The Role of Blockholders in Debt Markets:

Fannie Mae, Freddie Mac and Subprime MBS

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Abstract

This paper examines the impact of the presence of Fannie Mae and Freddie Mac as the largest investors in the subprime mortgage-backed securities (MBS) market on the risk characteristics and prices of those securities. Given the size of the investments of the government-sponsored enterprises (GSEs) in this market, these two investors had strong incentives to collect information about the assets they purchased. At the same time, the GSEs are widely believed to have relied on the implicit government guarantee to take on excessive risk and they bought primarily triple-A MBS, which are usually thought of as information insensitive securities. We use a unique feature of the subprime MBS market to identify the effect of the GSEs on this market. Subprime MBS deals were commonly split into a conforming and a non-conforming pool. Only the conforming pool was eligible to be bought by the GSEs, but the fact that both types of pools were found in the same deals eliminates most sources of unobserved heterogeneity that would typically confound a study of this nature. The results show that subprime triple-A pools that were eligible to be bought by the GSEs had similar ex ante risk characteristics, but had much better ex post performance once the crisis hit. We also find that the yields on the securities purchased by the GSEs are more informative about the riskiness of the deals than equivalent non-conforming pools. These results indicate that the GSEs acted as relatively informed investors in the subprime MBS market and that the conforming triple-A tranches were better risk-adjusted investments than those made by investors in this market as a whole. Finally, we find no evidence that the presence of the agencies made loan modifications more likely relative to loans that were part of pools that could not be purchased by the GSEs.

1. Introduction

Fannie Mae and Freddie Mac are widely considered to have played a crucial role in both the creation of the housing bubble that burst in 2006 and in the financial panic that broke out in 2008 (see, for example, Pinto, 2010 and Acharya, Richardson, Van Nieuwerburgh and White, 2011). Using what the Financial Crisis Inquiry Commission (FCIC) calls a "deeply flawed business model", the governments-sponsored entities (GSEs) progressively increased both their leverage and their exposure to risky assets during the late 1990s and the 2000s, ultimately leading to the takeover of both institutions by the federal government in August of 2008 (FCIC, 2011).

The increasing riskiness of the assets on the agencies' portfolios occurred on two fronts simultaneously: First, the mortgages guaranteed by Fannie Mae and Freddie Mac were of progressively worse credit quality during this period (with lower documentation levels and higher loan-to-value ratios; see Pinto, 2010, for a detailed description). Second, the GSEs aggressively increased their purchases of subprime private-label mortgage-backed securities (MBS) during the 2000s. The combined purchases of subprime MBS by Fannie Mae and Freddie Mac totaled over 350 billion dollars and made up between 25 and 35 percent of all subprime securities issued in 2004-2006 (FCIC, 2011; Leonnig, 2008). This role of the GSEs as one of the major sources of funding for the securities that ultimately caused the financial panic of 2008 has largely remained unexplored in the literature.

The presence of Fannie Mae and Freddie Mac as large buyers in the subprime MBS market provides a unique setting to study the impact of large investors on the risk characteristics and on the pricing of debt securities. On the one hand, given the importance of this portfolio of securities for the GSEs and the size of the GSEs relative to the market, we would expect the agencies to have strong incentives to learn about the quality of the underlying assets and potentially to be able to make better risk-adjusted investments than other investors in the market (in particular if they can bargain for better pricing terms at origination). At the same time, the agencies were operating under an implicit government guarantee and used the

investments in subprime MBS to meet the housing goals set by the administration[1], which could have attenuated those incentives significantly. The agencies also focused almost exclusively on information-insensitive triple-A securities, which again would attenuate their incentives to collect information.[2]

One institutional feature of the GSEs is crucial for our ability to directly observe the impact of the agencies on the market, and that is the requirement that the agencies only invest in loans below the conforming loan limit (CLL). As Acharya et al (2011) put it, the requirement to only guarantee loans below the CLL was "the one rule that the GSEs were subject to without exception". This applied also to loans included in mortgage-backed securities, which prompted the creation of separate loan pools within many MBS deals where some pools were exclusively made up of conforming loans and other pools in the same deals had a mix of conforming and non-conforming loans. This design of the deals allows us to precisely identify the securities that were eligible to be purchased by the GSEs and which ones weren't, unlike other debt markets where it can be very hard to identify the holdings of individual investors.

The fact that the same deals were split into conforming and non-conforming pools of loans has another important advantage for our empirical tests, namely that we can exclude all alternative explanations for our findings that are related to unobserved heterogeneity at the issuer, originator or servicer level. Given that these pools of loans were all part of the same deal, all of those characteristics were shared by both pools of loans. Additionally, the split between conforming and non-conforming pools of loans applied exclusively to the triple-A securities in these deals, with the more junior tranches receiving cash flows from both pools and providing credit support to all senior triple-A securities, conforming and non-conforming alike. This removes any concern that differences in pricing or performance could be driven by differential levels of credit support between tranches. In the mortgage-backed securities market we also

[1] After a substantial increase in 2004 of the target for affordable housing goals by the U.S Department of Housing and Urban Development, the two agencies relied on purchases of subprime MBS to meet some of the goals set by the administration (FCIC, 2011).
[2] According to the 2007 third quarter 10-Q of Fannie Mae, 99% of the securities purchased by this institution were triple-A.

have detailed information on the individual mortgages underlying the deals, which allows us to control in a very fine way for the observable characteristics of the securities.

We find that triple-A tranches that were eligible to be bought by Fannie Mae and Freddie Mac have similar ex ante risk characteristics but perform significantly better in the crisis than the non-conforming pools in the same deal. Conforming loan pools had 3-8 percentage points lower default rates during the crisis when compared to non-conforming pools (for an average default rate of approximately 40 percent by the end of 2010). This ex post performance difference holds unconditionally and after controlling for observable differences in the ex-ante risk characteristics of the pools. Two explanations are consistent with this finding. First, the GSEs may have had information about unobserved characteristics of the loans or may have had better risk assessment models that led them to demand a better composition of the loan pools than what was in non-conforming pools in the same deals. Another closely related mechanism for producing our result is that originating banks may have chosen safer mortgages as the underlying assets for GSE-eligible pools because of reputation concerns and the importance of the GSEs as major investors in the deals. Whether the source of the improvement in quality of the pools was knowledge by the GSEs about the risk characteristics of the loans (i.e., demand-driven) or a decision by the banks putting together the deals (i.e., a supply-side effect), the end result was that the presence of those large investors made the conforming pools of loans safer than non-conforming ones.

