat akin to the fox watching over the chicken coop.

Without reserves to absorb losses and the likelihood of continued mortgage defaults for both Fannie and Freddie, little potential exists for privatization without additional taxpayer bailouts. Thus, we recommend a return to the mission and operational program defined for Fannie Mae by the New Deal architects in 1938 and later adopted for Freddie Mac. The New Deal system worked effectively, without interruption for more than half a century until the original controls set in place to stabilize the housing and housing finance markets were essentially dismantled by Congress during the 1990s and early 2000s.

An objective of this paper is to suggest changes to the housing finance structure and operating guidelines of the GSEs that will provide assurance that the crisis will not be repeated. As suggested above, both Fannie and Freddie should return to the New Deal structure and operating practices that existed for many years prior to the 1990s. It is our contention that this restructuring plan for the GSEs will attain the goals outlined by the Federal Reserve Bank of New York study (August 2010) to promote the availability, stability, efficiency and standardization of mortgage finance for the core of the housing market while minimizing systemic risk and costs to taxpayers. Thus, in addition to returning the operational guidelines for
the GSEs to those established by the New Deal, we suggest during the resolution period for the GSEs a tried and effective structural model similar to the one used in the resolution of the savings and loan crisis.

The model used for the resolution of each institution during the savings and loan crisis was to create a good bank, which would be sold or merged with another bank and a bad bank. Bad assets were then placed in the Resolution Trust Corporation (RTC) for liquidation. However, some S&Ls were entirely liquidated. Similar to the resolution of the S&L crisis, we recommend that both Freddie and Fannie be divided into good banks and bad banks, where the bad assets are stripped from each GSE and placed in an organization similar to the RTC, which was the vehicle used to dispose of the bad assets in the S&L crisis. These assets would include REO, underperforming mortgages and those mortgages and mortgage instruments that will most likely default in the near future. Actions can then be taken to deal most appropriately with each bad asset in a manner which would be fair to the mortgagees and would minimize taxpayer cost. These costs, however, should be considered essentially sunk costs and should have little impact on the future structure of housing finance, the housing GSEs or their subsequent organizational form.

Subsequent to stripping the bad assets from each GSE, each would own lower risk, performing assets and with substantially reduced systemic default risk. Regressing to the New Deal operating guidelines, both GSEs would be required to operate under parameters of purchasing prime or third party (FHA or PMI) insured mortgages, and minimizing interest rate risk by securitizing rather than intermediating assets. We recommend that the practice of intermediation, i.e., holding mortgages indefinitely and issuing debt to finance the investment, which began during the 1990s, be minimized. The GSE change in focus to intermediation rather than securitization added significant interest rate risk to an already increasing default risk
resulting from the GSEs purchasing below prime mortgages and their derivatives. Thus, in future operations, Freddie and Fannie would be responsible only for the default risk of their respective securitized and guaranteed portfolios of prime mortgages. Securitizing essentially eliminates interest rate risk.

Cummins and Trainar (2009) provide further support for securitization over reinsuring. A Government guarantee may be considered a form of reinsurance. They demonstrate that when the magnitude of potential losses and the correlation of risks are high, such as with mortgage risk, the efficiency of reinsurance breaks down and the risk becomes unbearable. Securitization is more efficient by passing the risks along to broader private capital markets.

Once operating efficiently and in a sustainable manner, both Freddie and Fannie may again entertain privatization and initiate initial public offerings (IPO) where public policy may dictate that they retain their GSE status, or alternatively, each surrender their national charter and GSE status.

3. Background and Causes of the Financial Crisis

Because of questionable management decisions by both Fannie and Freddie on how to comply with affordable housing goals, the GSEs received blame for causing and exacerbating the financial crisis. These decisions made prior to the beginning of the crisis in 2007, motivated by social and political pressure exerted by the promotion of the Affordable Housing Policy goals, resulted in the GSEs taking on more risk by purchasing and providing markets for mortgages with reduced underwriting standards and increased intermediation rather than securitization. We hypothesize, however, that the basic GSE structure was not the problem and that the deviation from the original New Deal structure resulting from political pressure and the requirements of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA), as implemented by HUD, were at the root of the crisis.
The Financial Crisis Inquiry Commission report, “Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States,” which came out January, 2011, was meant to examine and explain to the American people the causes of the financial and economic crisis. However, even though the report thoroughly identified a myriad of factors that contributed to and exacerbated the crisis, it conveniently failed to identify the root, underlying cause of the crisis, which was the provision of FHEFSSA that required both Fannie Mae and Freddie Mac to support affordable housing goals by meeting Federal housing goals to purchase, as a percent of total purchases, subprime and Alt-A mortgages with reduced underwriting standards and down payments under 20%. This resulted in both Fannie and Freddie subsequently purchasing considerable quantities of below prime mortgages and collateralized debt obligation derivative securities backed by subprime mortgages. Thus, because of FHEFSSA, Freddie and Fannie provided the initial market for below prime mortgages, which the mortgage underwriting community was more than willing to support.11

FHEFSSA, as mentioned in its title, attempted to limit the risk borne by taxpayers due to federal sponsorship of Freddie and Fannie by requiring a level of capital sufficient to absorb substantial losses and provided a mechanism for closure if capital proved insufficient. However, the act also overrode its financial protection mechanisms by requiring that HUD set annual requirements for the two housing GSEs to purchase mortgages that were used to support “affordable housing” goals. This requirement resulted in the two GSEs purchasing subprime mortgages, Alt-A mortgages and AAA rated derivatives backed by lower grade mortgages. These GSE purchases cannot be identified as the sole cause of the subprime mortgage crises, but the act, by requiring the GSEs to support affordable housing goals provided the incentive and initial demand for private sector originations of these instruments.

In reaction to the GSEs’ support of affordable housing goals and their purchases of lower
credit quality, below prime, mortgages, the private sector, for mainly economic rather than for political reasons, were the main originators of subprime and, to a lesser extent, Alt-A mortgages and their derivative products. Thus, the market for lower-grade mortgages, which began with the GSEs, proliferated in the private sector to such a great extent that private sector originations resulted in exacerbating the recent world-wide financial crisis. Private sector lenders were essentially presented with a government endorsement to create low credit-quality mortgages for the creation of mortgage backed securities (MBS), asset backed securities (ABS) and collateralized debt obligations (CDOs). The endorsement including government sanctions implied government protection for investors from losses due to mortgage defaults and appeared to marginalize or eliminate virtually all loss risk that might accrue to the mortgage lenders and originators. The perceived government loss protection meant that the marketplace would have a virtually unlimited appetite to acquire such securities. Moreover, the protection appeared to guarantee a profit on every transaction for both lender and originator. The implication of unlimited transactions accompanied by guaranteed profits on each transaction constituted the economic “carrot” that implicitly accompanied the political “stick” imposed by the Community Reinvestment Act (CRA) and associated HUD affordable housing policy. This combination was ultimately responsible for dramatically inflating the magnitude of the debacle. Thus, we posit that the combination of an “economic carrot and political stick” is the root cause underlying the “perfect storm.”

