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CREDIT RATINGS AND THE FINANCIAL CRISIS †

Credit Ratings and Security Prices in the Subprime MBS Market

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> *In a practical sense, it was Moody's and Standard and Poor's that set the credit standards that determined which loans Wall Street could repackage and, ultimately, which borrowers would qualify.*
> —Roger Lowenstein, *New York Times*, April 27 2008

Credit rating agencies (CRAs) are widely perceived as contributing to the recent financial crisis through their role in rating subprime mortgage-backed securities (MBS), collateralized debt obligations, and other structured finance securities. Our previous research documents that on a value-weighted basis, 80 to 90 percent of securities in a typical nonprime MBS deal initially received the highest possible triple-A rating (Ashcraft, Goldsmith-Pinkham, and Vickery 2010). Ex post, however, many of these securities have defaulted or are in danger of doing so, reflected in striking rating downgrades of the order of 6-10 rating notches per security for recent MBS vintages (measured on a 21-22-notch scale).[1]

As typified by the quote above from the *New York Times*, many commentators argue that if subprime MBS had received lower credit ratings prior to the crisis, investors would have demanded a higher rate of return on these bonds, thereby reducing the supply of credit to borrowers, and muting the subprime boom and bust.[2] However, there is surprisingly little hard evidence to either support or refute this argument. This short paper presents evidence on the question: how sensitive were subprime MBS prices to credit ratings?

The strength of the causal linkage between ratings and prices is unclear based on economic theory alone. MBS credit ratings were based on hard information, particularly data on the underlying mortgage pools and rules used to allocate mortgage cash flows across securities. This information was generally available to informed investors via each deal's prospectus and pooling and servicing agreement, and from industry datasets like Intex and LoanPerformance. In a standard frictionless model, equilibrium prices will reflect this public information even without CRAs, and ratings will have little independent effect on prices.

On the other hand, ratings may influence prices by providing information to less informed investors, so long as these investors have some price impact in equilibrium (for example, because of limits to arbitrage). Closely related, credit ratings may affect the cost of capital for leveraged investors if used to set haircuts (i.e., borrowing limits) on repurchase agreements and other loans secured by MBS.[3] Finally, ratings

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[1] Ratings from Moody's are reported on a 21-notch scale from AAA to C, while ratings from Standard and Poor's (S&P) and Fitch are reported on a 22-notch scale from AAA to D.

[2] Atif Mian and Amir Sufi (2009) present evidence of an increase in mortgage supply in the period before the financial crisis, perhaps due to increased securitization.

[3] For example, tri-party repo lenders such as money market mutual funds have little incentive to analyze counterparty collateral in detail, rather than rely on credit ratings, given the low margins and short maturities involved in such loans. This market was a key funding source for investment banks during the period of our study.

may affect prices via regulatory arbitrage, since rating levels are built into capital requirements and other regulations (Darren Kisgen and Philip Strahan 2010; Christian Opp, Marcus Opp, and Milton Harris 2010).

The main empirical challenge to be overcome is identifying the *causal* effect of ratings on security prices, holding security fundamentals fixed. We are not aware of a convincing econometric instrument in this context, that is, a variable correlated with ratings but unrelated to other determinants of MBS prices. However, we do have access to an unusually rich dataset of nonprime MBS, including a wide range of security- and loan-level information at the time of issuance, and data on ex-post security and mortgage default.

Using these data, we examine the relationship between initial credit ratings and MBS prices after controlling for a large set of security characteristics (e.g., bond seniority and data on the underlying mortgage pools). To preview, we find evidence that higher ratings are closely associated with lower yields or, equivalently, higher prices, controlling for these fundamentals. We also describe results to date from a more comprehensive analysis of this question (Ashcraft, Hull, and Vickery unpublished) that suggests MBS prices are *excessively* sensitive to credit ratings, relative to the informational content of ratings.

I. Data

An MBS *deal* consists of a set of securities backed by a common mortgage pool or pools. We begin with the data used in Ashcraft et al. (2010), consisting of 56,764 MBS from 3,069 subprime and Alt-A deals issued from 2001 to 2007. (The terms "subprime" and "Alt-A" refer to features of the underlying mortgages, with subprime deals being backed by riskier loans.)