The spread on conforming tranches also provides more information about the riskiness of the underlying loans than spreads on non-conforming pools. Consistent with Adelino (2009), we find that the spreads of triple-A securities as a whole do not predict the performance of the securities during the crisis. However, the spreads of conforming pools are comparatively more correlated with ex-post performance than the spreads of non-conforming ones. This again suggests that the agencies were able to perform due diligence on the investments they made and account (at least partially) for credit risk. The spread on conforming pools is also, on average, higher than the spread on equivalent non-conforming pools, but this difference

becomes small and insignificant when we control for observable ex ante risk characteristics, consistent with the agencies having accounted for observable risk differences.

Our setting also provides an opportunity to consider the differences in the modification behavior of servicers as a function of the concentration of their investor base. One might expect servicers to modify more loans when the investor base is more concentrated, as this reduces the coordination problems between investors in the securities. However, we find no differences in the modification rates for pools of loans eligible to be held by the GSEs relative to ineligible pools. This result suggests that institutional features are not an important driver of modification behavior and it is consistent with the results in Adelino, Gerardi and Willen (2009), who argue that information asymmetries between lenders and borrowers are the main frictions affecting mortgage renegotiation.

This paper lies at the intersection of several strands of literature. First, this paper contributes to the expanding literature on the roots of the financial crisis of 2007-2010 by considering the effect of one of the most important sources of funding for the subprime MBS market that had been largely ignored in the previous literature. Several papers have studied the deterioration of credit standards and of ratings in the period leading up to the crisis (Dell'Ariccia, Igan and Laeven, 2009; Ashcraft, Goldsmith-Pinkham and Vickery, 2010), as well as the role of securitization in both the origination of bad loans (Keys, Mukherjee, Seru, and Vig, 2009; Bubb and Kaufman, 2009) and in preventing renegotiation after default (Adelino, Gerardi and Willen, 2010; Piskorski, Seru and Vig, 2009; Agarwal, Amromin, Ben-David, Chomsisengphet and Evanoff, 2011). The origination channel has been found to have a significant influence on this deterioration (Berndt, Hollifield and Sandas, 2010; Jiang, Nelson and Vytlacil, 2009), as has the interaction of expanding supply of credit and rising house prices (Mian and Sufi, 2009; Hubbard and Mayer, 2008; Mayer, 2011; Glaeser, Gottlieb and Gyourko, 2010). The extent to which investors were aware of the quality of the tranches in subprime MBS has been studied previously in Adelino (2009), He, Qian and Strahan (2011) and Ashcraft, Goldsmith-Pinkham, Hull and Vickery (2011).

Second, it extends the existing literature on the information-gathering incentives of holders of different claims on firm assets. The existing literature has discussed three types of claims on corporate assets: equity, bank debt and arm's-length debt. Large equity blockholders have strong incentives to learn about the underlying firm fundamentals (for example, Rubin, 2007 and Boehmer and Kelly, 2009) and the literature has argued that blockholders either directly intervene in the management of firms (Shleifer and Vishny, 1986; Burkart, Gromb, and Panunzi, 1997; Brav and Mathews, 2008, among others) or indirectly influence management through their ability to sell their stakes (Edmans, 2009; McCahery, Sautner, and Starks, 2008; Parrino, Sias, and Starks, 2003). Similarly, banks are typically thought to have superior information about the operations of the firm relative to arm's-length debt-holders (Rajan, 1992; Petersen and Rajan, 1995; see Boot, 2000 for a survey). In this paper I analyze blockholders of very senior arm's-length debt and present evidence of information-gathering behavior on the part of those large investors.

Third, while several aspects of the behavior of the GSEs have been studied extensively, including the interest rate differential charged on conforming loans relative to jumbo loans (McKenzie, 2002; Ambrose, LaCour-Little and Sanders, 2004; Sherlund, 2008), the size of the subsidy received by the shareholders of the agencies (Congressional Budget Office, 2004; Passmore, 2005), and the differential screening of jumbo loans relative to conforming loans on the part of banks (Loutskina and Strahan, 2009, 2010), much less is known about the impact of the GSEs on the subprime mortgage-backed securities market, other than the fact that the agencies were very large investors in that market.

The paper is organized as follows: Section 2 discusses models of differentially informed investors in securitized debt and which investors were known participants in this market. Section 3 describes the data and the empirical strategy. Section 4 presents the results and Section 5 concludes.

2. Securitization and Differentially Informed Investors

This section describes existing models of segmented debt markets and discusses the application of those models to the setting of conforming and non-conforming pools of subprime mortgage-backed securities.

Residential mortgage-backed securities (RMBS) are more complex structures than most other debt instruments (Mason and Rosner, 2007), and the pricing of these securities requires some degree of sophistication on the part of investors. Most RMBS deals include many tranches (including multiple triple-A bonds issued on different pools of assets), as well as a wide variety of security types with different levels of prepayment protection and interest rate risk. Many have suggested that although (or maybe because) the securities in question are complex, some investors may have avoided performing (costly) due diligence on the RMBS they bought.

Boot and Thakor (1993) present a model in which information insensitive classes are bought by uninformed investors and the informed investors buy more information sensitive securities. In their model, there are good and bad issuers and tranching the pools of assets is a way around the "lemons" problem faced by the good issuers. The model includes a fixed cost of acquiring information that is only worth incurring for trading in the information sensitive securities.