The economic carrot may explain why, especially during the 2000-2007 time period, the growth in the below prime mortgage market was mainly a non-GSEs phenomenon. Growth occurred from less traditional mortgage originators and was funded by non-GSE or “private label” securities (ABS and CDOs). However, the two GSEs purchased a large portfolio of AAA rated tranches of CDO backed by below prime mortgages in response to affordable housing
goals. We observe, in our subsequent analysis of default losses; however, that investments in both below prime mortgages and derivative products were responsible for a large share of their credit losses.

Numerous studies have analyzed the performance of the GSEs and the cost of the implicit government guarantee; however, in this paper we analyze Fannie and Freddie default risk between 2001 and 2011 and update studies by Gatti and Spahr (1990, 1995 and 1997) that explicitly enumerated the cost of government’s implicit guarantees of Freddie and Fannie both before the FHEFSSA and the proliferation of subprime mortgages (1990 and 1997) after the FHEFSSA and the requirement for the GSEs to purchase subprime mortgage instruments (1995).

Gatti and Spahr (1990 and 1997) demonstrated manageable risk associated with the GSEs’ implicit guarantees before subprime mortgages. However, Gatti and Spahr (1995) also projected that the impact of meeting affordable housing goals through purchases of subprime mortgage instruments would significantly increase mortgage default risk and compromise the solvency of the GSEs. Moreover, because of Government’s implicit guarantee of the GSEs, they predicted subsequent high bailout costs to the federal government and ultimately the taxpayer. This study, funded by HUD, took place after the GSE’s requirement to support affordable housing goals and the resulting proliferation of subprime mortgage instruments.

Gatti and Spahr (1995) in their report to HUD included a section on Additional Capital Needs and Surveillance of Credit Risk (page 15). In this section, they stated:

The Act requires that the mortgage purchases necessary to meet affordable housing goals must not have a significant adverse impact on the financial condition of FNMA or FHLMC. --- Incremental risk may come from either increased interest rate risk or credit risk. A change in the level of interest rate risk can occur only if the GSEs are forced to increase the proportion of the purchased mortgages retained in their portfolios, ---

Credit risk is a different matter. Unless one believes that targeted borrowers are no more likely to default than the marginal borrower and have been excluded from the market for noneconomic reasons, compliance should be expected to lead to an increase in the default experience of the GSEs. At this point in time it is too early to determine whether affordable housing mortgages carry a greater risk of default. Such mortgages have not been separately
identified for more than a few years, and mortgage defaults are normally very low in the early years, increasing to a maximum after the mortgages are about five years old. If, in the future, it turns out that affordable housing mortgages carry higher credit related costs, and GSEs are unable to raise guarantees fees on these mortgages to compensate for the greater risk, additional GSE profitability is likely to suffer and additional capital infusion will be necessary in order to maintain the same level of risk.

At the moment there is no evidence available on differential risk and, therefore, no way in which to base an estimate of additional fee income or higher capital requirements. Given this uncertainty, HUD must put in place a system to monitor the differential credit risk and estimate the amount of additional capital necessary to maintain the GSEs’ current financial condition. A methodology has been developed by Gatti and Spahr that can be used to generate those estimates. -- To the extent that the GSEs incur more credit risk because of compliance with the housing goals, the value of this federal guarantee will rise.

Thus, Gatti and Spahr (1995) differentiated the risk of “Affordable Housing Mortgages” (below prime mortgages) from the default risk associated with the prime mortgage proportion of Freddie’s and Fannies’ mortgage portfolios on which they had performed a similar risk analysis in 1990 and which was subsequently published in 1997.

A parallel study funded by Fannie Mae by Stiglitz, Jonathan and Peter Orszag (2002, p. 2) observed the following: They conclude:

that the probability of default by the GSEs is extremely small. --- For example, if the probability of the stress test conditions occurring is less than one in 500,000, and if the GSEs hold sufficient capital to withstand the stress test, the implication is that the expected cost to the government of providing an explicit government guarantee on $1 trillion in GSE debt is less than $2 million. --- Even if the analysis is off by an order of magnitude, however, the expected cost to the government is still very modest.

The difference between Gatti-Spahr (1995) and Stiglitz-Orszags (2002) is that the prior study employed an actuarial-risk management methodology; whereas, the subsequent study adopted a financial institution stress test methodology. Thus, future studies assessing solvency issues of the two GSEs or default risk in general should consider the dramatically different risk assessments of these studies when selecting a methodology.

Bokhari, Torous and Wheaton (2012), using extensive loan-level data from Fannie Mae over the sample period 1986 to 2010, estimated an interest rate elasticity of demand of -0.37. They also imply that when mortgage interest rates declined from 10% to 5% (as they did during
this time period) on initial LTV ratios of 72% (avg. LTV in 1986), leverage demand rose by 18.5% to an LTV average ratio of 85%. They observed that the fraction of risky, high LTV ratio, mortgages (LTV ratios higher than 90%) increased over the 1986 to 2010 time period. For example, the fraction of mortgages with LTV ratios greater than 90% increased from 7% in 1992 to over 15% by 1999, and by 2007, high LTV mortgages made up approximately a fifth of all mortgages in their sample. Consistent with arguments by Acharya et al. (2011) and others, this analysis suggests that the quality of loans purchased by Fannie Mae deteriorated over time. We find that this was also the case for Freddie Mac. They found that generally poorer, younger and riskier (those with low FICO scores) borrowers were leveraged the highest.

Bokhari, Torous and Wheaton’s findings are consistent with the prediction of proliferating subprime mortgages made by Gatti-Spahr (1995) and confirm the impact of the Federal Housing Enterprise Financial Safety and Soundness Act of 1992, which changed the residential mortgage market and traditional underwriting standards.

4. The United States Financial Crisis Inquiry Commission Report

The United States Financial Crisis Inquiry Commission (FCIC) Report (2011) was a very thorough and exhaustive study on the causes and implications of the financial crisis. The FCIC report contains both a majority opinion and two opinions dissenting from the FCIC majority's conclusions.