This sample covers around 90 percent of nonprime deals issued during this period, and combines data from several leading industry datasets: Intex, LoanPerformance, ABSNet, and Bloomberg. Intex, ABSNet, and Bloomberg provide security-level data, such as coupon rate, size, credit support, and ratings. Credit support, or "subordination," is a key variable: it indicates the seniority of the bond. Mortgage losses are first applied to the most junior tranche, then the next most junior tranche, and so on. Higher credit support thus implies lower credit risk, all else equal, since the security has a larger buffer against mortgage losses.[4]

LoanPerformance (LP) includes loan-level data on mortgages underlying these MBS, including the loan-to-valuation (LTV) ratio, borrower credit score, property zip code, level of borrower income documentation, history of borrower payments, and so on. These loan-level data are matched to our security data by deal. See Ashcraft et al. (2010) for more details.

This initial sample includes a mix of security types, many of which are exposed to significant interest rate and prepayment risk in addition to credit risk (e.g., fixed-rate bonds, inverse floaters, and planned amortization class bonds). To keep our analysis as clean as possible, we focus on floating-rate securities linked to the one-month London Interbank Offer Rate (Libor). These tranches have little exposure to interest rate risk because their duration is close to zero; since they all have the same cash flow structure, and are generally issued at par, their prices can reasonably be compared in terms of the yield spread to Libor.[5] We also drop the senior A-class MBS to focus on the credit sensitive mezzanine and junior tranches. After applying these filters, and dropping a small number of MBS with no current rating, we are left with a sample of 14,192 bonds. Summary statistics for this sample are presented in Table 1.

The average spread to one-month Libor is 115 basis points (bp). This measure reflects the additional yield required by investors over Libor to compensate for credit risk, and is used as our main measure of security prices. Average subordination is 7.3 percent. Our data include the history of ratings from Moody's, S&P, and Fitch. Ninety-six percent of our sample received at least two ratings (S&P rated 97 percent of the sample, Moody's 93 percent, and Fitch 43 percent). The initial rating variable used in our analysis is the average rating across CRAs,

[4] MBS also include other types of credit enhancement. Most important is excess spread, which is the difference between mortgage interest received and coupon payments to bondholders. This difference accumulates in a reserve as an additional buffer against losses.

[5] In some deals, the most junior tranches were sold at a discount to par. Results are robust to excluding junior bonds, suggesting this does not affect our main findings. We also have data on these discounts for a subset of deals, which we plan to use in Ashcraft et al. (in progress).

TABLE 1—SUMMARY STATISTICS FOR KEY VARIABLES

	Mean	10th percentile	90th percentile
Security characteristics			
Default indicator (=1 if security is in default)	0.613		
One-month yield spread (percent)	1.15	0.35	2.41
Credit rating (e.g., AAA = 1, AA+ = 2 etc.)	5.95	2.50	9.50
Subordination (percent)	7.33	1.65	14.80
Excess spread (percent)	3.31	1.50	5.62
Projected mortgage early default rate (percent)	4.59	1.16	10.30
Selected characteristics of underlying mortgages (value weighted)			
Combined loan-to-valuation (CLTV, percent)	85.62	79.00	92.77
Borrower credit score (points)	644	608	707
Loan has incomplete documentation (percent)	50.49	28.48	82.53
Investor loans (percent)	7.87	1.86	17.49
Interest only loans (percent)	28.98	0.00	80.35
Annual trailing MSA home price growth (percent)	12.18	3.11	19.38

measured in "notches" (AAA = 1, AA+ = 2, etc.). We classify the security as being in default if it has the lowest possible letter rating from at least one CRA as of September 2010. Strikingly, 61 percent of securities in our sample are in default as of September 2010 by this measure.

The lower part of Table 1 presents summary statistics of the mortgages underlying these MBS. As well as individual characteristics like the loan-to-valuation (LTV) ratio, in Ashcraft et al. (2010) we construct a projected early payment default rate for each mortgage pool, using a simple ex ante default model. This variable, listed as "projected mortgage early default rate" in Table 1, is a useful summary statistic of the relative credit risk in each mortgage pool, incorporating information from a large set of mortgage characteristics in our loan-level data.

II. Results

It is unsurprising that securities with a rating closer to triple-A would have lower MBS yields, given that ratings are correlated with fundamental determinants of credit risk. More strikingly, however, Figure 1 shows that this association between ratings and yields holds strongly even after controlling for a rich set of security and loan characteristics.