We can extend the Boot and Thakor result to take into account risky senior securities that are less information sensitive than junior securities. In this case, investors in junior securities (say, below triple-A) will, in general, be more likely to invest in information acquisition because of the riskiness of those assets. For the triple-A securities, the threshold for investing in information acquisition will be higher (because those securities are safer), but given that the cost of acquiring information is assumed to be fixed, the larger the amount of those securities held by an investor, the more likely it is that she will find it optimal to invest in information acquisition. Given the size of the positions in subprime MBS held by the GSEs, we would predict that they would be more likely to find it optimal to acquire information on the underlying assets than other investors in triple-A MBS.

There are several other authors in the literature that have assumed that investors were not fully informed about the quality of the underlying assets in the structured finance market. Bolton, Freixas and Shapiro (2009) argue that rating agencies have a larger incentive to inflate ratings when the fraction of naive

investors in the market is large. In a related paper, Skreta and Veldkamp (2009) point out that the greater complexity of the pool of assets being securitized may create incentives for issuers to shop for ratings when some investors are not fully informed.

2.1 Investors in Triple-A MBS

Who are, then, the other investors in the triple-A subprime MBS market that chose to be uninformed (or, at least, less informed than the GSEs participating in the same deals)? Below we describe four main groups of investors in triple-A mortgage backed securities.

A first important driver of the demand for triple-A paper was the regulatory framework of commercial banks. Triple-A mortgage- and asset-backed securities provided a higher yielding alternative to traditional triple-A corporate bonds or treasuries to be used, among others, in repo transactions and, since 2002, these securities received the same risk weighting as equally rated debt of government sponsored entities for calculating the risk weighted assets of US depository institutions.[3]

A second large group of buyers of triple-A MBS were bank-sponsored securities arbitrage asset-backed commercial paper (ABCP) programs that were set up to benefit from low short term funding rates (ABCP has a typical maturity of one year or less) by investing the proceeds in longer dated (higher yielding) assets. According to Moody's (2007) the securities arbitrage ABCP programs sponsored by US banks held approximately 94% of its assets in triple-A securities (CDOs, commercial and residential mortgage-backed securities). The securities arbitrage ABCP programs of European banks held 19% of their assets in US residential MBS and of those assets a full 98% were rated triple-A.

[3] Since 2002 triple-A and double-A asset-backed and mortgage-backed securities are assigned a risk weight of 20 percent for calculating the risk-weighted assets of US depository institutions, the same as government-sponsored entities' debt (Federal Register, November 29, 2001, Risk-Based Capital Guidelines; Capital Adequacy Guidelines; Capital Maintenance: Capital Treatment of Recourse, Direct Credit Substitutes and Residual Interests in Asset Securitizations; Final Rules).

Third, these securities were sought by sovereign wealth funds and sovereign foreign investors as a whole. There is no systematic evidence on these investments, but several industry sources point to the importance of these investors in this asset class.

A final group of investors who were known to hold triple-A private-label mortgage-backed securities were the Federal Home Loan Banks (FHLB). According to the 2008 annual reports of the San Francisco FHLB and the Seattle FHLB, both these institutions had large amounts of private-label MBS in portfolio (about 7 billion dollars and 2 billion dollars, respectively) and both banks invested almost exclusively in triple-A securities.

The investors in triple-A securities are markedly different from those in the more junior tranches of the deals. The securities below triple-A were mostly directed at investors such as specialized mortgage funds,[4] mezzanine CDOs,[5] and hedge funds, who seem a priori more specialized and better informed than those that focused on triple-A only.

3. Data Sources and Variable Construction

The data used in this paper comes from two main sources. All the data on the residential mortgage-backed securities was hand-collected from Bloomberg. The data fields include all the security identifiers (including CUSIP and ticker), the issuer name, the date of issuance, all original ratings and rating changes for each security up to the end of 2010 by the three major rating agencies, the identification of the loan pool that the security has claims on, whether the loan pool is conforming or non-conforming, the spread at origination and the weighted average life as advertised in the prospectus. This dataset covers over 90 percent of all RMBS issued in the US between 2003 and 2007.

[4] f we look at the composition of specialized mortgage securities funds (such as FMSFX run by Fidelity) the distribution of non-government backed mortgage-backed securities is about 20% triple-A, 70% other investment-grade securities and 10% non-investment grade classes (although this fund in particular invested mostly in government-backed securities)

[5] Often these CDOs were put together by the same banks that arranged MBS deals, and they were by construction buyers of mezzanine classes of mortgage-backed securities (typically BBB)

The second data source for this paper is loan-level data from Blackbox Logic. This includes all of the characteristics on the loans underlying the mortgage backed securities at origination (borrower credit score, first-lien and combined LTV, term of the loan, balance, documentation status, original interest rate, and indicators for adjustable and fixed-rate loans, interest-Only loans, negative amortizing loans, occupancy status and property type) and the performance of the loans up to the second quarter of 2011 (most importantly the loan's delinquency status and whether the loan was modified). Importantly, this dataset includes an identifier for the pool of loans that each loan belongs to, which allows us to construct pool-level variables using individual loan data (as opposed to datasets that just include the deal to which a loan belongs, which does not allow the distinction between conforming and non-conforming pools that we use in this paper).

The raw sample of deals includes 10,754 subprime triple-A securities (the dataset also has jumbo and Alt-A deals that we do not include in this analysis) issued between 2004 and 2007. Given that GSEs only purchased triple-A MBS, we focus exclusively on the highest rated tranches and restrict our attention to those issued between 2004 and 2007 so that the majority of securities are not paid off or close to being paid off by the third quarter of 2007 when the crisis hits. Because one of the most important outcomes that we consider is the yield spread on the conforming vs. non-conforming triple-A pools, we include only deals where all the triple-A securities were either floating rate tranches or inverse floaters. Focusing on floating rate tranches has two main advantages: first, because the yield on those tranches is always quoted as a spread over one-month Libor in our sample, we can cleanly aggregate the yield for multiple tranches in the same deal and construct a pool-level spread. Second, because these tranches have a very short duration, we can ignore interest rate risk and the negative convexity issue that arises with fixed-rate mortgage-backed securities. This step leaves us with 7,763 individual securities with claims on 3,337 pools of loans. Out of these securities, we focus exclusively on deals that contain at least one conforming pool of loans (given that these were the ones that were eligible to be purchased by the GSEs), which

leaves 2,610 securities and 1,318 pools of loans. When we merge this dataset with the data from Blackbox logic, we have a successful match for 2,024 securities representing 976 pools of loans.