The conclusions of the FCIC's majority ascribe the primary cause of the financial crisis to lax government regulation and oversight in the mortgage and mortgage-backed securities market accompanied by low interest rates, easily attainable credit and toxic mortgages that spurred the rapid deflation of the housing bubble. That collapse catalyzed a series of events that resulted in losses of hundreds of billions of dollars from mortgages and mortgage-related securities, which negatively impacted both the real estate and the financial markets. Financial institutions that had
overexposed themselves to subprime mortgages and borrowed significantly against them were facing insolvency. Global losses were magnified by derivatives and synthetic securities. The Commission concluded that the crisis was avoidable and stemmed from failures in regulation and supervision. In short, the combination of rampant borrowing, risky investments, and a stark lack of transparency throughout the financial system caused the financial crisis. The FCIC’s majority findings further conclude, first and foremost, that the financial crisis was completely avoidable and disagreed with the Wallison (2011) dissenting opinion regarding Government’s and Freddie and Fannie’s role in precipitating the crisis. The majority conclusions were that Fannie Mae and Freddie Mac played insignificant roles as a cause of the crisis because even though the GSEs did participate in the expansion of subprime mortgages, they followed the lead of Wall Street.

The majority also dismisses Wallison’s second point that the government's housing policy precipitated the crisis because the Commission claims the affordable housing goals only slightly contributed to Fannie Mae and Freddie Mac’s participation in these mortgages. Moreover, it claims that government policy had historically incentivized homeownership through assistance programs and mandates, so the Community Reinvestment Act’s (CRA) only effect was to combat “redlining,” or the practice of denying credit to individuals or businesses in certain geographic regions without any regard to the specific applicant's creditworthiness.

By contrast, Wallison (2011) lays the blame largely on Fannie and Freddie because of their role in inflating the housing bubble that triggered the crisis. He attributes the financial crisis primarily to the United States government’s housing policy of seeking to increase homeownership. He notes that the only means to achieve this goal was through a concerted effort to reduce mortgage underwriting standards that resulted in the creation of 27 million subprime and the addition of risky mortgages, well beyond the number that the free market would have produced or could safely accommodate.
The HUD policy resulted in the most intense and longest lasting housing bubble in the history of US residential finance. Moreover, Wallison’s dissent identifies three primary mechanisms through which HUD pursued this policy: imposing the 1992 congressional affordable housing requirements on GSEs, its control over the policies of the Federal Housing Administration (FHA), and its “Best Practices Initiative” for subprime lenders and mortgage banks to encourage/compel greater subprime lending in the private sector. The GSE’s Affordable Housing Mission affixed a quota for the percentage of Fannie Mae and Freddie Mac mortgage acquisitions that had to be loaned to low-and-moderate income borrowers. That percentage was 50% in 2000, increasing to 56% in 2008. In order to meet that quota, the GSEs were forced to reduce mortgage underwriting standards applied when acquiring loans from originators. The Community Reinvestment Act (CRA) of 1995 required insured banks to prove they were actually making loans to low income borrowers in low-income communities. In many of these cases, a qualifying loan under the CRA was one to a borrower at or below 80% of the area median income (AMI). CRA policy paralleled that of HUD for the GSEs and forced them to compete with FHA and banks for the same mortgages. When coupled with the HUD’s Best Practices Initiative’s explicit intent to reduce underwriting standards so as to increase access for low-income borrowers to mortgage credit, it formed a perfect condition for the housing bubble. In short, government’s pursuit of a specific social policy - increasing home ownership by increasing the availability of mortgage credit to LMI borrowers - had significant and unintended adverse consequences, including the fact that competition for HUD’s approval of their CRA – mandated activities forced agencies and financial institutions to continue injecting money into the housing market long after the bubble would have deflated on its own.

As we will show in our subsequent analysis of Fannie and Freddie default losses when the bubble began to burst in 2007, the loans created by government policies failed in astounding
numbers. The impact of defaulting mortgages was intensified by the fact that few knew the GSEs had acquired so many subprime and other high-risk loans. The lack of transparency regarding Fannie and Freddie’s subprime portfolio was perhaps a result of a concerted effort to conceal their default risk. This disputes the majority's allegation that 30 years of deregulation precipitated the crisis and blatantly ignores the government's role in the crisis. If government housing policies caused the financial crisis, then the Dodd–Frank Act is, at best, purely an exercise in unnecessary legislative interference. The appropriate policy response is a reduction or elimination of government’s interference and direct imposition of social goals in the residential mortgage markets.


Unlike life and automobile insurance, it is unreasonable to assume independence between frequency and severity of Fannie Mae and Freddie Mac mortgage default losses. It is also unreasonable to assume zero autocorrelation of losses from year to year. During most years, GSE default risk experience may be categorized as low frequency and low severity with relatively low default losses; however, the potential exist, because of declines in housing prices, for both frequency of default and severity of default to persistently remain high and result in catastrophically high losses for consecutive years. This means that under most economic conditions the probability of any single mortgage defaulting is rather low with the expected loss, given that loan has defaulted, being rather small. However, under a few, usually recessionary, economic states (when housing prices are falling or have fallen from previous levels and many houses are “underwater”) both frequency and severity of default may increase exponentially resulting in high realized default losses. These high losses usually persist for a number of years. This was the case during the crisis of 2007-2009 when the housing bubble burst and housing values plummeted.
One expression that allows consideration of both dependencies between default frequency and severity and serial (autocorrelation) dependencies expresses the mean and variance for individual mortgage pure risk premiums as the product of two random variables.\(^{13}\)

\[
E(x) = E(zy) = E(z)E(y) + \text{Cov}(z,y)
\]  
(1)

and

\[
\sigma^2_x = E(z)^2\sigma^2_z + E(y)^2\sigma^2_y + 2E(z)E(y)\text{Cov}(z,y). \quad \text{\(14\)}
\]  
(2)

Where,

- \(z\) = frequency of mortgage defaults;
- \(y\) = severity of mortgage defaults – percent of remaining principal lost given the mortgage defaulted;
- \(x\) = default loss experience as a percent of remaining principal balance;
- \(E(z)\) = the annual expected probability of a default (frequency) for mortgages;
- \(\sigma^2_z\) = the variance of the frequency of default occurrence;
- \(E(y)\) = the expected amount of loss (severity), measured annually, as a percent of remaining loan balance if a default occurs for guaranteed mortgages or MBS;
- \(\sigma^2_y\) = the variance of the loss severity per unit risk of guaranteed mortgages;
- \(\text{Cov}(z,y)\) = the covariance between the frequency and severity of mortgages;
- \(E(x_i)\) = the expected mean pure premium (hereafter MPP) for the guaranteed mortgages.

Relationships (1) and (2) demonstrate the bias that may result from simply multiplying the average annual frequency and severity to obtain annualized loss estimates. Because of possible covariance between frequency and severity, either expressions (1) and (2) may be used to estimate the mean and variance of annual losses or they may be calculated individually for each year by the product of annual frequency and annual severity. The model also includes the impact of a first order autoregressive stationery process when losses from year to year are correlated with \(-1 \leq \rho \leq 1\).