To construct Figure 1, we first regress yield spreads and credit ratings in turn on a rich set of controls measuring the security's level of credit risk. We then create a scatter plot of the residuals from these two regressions. The upward-sloping relationship in Figure 1 shows that securities with a rating closer to triple-A (farther to the left on the x-axis) have significantly lower yield spreads, holding these controls fixed. A one-notch improvement in the credit rating is associated with a decline in yield spreads of about 20 basis points. In regression analysis in Ashcraft et al. (in progress), we find that this relationship is highly statistically significant, with a *t*-statistic of between 15 and 25, depending on the specification. We also find evidence that fundamentals such as the security's seniority have little correlation with MBS yields (and sometimes the wrong sign), holding credit ratings fixed.

Conditioning variables used to construct Figure 1 include all variables in Table 1 and additional controls. We control for seniority by conditioning on subordination and log subordination, and for features of the underlying mortgage pool via the Ashcraft et al. (2010) predicted default rate, its log, the six mortgage variables listed in Table 1, and an interaction term between predicted default and subordination. We also control for excess spread at origination, a subprime deal dummy and security class dummy (junior or mezzanine). These variables are then interacted with seven calendar year dummies, to account for time variation in the effect of fundamentals on spreads. We also condition on 28 calendar quarter dummies.

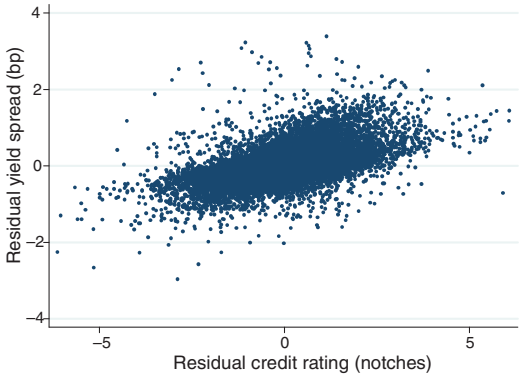

FIGURE 1. CREDIT RATINGS AND YIELD SPREADS

Notes: Relationship between yield spread residuals and rating residuals. Ratings are measured in notches (AAA = 1, AA+ = 2, etc.), so a higher value indicates a lower letter rating.

III. Discussion

While we view these stylized facts as strongly suggestive that ratings are causally related to MBS yield spreads, at least two interpretations are possible. One is that ratings affect yields (or equivalently, prices) because they contain valuable additional information about credit risk not reflected in our data (e.g., due to private information held by CRAs).[6] A second interpretation is that the residual variation in ratings in Figure 1 is driven by the discreteness of letter ratings or rating mistakes or biases, rather than useful information about risk, and thus that MBS yields are *excessively* sensitive to ratings, relative to their informational content.

To distinguish between these views, Ashcraft et al. (in progress) analyze the relative predictive content of ratings for ex post security default. While this research is still preliminary, our findings so far indicate ratings are much less predictive for default than for initial security prices, by as much as an order of magnitude. Furthermore, fundamentals like seniority strongly predict default, holding ratings fixed, even though these variables are nearly uncorrelated with initial spreads, conditional on ratings. These results are consistent with the view that MBS prices were disproportionately sensitive to ratings during this period.

Most closely related to our evidence, Manuel Adelino (2009) finds subprime MBS yield spreads are generally predictive of rating downgrades, except for triple-A, suggesting that triple-A investors relied excessively on ratings. See Kisgen and Strahan (2010) and references therein for evidence on how ratings influence corporate bond prices and supply.

We view our research question as being a crucial link in understanding the role of CRAs in the recent subprime credit cycle. A growing literature studies the quality of structured finance ratings during this period (Ashcraft et al. 2010; Richard Stanton and Nancy Wallace 2010; John Griffin and Dragon Tang 2009; Jie He, Jun Qian, and Philip Strahan 2009), or develops models of incentive problems in the rating process (Patrick Bolton, Xavier Freixas, and Joel Shapiro 2009; Jerome Mathis, Jamie McAndrews, and Jean-Charles Rochet 2009). The findings of these papers are of limited economic interest, however, unless structured finance ratings meaningfully affected prices and the supply of credit to households and firms. Our preliminary results support the hypothesis that subprime MBS ratings *were* influential for prices during this period, reinforcing the view that decisions about regulation of the credit rating industry are important, and should be weighed carefully by policymakers.

[6] Closely related to this explanation, the correlation between ratings and yields could be due to an omitted variable bias, namely that ratings are correlated with components of credit risk which are observable to investors but not absorbed by our set of controls.

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