Because of how we select the securities into the regression sample, the deals included in my dataset all have at least two pools of loans. One of those pools, as described in the introduction, contains loans with a principal balance below the conforming loan limit of the year in which the deal was issued.[6] The other pools in the same deal contain mortgages below this limit as well as above (jumbo mortgages).

The deals have, on average, 4 different triple-A tranches – typically one large tranche that has priority claims only on the cash-flows from the conforming pool and another 3 tranches with priority claims on the cash-flows from the non-conforming pools. Each of the two (or more) groups of triple-A securities have junior claims on remaining cash-flows from the other pools in the event that interest and principal from their own pool of mortgages are insufficient to cover the promised cash-flows.[7] In this sense, there is some degree of insurance that comes from the mortgage pools in the same deal, but each group of triple-A securities is mostly subject to the performance of the mortgages on which they have priority claims (in particular given that shocks to the performance of different pools in the same deal are likely to be very correlated). The prospectuses of all MBS deals with multiple loan pools make very clear distinctions between the risk characteristics of the separate pools and always provide detailed summary statistics on the pools of loans separately. Additional cash-flows from all pools of mortgages then accrue to the junior tranches in a deal (AA and below).

[6] The conforming loan limit for single-family homes in 2004 was 333,700 dollars, it was 359,650 dollars in 2005 and 417,000 dollars in 2006 and 2007.

[7] The priority structure is split between interest payments and principal payments, such that interest payments received from one mortgage pool may be used to make interest payments to the triple-A securities in another pool if the interest payments from that pool are insufficient. However, cash-flow from interest payments from the first pool must then first be allocated to pay interest to junior tranches, and only the remainder can be allocated to excess cash flow that can then potentially be used to make scheduled principal payments to triple-A securities. A similar logic applies to principal payments.

3.2 Summary Statistics

We show summary statistics for the triple-A securities in Table 1. Panel A shows summary statistics for individual securities and Panel B aggregates the size, the spread in basis points and the expected life of the securities at the pool (or group) level using the size of each individual security as the weight.

The individual conforming securities are always significantly larger the non-conforming ones, but that just reflects the fact that there is usually just one triple-A conforming security (or sometimes two) in most deals, whereas the non-conforming triple-A groups are usually made up of 3, 4 or more securities, possibly reflecting the fact that they must be marketed at a larger number of investors with potentially different preferences in terms of yield and expected maturity, whereas the conforming securities had a well-defined small set of investors – the GSEs. When we consider the aggregate size of the conforming and non-conforming pools, the two are comparable at 379 million dollars for conforming pools vs. 422 million on average for the non-conforming ones over the four years.

The spread over the Libor rate on conforming securities was somewhat higher than the spread on the non-conforming ones, both when we take simple averages (25.2 versus 21.7) and when we weight the securities by their size and aggregate at the group level (23.6 vs. 21.5). This difference emerges mostly in 2006 and 2007, with the previous two years showing the inverse relationship. This may reflect learning on the part of the agencies or an increased ability to extract higher yields in the later years.

Finally, the conforming and non-conforming groups have similar weighted average lives, where the life of each security is taken from the prospectus and is based on predicted prepayment behavior on the part of the borrowers. Again, the differences between the two panels reflect only the fact that non-conforming groups are usually tranched into a larger number of individual securities than conforming ones.

Table 2 provides summary statistics on the characteristics of the mortgages underlying each type of pool. We focus on six characteristics of the loans – credit score, balance at origination in dollars, the original term of the loans, the interest rate at origination, the first-lien LTV and the share of loans that were low

documentation. It is clear from the table that the mortgages in the conforming pools are not uniformly less risky on all characteristics. In particular, they have lower credit scores and somewhat longer terms. On the other hand, they do have much smaller balances at origination on average (as we would expect), smaller shares of low documentation loans and lower interest rates at origination.

Interestingly, the conforming pools of mortgages were much less concentrated than the non-conforming pools, which may have contributed to their superior performance during the crisis. They were in areas with higher house-price appreciation over the 12 months preceding the date of origination of the loan and in areas with higher unemployment, which may be linked to the fact that the agencies used the loans in the mortgage backed securities to fulfill their affordable housing goals.

The second to last row of Table 2 shows that conforming pools had a significantly better performance than nonconforming pools, with a difference in actual default rates by the end of 2010 of almost 12 percentage points. In the results below I show that this difference is significant even after accounting for issue fixed effects and loan characteristics. We discuss the predicted default variable in the next subsection.

We find very small differences in modification rates between agency and non-agency pools, and these differences are not robust to inclusion of controls, as we show in Table 8. This shows that differences in the concentration of the investor base in mortgage-backed securities does not change the modification behavior of servicers, consistent with the results in Adelino, Gerardi and Willen (2009) who argue that informational problems are the biggest impediment to loan modification, not institutional features.

Table 3 shows the rating transitions for conforming and non-conforming securities. All of these securities were rated triple-A at origination and we show the ratings of those securities at the end of 2008 and 2010 for the subset of securities that had not been paid off. The overall conclusion from this table is that conforming triple-A securities performed better than non-conforming securities, in line with our conclusions from the default rates of the underlying loans.