When applying this actuarial default loss expression to real estate mortgages, the potential for catastrophic losses exist because of the presence of positive covariance, \(\text{Cov}(z,y)\), between the expected frequency of default, \(E(z)\), and expected severity of loss given default,
Since most economic/housing cycles, whether recession or boom, may last for more than one year, mortgage default risk may also display a time dependency. In addition, real estate default risk may also display autocorrelation across time. During periods of severe distress in residential real estate markets, default (frequency) rises concurrently with loss severity. Thus, because of dependencies between frequency and severity and autocorrelation dependencies, default losses may increase geometrically during market downturns. Statistical dependencies for mortgage losses result in episodes of high realized losses for guarantors, in this case, Freddie Mac or Fannie Mae. During such periods, Fannie Mae and Freddie Mac, as well as any mortgage guarantor, are less likely to possess the ability to meet their obligations. This scenario was perfectly scripted from 2007 through 2009 forcing the housing GSEs to exercise their put option and requiring the federal government to honor its implied guarantee, or in other words a government bailout. Thus, Freddie Mac and Fannie Mae’s default loss pure premiums depend not only on the mean annual frequency and severity of losses, but also on the dependency terms. This may explain why Stiglitz, et. al. (2002), using as stress test, approach failed to predict the pending crisis for the GSEs.

Mortgage defaults may result from changes in the ability and/or desire of borrowers to maintain monthly payments and the relationship between the market value of the mortgaged property and the unpaid mortgage balance. Under “normal” economic conditions, default losses tend to be restricted to isolated instances of economic adversity affecting individual borrowers and idiosyncratic or regionally isolated declines in market values. With traditional underwriting standards and in the absence of widely generalized, systemic, economic distress, borrowers’ equity positions in prime mortgages generally allow lenders to avoid losses resulting from foreclosures if housing prices are generally stable or increasing. Thus, both frequency and severity will be low. Such was the general state of the economy during from the early 1990s to
2006. A steady growth in the economy, with a slight recession in 2000, caused housing prices to generally increase. Price levels were also further stimulated by low interest rates and the additional demand for housing caused by the prevalence of below prime lending. However, during the economic recession, 2006-2009, with widespread interruption of income and falling property values, both frequency and severity of default increased. For below prime mortgages, where loan to value ratios (LTV ratios) were often above 97% (Pinto, 2011), lower underwriting standards and the lack of a borrower’s equity position resulted in almost immediate default.

Economic states leading to mortgage losses have occurred briefly during the late 1970s, 1980s, early 1990s and more recently beginning in 2006 up to the present. The recent crisis resulted in the most severe downturn in residential housing prices during Freddie Mac’s and Fannie Mac’s existence (1938 until now for Fannie). Capital levels and risk management practices for Freddie and Fannie were not sufficiently robust to allow the GSEs to survive the crisis. Default risk assessment must include entire housing cycles to collect a reliable set of data.

Possibly, as a result of being placed into conservatorship, both Fannie Mae and Freddie Mac declined when asked to provide loan-level default experience data; however, we have formulated Table 1 from many sources including data from the 2001 through 2011 Annual Reports of the two GSEs. Also, another complicating factor is the reliability of the data reported from all sources as a result of the December 16, 2011 Securities and Exchange Commission charging six former top executives of Fannie Mae and Freddie Mac with securities fraud, alleging they knew and approved of misleading statements claiming the companies had minimal holdings of higher-risk mortgages. This draws into question whether annual reports and statements significantly under reported risky mortgages. For example, Fannie Mae in 2007 reported that Alt-A mortgages made up 11 percent of their Total Book of Business; whereas, it is claimed by the SEC that they actually made up 18 percent of Fannie’s Total Book of Business.
In 2008, Freddie Mac claimed only $6 billion of subprime risk exposure; however, it is alleged that they actually had $250 billion. Likewise at the same time, Fannie Mae reported subprime risk exposure of $8 billion when in fact had exposure to $110 billion.

We compile the “Annual Credit Related Expenses” and the “Total Credit Guarantee Portfolio” for both GSEs. We have no reason to believe that these data were under-reported as were the magnitude of below prime including subprime and Alt-A mortgage loans. We also were able to estimate default severity rates for each year from data reported by MetWest in their Mortgage Market Monitor reports of mortgage loss severity data originally obtained from First American CoreLogic. Also, Freddie Mac reported loss severity measures for some years. This allowed us to estimate the effective annual default losses incurred by both Fannie and Freddie, the average over the eleven year time period and the 90 percent confidence interval for default losses during this time period. We also incorporated the impacts of both correlation between default frequency and severity and first order autocorrelation. For example, in Table 1, Fannie Mae had annual default losses of only 1.005 basis points (0.01005%) during 2001; whereas, default losses during the worst year of the mortgage crisis, 2009, resulted in Fannie Mae absorbing default losses on their Total Credit Guarantee Portfolio (Mortgage Credit Book of Business for Fannie Mae) of 233.290 basis points (2.3329%). Default severity rates were estimated at 22.6% for Freddie Mac during 2001 and reached a high of 61% in 2011 for both Fannie and Freddie. The correlation over the 2001 through 2011 time period between frequency and severity of default losses was 0.84 for Fannie and 0.76 for Freddie. First order autocorrelation for Fannie was 0.71 and 0.74 for Freddie. The 90 percent confidence interval for default losses for Fannie was (-0.01466 to 0.02687) and (-0.00927 to 0.01619) for Freddie. The 95 percent confidence interval for default losses for Fannie was (-0.01864 to 0.03084) and (-0.01171 to 0.01863) for Freddie. To place the confidence intervals into perspective, Fannie
should experience losses exceeding 2.687% or higher only 10 years out of 100 years. During the period of study, the highest annual default loss for Fannie and 2009 was 2.33%. Since insurance premiums are often set at 90 percent confidence levels, 2.33% may be considered an appropriate default risk premium for Fannie Mae; however, including additional years in the sample may reduce this estimate. Also, by changing the operating parameters for both GSEs, default risk premiums would undoubtedly be reduced considerably.