3.3 Model of Predicted Default

Because we are using issue-level fixed effects in many of the regressions and we have a limited number of observations, it is useful to aggregate the characteristics of the underlying mortgages in each pool by creating a predicted default variable for each loan instead of adding all of the characteristics that we have in the data to the regressions. The predicted default variable is constructed each quarter using all the data available in Blackbox and is done in the spirit of the credit risk model in Ashcraft, Goldsmith-Pinkham and Vickery (2010). For each quarter in the data, we take mortgages originated between 36 months and 24 months *before* that quarter. We then track those mortgages over the subsequent 24 months and create an indicator variable that is a 1 if the mortgage is 60 days delinquent, 90 days delinquent, in foreclosure or in REO (or any other liquidation status following foreclosure).[8] We then run an OLS regression using all of the variables that are available on Blackbox to predict that default variable.[9] The regressions are run each quarter and include month and county fixed effects:

$$1_{Default} = \beta * X_i + month_i + county_i + \varepsilon_i$$

We take the estimated coefficients from this loan-level credit risk model and apply them to the characteristics of the loans originated in that quarter to create a loan-level predicted default variable. This means that default is predicted using only available information as of the time of origination of each loan. Finally, we aggregate this predicted default variable at the pool level by weighting each loan-level observation by the original size of the loan.

The average of the 24-month predicted default variable is shown in the second to last row of Table 2. According to this measure, conforming pools were somewhat riskier than the non-conforming pools,

[8] For the 24-month predicted default variable we take loans that were originated between 36 months and 24 months before that quarter, so that we can have a full 24 months of history for each loan.

[9] Results are robust to using Logit regressions instead of a linear probability model. The variables used are Combined LTV, first lien LTV, the original interest rate, the credit score, the original size of the loan, the original term and indicator variables for low documentation, interest-only loans, first lien loan, negative amortization, residence status, loan purpose (cash-out refinance, other refinance, purchase), trailing house price appreciation at the state level and unemployment at the state level. Additional indicator variables are included whenever there are missing observations in any of the controls.

although the difference is not statistically significant. The correlation of the 24-month predicted default variable and the actual default experienced by the pools of loans by 2010q4 is 26 percent (not shown).

4. Effect of GSE Participation on Subprime MBS Characteristics and Prices

In this section we discuss the impact that the presence of the GSEs in the subprime MBS market had on the risk characteristics of the pools of mortgages included in the deals and on the prices of the securities.

We first consider whether there are differences in the observable risk characteristics of the pools bought by the government sponsored agencies. Table 4 shows the results of a regression of the 12-month and the 24-month predicted delinquency variables on an "Agency" dummy variable that is equal to 1 for the pools that are eligible to be bought by the GSEs. The results show no difference in the 12-month predicted default variable between the GSE-eligible and the non-eligible pools, and a small but statistically significant difference for the 24-month delinquency of 40 basis points (for an average delinquency of 6.14 percent, shown in Table 2). The difference is not affected by the inclusion of deal fixed effects, which eliminates any source of unobserved heterogeneity between pools that is linked to the arranger, servicer, or exact timing of the issue. This suggests that, based on the observable characteristics of the loans, the conforming pools were more, not less, risky than the non-conforming pools included in the same deals.

In Table 5 we consider the effect of the GSEs on the ex post performance of the deals. The results contradict the finding in Table 4 that would suggest that the conforming pools were riskier than pools that were not eligible to be bought by the GSEs. In fact, the ex-post performance of the conforming pools is much better than the performance of the non-conforming pools, by a total difference of 7-8 percentage points when we include only issue fixed effects and no other controls, and about 3 percentage points when we include pool-level average loan characteristics.[10] This holds whether we measure the performance of

[10] The loan characteristics included in the second specification for each time period are: (1) Categorical loan characteristics: We compute the share of each pool (measured in dollar amounts) that is made up of low documentation or missing documentation loans, interest only loans, first lien mortgages, primary residences, single family properties, cash-out refinances, loans with LTV = 80 percent, borrowers with a FICO score below 620, and

the mortgage pools up to the end of 2008, 2009 or 2010. In the third specification for each time period we include the predicted 24-month default variable and see that it is positively related with subsequent default, although it is not always statistically significant.

The results shown in Table 5 have two potential interpretations: one is that agencies had superior information about the performance of mortgages than other investors and required that their loan pools include better loans on average, in particular loans that would be better able to withstand the adverse conditions in the housing market. An alternative explanation is that the arrangers of the deals included better quality loans in the GSE-eligible pools because of reputation concerns and given the large size of the GSEs as investors in subprime MBS. Both mechanisms could lead to the outcome we observe that GSE-eligible pools performed much better in terms of loan delinquencies than ineligible pools.

We turn next to the pricing of subprime MBS and we consider to what extent conforming and non-conforming pools were priced differently at origination. As we discuss in Section 3, we focus on floating rate tranches that are part of pools that only include floating rate triple-A securities in order to exclude prepayment risk as an explanation of our findings.

Table 6 reports the results of a regression of the spreads at origination of the tranches of our sample on the Agency dummy variable, a control for the expected duration of the securities in each pool (where we take the weighted average of the expected life of each individual security) and loan characteristics. We find that the spread on GSE-eligible tranches is higher, on average, than the spread on non-conforming tranches, but that this difference disappears when we include both issue fixed effects and a control for the predicted 24-month delinquency probability of the loans. This suggests that the higher spread charged by the agencies on the conforming tranches can be accounted for by the differences in ex ante risk characteristics of the mortgage pools.

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the state-level Herfindahl index to capture the geographic concentration of the loans. For the categorical variables we also include the share of the loans for which we have missing information about that variable in the loan-level Blackbox data. (2) Non-categorical variables: We calculate the weighted average FICO score, original interest rate, 12-month trailing house price appreciation in the metropolitan statistical area that the loan is located, and the lagged unemployment at the county level.

In Table 7 we consider the information content of the spreads at origination for predicting the default levels experienced by the pools at different points in time during the crisis. Consistent with Adelino (2009), we find that the yield spreads of triple-A securities are not informative when we try to predict the outcomes of those securities in the crisis. In fact, the coefficient on the "Pool Spread" variable is insignificant when we consider any of the three time periods (defaults up to the end of 2008, 2009 and 2010) and both with and without controls for loan characteristics of the pools.