Insert Table 1 about Here

Fannie Mae and Freddie Mac annual reports, because of unreported and under reporting of risky mortgages, provides no differentiation between default losses on prime versus subprime/Alt-A loans. However, a publication by the Federal Reserve Bank of Chicago, using loan-level data from Lender Processing Services Applied Analytics by Amromin and Paulson (2010) allowed us to estimate default rate differences between prime and subprime/Alt-A mortgages. They calculate the cumulative default experience for loans originated in a given year as a function of how many months it has been since the loan was underwritten. Not surprisingly, they observe that the performance of both prime and subprime loans originating each year from 2004 to 2007 had gotten substantially worse as we entered the mortgage crisis period. They also observe that mortgages originated in 2006 and 2007 defaulted at much higher rates than mortgages originated in 2004 and 2005. The default experience among subprime loans started deteriorating earlier, with rates being higher for loans made in 2005 than in 2004. Defaults among subprime loans were much higher than defaults among prime loans. For example, prime mortgages originated in 2004 had defaults on 5.11% of mortgages over the first 21 months; whereas, subprime mortgages that defaulted during their first 21 months was 23.35% (4.57 times the default rate on prime mortgages). Also, for prime mortgages originated in 2006, defaults over the first 21 months were 10.51% of mortgages, whereas the rate for subprime mortgages...
that defaulted during their first 21 months was 43.75% (4.16 times the default rate on prime mortgages). For the other two origination years (2005 and 2007), default rate differences between prime and subprime mortgages for the first 21 months were 6.46 and 5.02 times default rates on prime loans. On the average for the first 21 months after origination for each mortgage, subprime mortgages defaulted 5.05 times the default rates on prime mortgages. Since subprime default losses were consistently approximately 5 times the losses on prime mortgages, we assumed that this ratio is constant for our sample period.

6. The Default Impact of Subprime and Alt-A Mortgages in GSE Portfolios

Given Amromin and Paulson (2010) results, we assume that subprime mortgages defaulted at five (5) times the rate of prime mortgages. As a result of the reporting fraud discussed above, there are no reliable data on the subprime and Alt-A risk exposure for Fannie and Freddie; therefore, we estimate that subprime and Alt-A mortgages represented approximately 20% of all mortgages held or guaranteed by Fannie and Freddie.

From our analysis, it is apparent that much of the credit losses from defaults resulted from the GSEs holding or guaranteeing subprime mortgages. For example, of the credit losses from mortgage defaults incurred by Fannie Mae in 2009 of $75.345 billion, an estimated $41.858 billion were the result of subprime mortgage defaults. Given the Mortgage Credit Book of Business for Fannie Mae in 2009 of $3,229.665 billion, this represents default losses for their entire book of mortgages of 1.296% or 129.6 basis points on their entire portfolio or an estimated 6.48% or 648 basis points on their more risky, below prime, portfolio.15

The prime portfolio held or guaranteed, however was not totally composed of conventional mortgages with at least 20 percent down payments and prime grade underwriting standards. Between 2005 and 2007, few of the mortgages acquired were conventional, fixed-interest loans with 20% down. Fannie Mae's loan acquisitions were 62% negative amortization,
84% interest only, 58% subprime and 62% that required less than 10% down payment (U.S. Department of Housing and Urban Development, 2008). Freddie Mac's loans were even more risky, consisting of 72% negative amortization, 97% interest only, 67% subprime and 68% that required less than 10% down payment.

It was the preponderance of exotic loans in addition to subprime borrowers that made Fannie and Freddie's loan acquisitions and therefore their securities so toxic.

Table 1 indicates that in 2005 the two GSEs held or guaranteed a total of $4.04 trillion of which it is estimated that $758 billion were subprime and Alt-A; whereas, by 2009, the two GSEs held or guaranteed a total of $5.48 trillion of which it is estimated that $1.059 trillion, or about 20%, were below prime. In all, the two GSEs were involved in at least half of all new mortgages originated each year for the study period. According to the Office of Federal Housing Enterprise Oversight, by December 2007, when banks began to constrict their lending, Fannie and Freddie were responsible for 90% of all mortgages originated. Thus, when the mortgage crisis was beginning, liquidity provided by banks and mortgage companies was in essence nonexistent. Thus, the housing GSEs were essential to the continued availability of housing finance and they provided just about all of the liquidity/capital in the residential markets. Arguably, the willingness of Fannie and Freddie to make loans and provide mortgages reduced the severity of the crisis rather than exacerbating it further. Although the GSEs subsequently needed a bail out, they were essential for keeping the markets at least somewhat active.

The impact of below prime mortgage purchases directly impacted the solvency problems at the GSEs. For example, in 2007, using data from the Federal Housing Finance Agency, purchased mortgages with LTV ratios greater than 80% represented 42.4% for Fannie Mae and 36.9% for Freddie Mac of total purchased mortgages. Fannie and Freddie increased their holdings of risky mortgages because they could make more money from holding (intermediating)
loans with higher interest rates rather than from guarantee fees. Prior to conservatorship, the GSEs were seeking to maintain high stock prices during a very competitive housing market. As reported by Barron’s, by 2007 approximately 17% of their total portfolio was either subprime or Alt-A loans, although this number is highly suspect in light of the recent SEC allegations. If these data were accurate, the GSE’s percentage of high-risk mortgages would have been better than many banks. Both GSEs appear to meet affordable housing goals; however, this finding is now in doubt because conflicting reports and in light of the recent SEC charges.\textsuperscript{16}

Based on Table 1 data for mortgages defaulting in 2001-2011, the average default loss mean pure premium (MPP) for Fannie Mae and Freddie Mac, was 61.00 b.p. and 34.60 b.p., respectively. Given only eleven years of data, it may be argued that mean MPPs are merely point estimates, thus a more conservative approach would be to use the upper end of the 90% confidence interval. As previously reported, the 90% confidence level for annual default losses for Fannie was 2.687\% and for Freddie was 1.619\%.

Given total 2011 credit guarantee portfolios of $3,184.504 billion for Fannie and $2,249.299 billion for Freddie, from a purely insurance perspective, annual insurance premiums for Fannie and Freddie should be $19.426 billion and $7.783 billion, respectively given respective MPPs of 61.00 b.p. and 34.60 b.p. Obviously, the Federal Government would be the beneficiary of these premiums, assuming that the Government is incurring all default risk. The more likely insurer premiums for Government’s covering default losses from the GSEs using the 90% confidence level are $85.568 billion for Fannie and $36.416 billion for Freddie. However, assuming that subprime and Alta-A mortgages represented 20\% of each GSEs’ portfolios, but defaulted at five times the rate of prime mortgages, the annual insurer risk premiums of $8.634 billion would be charged to Fannie in 2011 for prime mortgages and $10.792 billion would be charged for insuring subprime/Alt-A mortgages assuming only the MPP. If, as is standard
insurance practice, an insurer charged a premium based on the 90 percent confidence level, Fannie in 2011 would be charged $38.030 billion for prime mortgages and $47.538 billion for subprime/Alt-A mortgages. For Freddie, premiums based on the 90 percent confidence level would be charged $16.185 billion for prime mortgages and $20.231 billion for subprime/Alt-A mortgages.

7. Default Losses and LTV Ratios

In theory, the perfectly rational borrower would default as soon as the market value of the collateral falls below the market value of the mortgage. In practice, default generally occurs only when the market value of the real estate falls substantially below the market value of the mortgage. In general, delays in defaulting are due to transactions costs borne by borrowers in the event of default. These costs include, but are not limited to, those associated with moving, damage to credit standing, potential tax liabilities and recourse to personal assets.

The presence of significant borrower default costs constitutes a de facto reduction in the strike price of the borrower’s implied put option. Consequently, the value of the borrower's perceived put option is lower than the intrinsic cost of the option for the insurer. For insurers such as Fannie and Freddie, this asymmetry is favorable since it reduces default losses for a given variance of property values. It also means that, for any given default experience, the variance in property values must be greater than would be the case in the absence of default costs. Since the implied variance is calculated assuming default occurs as soon as equity turns negative, the estimates contain a negative bias. This, in turn, imparts a negative bias to the estimate of the value of the federal guarantee.

While the sign of this bias is clear, its value is not known. All that can be done is to examine the sensitivity of both the implied variance and guarantee to the presence of borrower default costs. For instance, if these costs are 5.0% of the market value of the real estate, the
implied variance given observed losses would be higher than determined directly from the Black–Sholes model. Clearly, while the default losses are sensitive to these costs, it is not so sensitive as to change the order of magnitude of base estimates.

Since prepayment penalties do not exist for most mortgages guaranteed or held by Fannie and Freddie, the option to default for each mortgagee, a put option, is dependent on the market price of their home, variance of market price or implied variance of the option, the current risk free interest rate and the current loan balance. The current loan balance/current market value is the market LTV ratio. Annual average default losses, imputed losses, for Fannie and Freddie over the 11 years of data were used to determine a put option’s implied variance assuming that only 20% of their respective portfolios had LTV’s greater than 80% and that all default losses were incurred by mortgages with LTV’s greater than 80%.

The imputed loss is the price that a risk neutral insurer would charge to guarantee the value of estimated default losses, where the imputed loss is an estimate of the value of the combined Fannie or Freddie and Federal Government guaranties. Given that both GSEs are currently in conservatorship, the entire loss at this time falls on the Federal Government/taxpayers. The strike price of the put option was the market value of at-risk mortgages (LTV’s greater than 80 percent). The market value of the real estate financed by such mortgages is estimated by dividing their unpaid balance by their average LTV. In an option framework estimating the value of default, the mortgage outstanding balance is commonly used as the exercise price of the put option (for example see: Gatti and Spahr, 1997, Ambrose, Capone and Deng, 2001, and Elul 2006).

Using the option implied variance observed from observed default losses, MPPs were estimated for increasing LTVs. Observing Figure 1, it is evident that mortgages with very low LTV ratios simply did not default.19
8. Conclusions and Recommendations

This study has two objectives. First, we recommend a reasonable resolution of the current conservatorship/solvency problems facing Fannie Mae and Freddie Mac, recommend what should be done at this time to stabilize the housing finance industry and minimize the cost of the GSE bailout. Second, we attempt to clarify the major causes of the financial (subprime) crisis, why the housing GSEs were held as scapegoats, and specifically, recommend modifications should be made to the GSE operating guidelines and the future structure of the housing finance industry in the United States to insure that the solvency issues are not repeated.

We estimate mortgage default losses from 2001 through 2011 for both Fannie Mae and Freddie Mac using data collected from the GSEs’ annual reports and default severity rate estimates from MetWest, Mortgage Market Monitor Reports. We then apply these data to a product of random variable methodology that includes the impact of correlations between default frequency and severity as well as first order autocorrelation methodology. This actuarial model was originally developed by Spahr and Escolas (1985).

Applying a similar actuarial model, Gatti and Spahr (1990 and 1997) found that, during the 1980s, default losses for Freddie Mac and the value of the Federal Government’s implicit guarantee (approximately 8 basis points) was manageable and relatively low. However, subsequent to the proliferation of below prime mortgages and after the GSEs operating practices changed to increasing intermediation and reducing securitization, Gatti and Spahr (1995) warned of potential solvency problems for Freddie Mac and, by extension, Fannie Mae.

Funding through securitization reduces risk for the GSEs because the holders of mortgage backed securities, not the GSEs who guarantee only default risk, assume the interest rate risk. Given the current interest rate environment with very low interest rates on long-term fixed rate
mortgages, substantial interest rate risk exists for holders/owners of mortgages and MBSs. If both GSEs finance their mortgage purchase through intermediation rather than securitization, interest rate risk is retained by the GSEs. Thus, we recommend that future GSEs operating parameters require securitization of the vast majority of purchased mortgages. If the GSEs are allowed to continue intermediation, it is our prediction that the next financial crisis involving the GSEs and the housing finance industry will be an interest rate risk crisis similar to the savings and loan crisis of the 1980s. Regardless, it is relatively certain that current holders of mortgages and MBSs backed by very low fix-rate mortgages (whether they be individuals, institutions or other governments) will be very displeased in the future when both interest rates and inflation increase. In fact, this potential loss of value for mortgage and MBSs investors may cause another financial crisis.

We recommend that new operating guidelines be established for the GSEs wherein they be required to purchase mostly prime or insured mortgages. Alternatively, if Congress desires to continue affordable housing policies obligating the GSEs to purchase below prime mortgage instruments with reduced underwriting standards, funding contingencies should be established by Congress to explicitly insure against the higher default risk. Gatti-Spahr estimated the value of the government implicit guarantee of Freddie Mac to be 8.3 basis points before the proliferation of below prime mortgage instruments. Thus, assuming the adoption of our recommendations, both default risk and interest rate risk will be significantly reduced for the GSEs and will create a sustainable future operating model. Also, observed default losses during 2001-2011 for Fannie and Freddie prime mortgages were comparable to default losses on prime mortgages observed by Gatti-Spahr (1990, 1997); whereas, below prime mortgages held or guaranteed by the GSEs sustained losses that were approximately five times the losses on prime mortgages. Thus, it is logical to assign blame to below prime mortgage defaults as the underlying cause of GSE
insolvency. Accordingly, we posit that Fannie and Freddie would not have sustained default losses that necessitated their being placed into conservatorships in the absence of their holding or guaranteeing large quantities of subprime, Alt-A and private label derivative mortgage instruments.

In 1993, only 11.2% of Freddie Mac's mortgage financing was on-balance sheet and financed by intermediation; thus, 88.8% of its mortgage financing was securitized and subject only to default risk. By contrast, in 2011, the GSEs on-balance sheet financing by intermediation was at least 25%. Thus, it is our recommendation that the two GSEs substantially reduce their held portfolios and return to the model wherein most mortgage instruments are securitized.

Much of the conservatorship costs borne by the Federal Government and referred to above should be considered sunk. Thus, regardless of future policy decisions regarding the structures of Freddie and Fannie, most of these costs will be incurred by the American people. Thus, it is our opinion that vindictive policies to punish Freddie and Fannie for the conservatorship status caused by the below prime “subprime” mortgage crisis, and using them as a scapegoat for causing or exacerbating the crisis, may be unwarranted and detrimental to the future of housing finance and the U.S. economy in general.