Importantly, however, we find that the spreads on the conforming pools are correlated with the outcomes of the underlying loans during the crisis for the GSE-eligible pools. This result is robust to including the characteristics of the loans and to the inclusion of either quarter of issuance or issue fixed effectsand it suggests that the GSEs were able to distinguish between better and worse tranches with respect to characteristics that impacted their performance in the crisis, unlike other investors in pools in the same deals. If we also take into account that the GSE-eligible pools also performed better in the crisis, together this strongly points to an informational advantage of the GSEs as investors in the subprime MBS market relative to other investors.

We next consider differences in the modification behavior of servicers with regards to GSE-eligible and GSE-ineligible pools. Previous literature has suggested that securitization is one of the major impediments to successful loan renegotiation between lenders and borrowers (Piskorski, Seru and Vig, 2009; Agarwal, Amromin, Ben-David, Chomsisengphet and Evanoff, 2011). One of the important frictions cited in this literature is the conflicting interests of the holders of different tranches within the same deal, sometimes referred to as "tranche warfare". In our setting, the GSE-eligible pools are likely to be held by just one investor, whereas GSE-ineligible pools usually were purchased by multiple investors (as evidenced by the larger number of smaller tranches that typically made up these pools). We would thus expect coordination frictions to be less severe for loans included in GSE-eligible pools relative to other pools included in the same deal, even if we take into account that there would still be some frictions with regards to the holders of the junior tranches.

In Table 8 we show that a similar percentage of loans was modified in pools that could be purchased by the agencies and in pools that could not. This evidence is inconsistent with coordination problems being an important driver of modification behavior on the part of servicers and suggests that other sources of frictions may be more relevant for facilitating or impeding renegotiation.

5. Conclusion

Fannie Mae and Freddie Mac were key players in the mortgage market during the run-up in house prices of the 2000s and during the bust of 2007-2009. The GSEs participated actively in originating loans and securitizing them in mortgage-backed securities, but they also were the two largest investors in subprime MBS, playing an important role in this fast-growing segment of the debt markets.

In this paper we use a unique feature of the structure of subprime MBS deals to show that the loan pools that were eligible to be bought by Fannie Mae and Freddie Mac had similar (or slightly worse) ex ante risk characteristics than those targeted at other investors, but they performed significantly better during the crisis. The tranches bought by the GSEs also had yields that were correlated with the ex post performance of the loan pools, unlike the yields on other loan pools.

The implications of our findings for the overall quality of the loans that were originated in the period leading up to the crisis are ambiguous and are an important topic for further research. On the one hand, the presence of Fannie Mae and Freddie Mac in this market may have pushed originators further down the distribution of borrower quality and, had the GSEs never bought subprime MBS, it is possible that the worse loans that were originated during this period would, in fact, have never been made. On the other hand, it may be that the capital that was used by the GSEs to buy subprime MBS would in any case find its way to these securities, in which case the presence of the GSEs as informed investors may have acted as a disciplining device.

The findings in this paper show that the GSEs acted as relatively more informed investors in the subprime MBS market relative to other market participants. While the GSEs suffered significant losses on their holdings of triple-A MBS, those losses are smaller than investors in the same deals that bought the pools that were ineligible to be purchased by the GSEs. These results suggest that the presence of blockholders in the subprime MBS market served as a disciplining device on issuers and originators.

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Table 1

Summary Statistics for Conforming and Non-Conforming Tranches

This table shows summary statistics at the individual tranche (or security) level in Panel A, and at the pool level in Panel B for conforming, non-conforming and all triple-A securities in the sample. The first column for each type of security shows the number of observations, the second column shows the average size at issuance of the tranche or pool (in millions of dollars), the third column shows the spread over the one-month Libor for the tranches or the average spread for the pools (weighted by the size of the tranche in each pool), both in basis points, and the fourth column shows the average expected life for the tranches or pools as advertised in the prospectus (where the average for the pools was weighted by the size of each tranche). Conforming tranches and pools have claims on groups of mortgages made up only of mortgages below the conforming loan limit, whereas non-conforming pools have claims on groups of loans that include mortgages both above and below the conforming loan limit. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters.

Panel A: Single Tranche Summary Statistics

	Conforming Triple-A				**Non-Conforming Triple-A**				**All Triple-A Tranches**			
Year	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*
2004	71	419.2	33.8	2.69	41	148.1	40.5	3.98	112	320.0	36.2	3.16
2005	262	271.1	30.0	2.43	96	132.8	39.3	3.53	358	234.0	32.5	2.73
2006	262	301.3	16.4	2.27	666	140.4	15.0	3.27	928	185.8	15.4	3.00
2007	158	247.7	28.1	2.41	468	119.0	25.8	3.32	626	151.5	26.4	3.11
All Years	753	290.7	25.2	2.40	1,271	132.2	21.7	3.33	2,024	191.1	23.0	2.99

Panel B: Pool Level Summary Statistics

	Conforming Triple-A				**Non-Conforming Triple-A**				**All Triple-A Tranches**			
Year	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*	*N. Obs.*	*Size (Millions)*	*Spread (b.p.)*	*Av. Life*
2004	50	595.2	31.9	2.73	32	189.8	40.3	3.80	82	437.0	35.2	3.15
2005	172	413.0	29.8	2.39	51	249.9	41.7	3.44	223	375.7	32.5	2.63
2006	224	352.4	15.8	2.24	183	510.8	11.9	2.30	407	423.7	14.1	2.27
2007	132	296.5	25.6	2.06	132	421.7	22.3	2.26	264	359.1	24.0	2.16
All Years	578	378.7	23.6	2.28	398	422.0	21.5	2.55	976	396.4	22.7	2.39

Table 2

Summary Statistics for Mortgages Underlying Conforming and Non-Conforming Tranches