The blame for the current subprime crisis may be spread widely; however, we posit that the root cause stems from the requirements of the Community Reinvestment Act of 1977 and the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 requiring that both Freddie and Fannie support affordable housing goals through the purchase of below prime mortgage instruments. These acts created an initial market for below prime mortgages and once begun, the pent up demand for lower grade mortgages provided an economic incentive for the private sector, with government endorsement, to underwrite low credit-quality mortgages for the creation of MBSs, ABSs and CDOs that implied government protection for investors from losses
due to mortgage defaults and that also appeared to marginalize or eliminate loss risk that might accrue to mortgage lenders and originators. Thus government’s endorsement of below prime lending, economic incentives for both the GSEs and the private sector to promote below prime lending, and the introduction of credit default swaps combined to create the perfect storm. Not only did the number of below prime mortgages, their derivatives and credit default swaps expand exponentially, the resulting increased demand for residential housing in conjunction with historically low interest rates significantly increased the magnitude of the housing bubble and created the financial environment for a worldwide economic crisis.

We recommend a policy that utilizes prior experiences of the Savings and Loan Crisis wherein each GSE may be divided into a good bank and a bad bank. Good banks, with initial capital injected by the Federal Government, should have future operating guidelines for both GSEs essentially as they were in the 1980s. Their operating guidelines should encourage only the purchase of prime mortgages with initial LTV ratios of at most 80% or require FHA or PMI insurance and to finance mortgage purchases mostly through securitization. Given these operating guidelines are adopted, the GSEs will provide needed mortgage market standardization, depth, liquidity and stability for the residential mortgages as originally intended. If, on the other hand, Congress continues to use the two GSEs to promote and operationalize affordable housing policies that require higher LTV ratios and reduced underwriting standards, it needs to be prepared to directly subsidize these mortgages because of their inherently higher default risk. Once operating efficiently and in a sustainable manner, both Freddie and Fannie may again entertain an IPO where public policy may dictate that they both retain their GSE status or alternatively, each may surrender their national charter and GSE status and operate as completely private entities.20

We recommend, given the current state of both GSEs’ balance sheets, which contain
quantities of bad assets, that a temporary bad bank similar to the Resolution Trust Corporation (RTC) of the S&L Crisis be established. Bad assets from both Freddie and Fannie may be placed in this Government corporation to be resolved in the most socially responsible and least expensive manner possible. Obviously, considerable government oversight will be necessary to insure the efficient and least disruptive policies for resolving these high risk mortgages and REO. Just as with the RTC, it may require years to fully resolve and dispose of these troubled assets and mortgages; however their existence and subsequent resolution should not be allowed to interfere with the primary job of the housing GSEs to promote efficiency in housing finance.21

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<table>
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<tr>
<th>Year</th>
<th>Credit Loss Fannie Mae ($000,000)*</th>
<th>Implied Default Freq</th>
<th>Average Default Severity</th>
<th>Total Credit Guarantee Portfolio ($000,000)**</th>
<th>Default Basis Points***</th>
<th>Alt-A &amp; Subprime</th>
<th>Credit Loss Freddie Mac ($000,000)*</th>
<th>Implied Default Freq</th>
<th>Average Default Severity</th>
<th>Total Credit Guarantee Portfolio ($000,000)</th>
<th>Default Basis Points***</th>
<th>Alt-A &amp; Subprime</th>
<th>Percent</th>
<th>Alt-A &amp; Subprime</th>
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<td>0.01189</td>
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<td>348,806</td>
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* Credit-related expenses consist of provision for credit losses and real estate owned (REO) operations expenses.

** Fannie Mae Defines this as: "Mortgage Credit Book of Business"

*** Basis point credit related expenses as a function of total guaranteed portfolio

**** These are estimates from GSE annual reports; however, it should be noted that on December 16, 2011 the The Securities and Exchange Commission charged six former top executives of Fannie Mae and Freddie Mac with securities fraud by significantly understating held and guaranteed risky mortgages including subprime and Alt-A.
Figure 1
Expected Annual Default Losses as a Function of LTV Ratio

* Estimated Losses are actually the value of the put option and the mean pure premium.
End Notes

1 LaCour-Little and Yang (2013) found that reduced documentation increases the likelihood of default after controlling for other risk factors. The problem is particularly acute for stated-doc loans, which are offered to lower quality borrowers (as measured by credit score and LTV) compared to no-doc loans, for which higher credit scores and lower LTV ratios mitigate some of the incremental risk.

2 Subprime Mortgages are loans made to borrowers with lower credit ratings. As a result of the borrowers’ lowered credit rating, conventional mortgages are often not available because lenders view these borrowers as having larger-than-average risks of defaulting. Alt-A mortgages generally have risk profiles that fall between prime and subprime. Borrowers will typically have clean credit histories, but these mortgages will generally have some issues that increase risk profiles. These issues include higher loan-to-value and debt-to-income ratios or inadequate documentation of the borrower's income and financial status. Affordable housing is defined as housing where occupants are paying no more than 30 percent of their incomes for gross housing costs.


4 In a white paper by the European Central Bank (2009), it is evident that housing finance in the European Union differs from the US model in several respects. In the absence of institutions similar to the housing GSEs, European mortgages generally have either much shorter fixed interest periods or they have variable rather than fixed interest rates. Generally, 30-year fixed rate mortgages, the standard in the U.S., do not exist in Europe. European mortgages often...
contain prepayment penalties and differ significantly across the EU with less government guarantees, less competition and possibly higher spreads. A much higher percentage of mortgages are retained on bank balance sheets, which increase interest rate risk for banks.

5 The Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (Pub.L. 102-550, title XIII of the Housing and Community Development Act of 1992, H.R. 5334, Oct. 28, 1992, 106 Stat. 3941,12 U.S.C. § 4501et seq.), mandated that HUD set specific goals for Fannie Mae and Freddie Mac, with regard to low income and underserved housing areas. This act, “Requires the Secretary to establish specified housing goals for each enterprise, including goals for purchase of mortgages on housing for low- and moderate-income families (adjustable annually to meet unaddressed needs of such families for affordable housing), and on housing located in underserved areas (both urban and rural).” The act also, “Requires the Secretary to monitor and enforce compliance with such goals, establishing guidelines, filing goal failure notices, and requiring (of noncompliant enterprises) submission of housing plans.” The Act also amended the charters of Fannie Mae and Freddie Mac to reflect Congress' view that the GSEs "... have an affirmative obligation to facilitate the financing of affordable housing for low and moderate income families in a manner consistent with their overall public purposes, while maintaining a strong financial condition and a reasonable economic return.” (TITLE 12, CHAPTER 46, Sec. 4501., Paragraph (7)). The part of this act requiring that the GSEs maintain a strong financial condition was either ignored or the risk of affordable housing mortgages was grossly underestimated.