This table shows summary statistics for the loans underlying the conforming and non-conforming triple-A securities in the sample at the pool level. The first column shows the mean for all pools in the sample, the second column shows the mean for the conforming pools and the second column shows the non-conforming pool mean. Conforming pools and non-conforming pools are defined as in the previous table. FICO score is the credit score of the borrowers on the loan application; balance is the size of the loan at origination; term is the original term of the loan; original rate is the interest rate on the loan at origination; LTV is the size of the loan relative to the price of the house (transaction price or appraisal amount, depending on whether it is a purchase or a refinance); low-documentation is a 1 if the loan was either low documentation or no-documentation; concentration is measured as the Herfindahl index by state of all the loans in the pool; HPA is the trailing 12-month state-level house price appreciation weighted by loan size; unemployment is the state-level unemployment rate at the time of origination. The third to last row shows the 12-month predicted default rate for each loan at the time of origination using all information in the data for the previous two years and defining default as being 60 or 90 days delinquent, in foreclosure or REO. The second to last row shows and the realized default rate as of 2010Q4 for the loans in each pool and the last row shows the percentage of loans modified in the pool as of May of 2011. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters.

		(a)	(b)			
	All Pools	**Conforming**	**Non-Conf.**	**(a) - (b)**	**T-Statistic**	**N. Obs.**
FICO (Points)	623.3	618.3	630.0	-11.8	-5.40	738
Balance (USD)	193,648	166,289	233,379	-67,090	-17.51	976
Term (Months)	349.6	350.7	347.9	2.8	1.78	976
Orig. Rate (P.Points)	8.41	8.33	8.54	-0.21	-3.10	976
LTV (P.Points)	77.24	77.53	76.81	0.72	1.16	976
Low-Doc. (Share)	0.37	0.34	0.40	-0.06	-4.04	692
Concentration (Herfindahl)	0.12	0.09	0.17	-0.08	-18.87	976
Trailing 12-month HPA	10.2	10.8	9.2	1.6	3.80	976
Unemployment (P.Points)	5.30	5.37	5.20	0.18	6.55	976
24-m. Pred. Loan Default (P.Points)	6.14	6.23	6.01	0.23	1.60	976
Defaulted Loans (Share by 2010Q4)	41.39	36.66	48.25	-11.59	-10.24	976
Modifications (Share by May 2011)	14.74	14.28	15.41	-1.13	-1.83	976

Table 3

Rating Transitions

This table shows the percentage of tranches at each rating level by the end of the fourth quarter of 2008 and by the end of 2010 (all tranches were triple-A at origination). The sample shown includes only securities that had not been paid off by the end of each of the periods used (i.e. 2008Q4 and 2010Q4). Ratings are first converted into a numerical scale and averaged across rating agencies whenever there are multiple ratings. Conforming pools have claims on groups of mortgages made up only of loans below the conforming loan limit, whereas non-conforming pools have claims on groups of loans that include mortgages both above and below the conforming loan limit. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters.

	AAA	AA	A	BBB	BB	B	CCC	CC	C	D
2008Q4										
Conforming Triple-A	51.6%	14.8%	9.5%	8.2%	6.7%	5.9%	3.0%	0.1%	0.1%	0.0%
Non-Conf. Triple-A	35.2%	17.5%	13.1%	12.1%	9.0%	8.1%	4.6%	0.4%	0.1%	0.0%
2010Q4										
Conforming Triple-A	29.4%	6.3%	4.0%	4.3%	6.6%	8.1%	28.6%	10.4%	2.3%	0.0%
Non-Conf. Triple-A	14.7%	2.6%	3.4%	5.0%	5.3%	9.7%	36.9%	20.3%	2.0%	0.0%

Table 4

Predicted Default Rate for Conforming and Non-Conforming Pools

This table shows OLS regressions where the dependent variables are the 12-month and the 24-month predicted default rates at the time the loan is originated using all information in the data for the previous two years for the 12-month rate and three years for the 24-month predicted rate. Default is defined as a loan being 60 or 90 days delinquent, in foreclosure or REO. The independent variable of interest is "Agency" and it is an indicator variable that is equal to 1 for conforming pools. Conforming pools have claims on groups of mortgages made up only of loans below the conforming loan limit, whereas non-conforming pools have claims on groups of loans that include mortgages both above and below the conforming loan limit. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters. Standard errors are heteroskedasticity-robust and clustered at the quarter of origination level. The first row for each variable shows the regression coefficient, the second row shows t-statistics.

	12-Month		24-Month	
	(1)	(2)	(3)	(4)
Agency	0.001	0.000	0.004	0.004
	1.488	0.118	3.339	2.481
Issue Quarter FE	Y		Y	
Issue FE		Y		Y
N. Obs.	976	976	976	976
R-Squared	0.70	0.98	0.31	0.96

Table 5

Effect of GSE participation on Ex-Post Default Rates

This table shows OLS regressions where the dependent variable is the pool-level default rate of the mortgages included in each pool as of three different points in time: 2008Q4, 2009Q4 and 2010Q4. Default is defined as a loan being 60 or 90 days delinquent, in foreclosure or REO. The independent variable of interest is "Agency" and it is an indicator variable that is equal to 1 for conforming pools. Conforming pools have claims on groups of mortgages made up only of loans below the conforming loan limit, whereas non-conforming pools have claims on groups of loans that include mortgages both above and below the conforming loan limit. All regressions include issue fixed effects, which absorbs all variation at the issuer, servicer and originating bank level. Regressions with "Loan Characteristics" (column two of each dependent variable) have pool level controls for the loan characteristics in the pool. A full list of those controls is given in the text in Section 4. Predicted Default is the 24-month predicted default rate for each loan at the time of origination using all information in the data for the previous three years. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters. Standard errors are heteroskedasticity-robust and clustered at the quarter of origination level. The first row for each variable shows the regression coefficient, the second row shows t-statistics.