6 Pennington-Cross and Ho (2010) find that by holding borrower and location characteristics constant the type of loan used can have dramatic impacts on the performance of mortgages. As the hybrid loan (which mixes fixed-rate characteristics with adjustable-rate characteristics)
became the dominate mortgage product in the subprime market it made the overall mortgage market much more sensitive to house prices, equity extraction and interest rates. This is because the hybrid loan was designed to be a short-term loan that would be refunded. Pennington-Cross and Ho argue that by 2008 house prices were declining so rapidly that only those with excellent credit history and large amounts of equity and wealth could refinance. Given these large and unaffordable payment shocks the only remaining option for most subprime borrowers was to default on the loan.

7 In 1999, the GSEs were pressured by the Clinton administration to expand mortgage loans to low and moderate income borrowers by increasing the ratios of their loan portfolios in distressed inner city areas designated in the Community Reinvestment Act of 1977. Additionally, institutions in the primary mortgage market pressed Fannie Mae to ease credit requirements on the mortgages it was willing to purchase, enabling them to make loans to subprime borrowers at interest rates higher than conventional loans and then sell them to get them off their books.

8 Further evidence is provided by, for example, Kaufman (2013) who finds that GSE conforming mortgages appears to have about 10 basis point lower rates, encouraged fixed-rate mortgages over ARMs and discouraged low-documentation and brokered loans. However, he does not adjust for option adjusted spreads, which may change the impact of GSEs on conforming mortgages as these spreads vary over time and the level of interest rates. Also Ambrose and Buttmer (2005) observe that GSE conforming mortgages provide improved access to credit in rural markets when compared to rural jumbo borrowers indicating that conventional mortgage markets may be more efficient in urban environments.

9 We thank an anonymous reviewer for reminding us that our recommendations are essentially
to a return to the regulatory standards imposed on Fannie Mae as part of the Roosevelt administration’s New Deal reforms.

10 For additional details, see: Carpenter and Murphy (2008).

11 In another study, The Department of the Treasury and U. S. Department of Housing and Urban Development (2011, p. 5) conveniently ignored the one underlying cause of the current subprime crisis by stating “No single cause can fully explain the crisis. Misbehavior, misjudgments, and missed opportunities – on Wall Street, on Main Street, and in Washington – all came together to push the economy to the brink of collapse. Several fundamental flaws in our housing finance system contributed to the crisis and must be corrected to protect American families from the instabilities and excesses that helped bring us to a crisis point.” We maintain that the fundamental flaw in the housing finance system was government’s insistence in pushing its affordable housing policy, intervening in traditional underwriting standards and ignoring potential default risks for political purposes.


13 Notice that this is not the simple portfolio equations presented in most elementary finance texts, but rather a product of random variable actuarial expression. The product of random variable model for estimating insurance premia allowing for dependencies between frequency and severity was first developed by Spahr and Escolas (1986). Since the default risk model is developed in a number of previous studies: see, for example Spahr and Escolas (1986) and Gatti and Spahr (1997), we do not reproduce the entire model; however, we are willing to provide this model to the reader.
According to Goodman (1960), the variance of the product of two dependent random variables is

$$\sigma^2_x = E(z^2)\sigma^2_y + E(y^2)\sigma^2_z + 2E(z)E(y)E_{11} + 2E(z)E_{12} + 2E(y)E_{21} + E_{22} - E_{11}^2$$

where

$$E_{11} = \text{Cov}(z,y)$$
$$E_{12} = E(z - E(z)) (y - E(Y))^2$$
$$E_{21} = E(z - E(z))^2 (y - E(y)) \text{ and}$$
$$E_{22} = E(z - E(z))^2 (y - E(y))^2$$

Given these relationships, it is clear that equation (2),

$$\sigma^2_x = E(z^2)\sigma^2_y + E(y^2)\sigma^2_z + 2E(z)E(y)\text{Cov}(z,y)$$

is a good approximation for determining the variance of the pure premium for a dollar of insurance coverage for an individual risk.

As previously referenced, Ding, Quercia, and Ratcliffe (2010) support our finding of significantly higher default rates for subprime mortgages. They observe that the neighborhood concentration of subprime lending is positively associated with the probability of default and the resulting clusters of foreclosed properties reduce neighborhood property values and increased price volatility.

Fannie and Freddie performance in achieving affordable housing goals as measured by the percentage of dwelling units financed by mortgages acquired by each Enterprise that meet goal eligibility requirements relative to all eligible dwelling units financed by acquired mortgages during the year for 2004 and 2009 are found at: [http://www.fhfa.gov/Default.aspx?page=135](http://www.fhfa.gov/Default.aspx?page=135)

This statement may have reflected economic thinking prior to an often cited article by Coase (1960) where he emphasizes the role of transaction costs or externalities in the economic efficiency of an economic outcome.
We also draw on informative literature on the performance of subprime loans, including, Acharya, Richardson, Van Nieuwerburgh and White (2011), Bajari, Chu, and Park (2008); Demyanyk and Van Hemert (2011); DiMartino and Duca (2007); Foote et al. (2008); and Mian and Sufi (2009).

During the current crisis observed losses on prime mortgages with original LTV ratios of 80% or less did default with about 1/5\textsuperscript{th} the loss rates of subprime and Alt-A mortgages. This resulted from the market LTVs for mortgages increasing because of substantial declines in house values. The current crisis was almost a perfect storm with the proliferation of subprime and Alt-A mortgages along with historically low interest rates creating incentives for speculation causing increased housing demand. Demand was exacerbated by the Federal Reserve’s sustained low interest rate environment. This combination created a substantial housing bubble, which began to burst in 2006.

Recently, both Fannie Mae and Freddie Mac have continued the practice of paying management significant bonuses even though each is currently in conservatorship. This practice as well as other practices that magnify agency problems associated with the housing GSEs must be curtailed. The long history of unreasonable perquisites for management and political favors and donations must be terminated and are demanded by the taxpayer.

The Federal Reserve recently announced Quantitative Easing III stating that it will buy, for an indefinite period, $40 billion per month in mortgage backed securities until the economy improves. Thus if the Federal Reserve were to purchase the MBSs backed by lower grade mortgages guaranteed and held by Fannie and Freddie as well as agree to assume all default risk on these underlying mortgages, the Fed may, in addition to monetizing debt, also monetize the
default risk of remaining high risk MBSs. Thus, the Federal Reserve may serve as the bad bank and assume the default risk of the MBSs it purchases.