	2008Q4			2009Q4			20010Q4		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Agency	-0.082	-0.032	-0.085	-0.076	-0.031	-0.079	-0.075	-0.033	-0.078
	-4.987	-3.800	-5.794	-4.986	-4.353	-6.289	-4.871	-4.031	-6.415
Predicted Default (24m)			0.999			0.990			0.894
			0.712			0.636			0.588
Loan Characteristics		Y			Y			Y	
Issue FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	976	976	976	976	976	976	976	976	976
R-Squared	0.94	0.96	0.94	0.96	0.97	0.96	0.95	0.97	0.96

Table 6

Yield Spreads for Conforming and Non-Conforming Pools

This table shows OLS regressions where the dependent variable is the pool-level average spread (in percentage points) over the one-month Libor rate. The average spread is calculated by weighting the spread on individual tranches included in each pool by their original dollar amount. The independent variable of interest is "Agency" and it is an indicator variable that is equal to 1 for conforming pools (as defined in Tables 4 and 5). Regressions with "Loan Characteristics" (columns 2 and 3) have pool level controls for the loan characteristics in the pool. A full list of those controls is given in the text in Section 4. Pool-level average life is the average weighted expected life for the tranches in each pool as advertised in the prospectus where the average is weighted by the size of each tranche. Predicted Default is the 24-month predicted default rate for each loan at the time of origination using all information in the data for the previous three years. Default is defined as a loan being 60 or 90 days delinquent, in foreclosure or REO. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters. Standard errors are heteroskedasticity-robust and clustered at the quarter of origination level. The first row for each variable shows the regression coefficient, the second row shows t-statistics.

	(1)	(2)	(3)	(4)	(5)
Agency	0.046	0.051	0.048	0.022	0.007
	2.632	3.465	2.094	3.052	0.222
Pool-Level Average Life	0.060	0.055	0.052	0.055	0.052
	2.204	5.134	3.364	4.227	2.655
Predicted Default (24m)				-0.812	10.478
				-1.196	1.230
Loan Characteristics		Y	Y		
Issue Quarter FE	Y	Y		Y	
Issue FE			Y		Y
N. Obs.	976	976	976	976	976
R-Squared	0.77	0.61	0.93	0.53	0.82

Table 7

Information Content of Yield Spreads for Conforming and Non-Conforming Pools

This table shows OLS regressions where the dependent variable is the pool-level default rate of the mortgages included in each pool as of three different points in time: 2008Q4, 2009Q4 and 2010Q4. Pool spread is the pool-level average spread (in percentage points) over the one-month Libor rate. The average spread is calculated by weighting the spread on individual tranches included in each pool by their original dollar amount. "Agency" is an indicator variable that is equal to 1 for conforming pools (as defined in Tables 4 and 5). Pool-level average life is the average weighted expected life for the tranches in each pool as advertised in the prospectus where the average is weighted by the size of each tranche. Predicted Default is the 24-month predicted default rate for each loan at the time of origination using all information in the data for the previous three years. Default is defined as a loan being 60 or 90 days delinquent, in foreclosure or REO. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters. Standard errors are heteroskedasticity-robust and clustered at the quarter of origination level. The first row for each variable shows the regression coefficient, the second row shows t-statistics.

	2008Q4			2009Q4			20010Q4		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Pool Spread	-0.011	-0.037	-0.010	0.017	-0.012	0.012	0.018	-0.012	0.002
	-0.320	-1.022	-0.152	0.353	-0.251	0.147	0.431	-0.300	0.042
Agency		-0.092	-0.100		-0.090	-0.094		-0.090	-0.095
		-7.271	-6.053		-8.234	-6.450		-8.057	-6.665
Pool Spread * Agency		0.077	0.062		0.080	0.059		0.083	0.069
		3.137	2.216		3.281	2.075		3.189	2.209
Pool-Level Average Life	0.007	-0.005	-0.009	0.005	-0.005	-0.011	0.004	-0.007	-0.012
	0.891	-0.636	-1.027	0.740	-0.783	-1.322	0.490	-0.913	-1.549
Predicted Default	0.113	0.349	0.721	0.089	0.319	0.512	0.108	0.334	0.454
	0.363	1.300	0.452	0.243	0.975	0.304	0.297	1.029	0.267
Issue Quarter FE	Y	Y		Y	Y		Y	Y	
Issue FE			Y			Y			Y
N. Obs.	976	976	976	976	976	976	976	976	976
R-Squared	0.61	0.66	0.94	0.74	0.77	0.96	0.73	0.77	0.96

Table 8

Effect of GSE participation on Modification Rates

This table shows OLS regressions where the dependent variable is the pool-level modification rate of the mortgages included in each pool as of May of 2011. A modification is defined as any change to the terms of the initial mortgage contract that occurred after origination as reported by the servicers of the loans. The independent variable of interest is "Agency" and it is an indicator variable that is equal to 1 for conforming pools. Conforming pools have claims on groups of mortgages made up only of loans below the conforming loan limit, whereas non-conforming pools have claims on groups of loans that include mortgages both above and below the conforming loan limit. Regressions with "Loan Characteristics" (columns 2 and 3) have pool level controls for the loan characteristics in the pool. A full list of those controls is given in the text in Section 4. Predicted Default is the 24-month predicted default rate for each loan at the time of origination using all information in the data for the previous three years. The sample includes only triple-A floating rate tranches that are part of deals where all the triple-A tranches are either floating rate or inverse floaters. Standard errors are heteroskedasticity-robust and clustered at the quarter of origination level. The first row for each variable shows the regression coefficient, the second row shows t-statistics.

	(1)	(2)	(3)	(4)	(5)
Agency	0.005	-0.002	-0.004	0.006	0.001
	1.048	-0.717	-0.772	1.420	0.215
Pool-Level Average Life	0.002	-0.002	0.000	-0.001	0.001
	0.451	-1.076	0.112	-0.549	0.237
Predicted Default				0.787	1.098
				3.525	1.361
Loan Characteristics		Y	Y		
Issue Quarter FE		Y		Y	
Issue FE	Y		Y		Y
N. Obs.	976	976	976	976	976
R-Squared	0.95	0.53	0.96	0.47	0.95