A Model of CMBS Spreads

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Abstract

The market for securitized commercial mortgages is still fairly new, dating back only to the mid-1990s. As the market developed, and both rating agencies and investors became more comfortable with the product and the associated risks, the level of credit support behind given tranches steadily declined. At the same time on-the-run spreads also declined. This paper develops a series of models of both on-the-run CMBS spreads and spreads on newly-issued CMBS. Unlike the on-the run spreads, we can observed differences in credit quality and credit support for the newly-issued securities and therefore identify the the marginal cost investors assigned to these measures of credit quality and credit support. We then use the model to see if the marginal cost assigned to these measures of CMBS credit quality and credit support significantly changed after the 9/11 attacks increased the perceived risk associated with commercial real estate, the passage and extension of the Terrorism Risk Insurance Act, and the turmoil in structured credit markets in 2007.

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1 Introduction

The market for commercial mortgage backed securities has developed into an important source of financing for commercial buildings since the early 1990s. This market has faced several significant exogenous shocks, including the 9/11 attacks and the onset of the subprime mortgage crisis. This paper takes advantage of the heterogeneous nature of CMBS pools to determine if investors demand higher spreads based on differences in the composition and credit quality of tranches with similar credit ratings, and if these premiums have responded to exogenous shocks to the marketplace.

After being developed to initial dispose of S&L commercial mortgages held by the Resolution Trust Company in the early 1990s, the CMBS market has grown to be a significant source of debt financing for commercial mortgages. Currently, based on Flow of Funds data from the Federal Reserve, over one-quarter of commercial mortgages outstanding are securitized, and the CMBS market accounts for a higher share of new originations, see Figure 1. Much of this growth has come at the expense of insurance companies, who have shift a portion of their portfolios from whole commercial mortgages, to CMBS securities. Despite the growth of CMBS, commercial banks continue to hold roughly half of all commercial mortgages and almost all commercial construction loans.

Commercial real estate investors wishing to increase their leverage found CMBS to be and attractive alternative to funding from portfolio lenders. Leveraged buyouts of REITs was a major source of the growth in CMBS in 2006 and the first half of 2007. There are indications that this surge in demand from highly leveraged investors using CMBS contributed to the sharp run-up in commercial real estate prices that peaked in 2007.

The terrorism attacks on 9/11 increased concerns that large commercial buildings, especially those that were concerned landmarks or had some iconic status, did not have sufficient insurance against repeated attacks. A motivating concern behind the passage of the Terrorism Risk Insurance Act in the fall of 2002 was that without some form of government intervention a robust private market for terrorism insurance would not develop and commercial real estate activity would be stunted. However, with the expectation of Brown et. al. 2004, there has been little empirical work on the impact of the 9/11 attacks on commercial real estate.

Our hypothesis is that the financial instrument that should be most sensitive to changes in terrorism risk is the spread on mortgages for large commercial properties. While we cannot observe this spread directly, we can observe the spread on the CMBS tranches for pools which include such large loan, in particular the BBB spreads which should be the most responsive to risk. We observe a sharp increase in the use of these fusion pools, which combined large loans with a group of smaller loans in an attempt to diversify some of the large loan risk at the 9/11 attacks (Figure 2).

CMBS pools differ from residential MBS in several distinct ways. CMBS pools contain a relatively small number of loans. In addition data on individual loan terms as well as rental income history for the underlying properties is readily available. It is feasible for an informed investor to analyze each individual loan and the performance of the underlying properties in a CMBS pool, a task that would be far more difficult with a residential pool. Finally, there is a great deal of heterogeneity in CMBS pools in terms of pool composition and credit quality.

One of the most significant trends over the history of the CMBS market has been the steady decline in subordination rates, or the percent of the pool that must default before the holders of a given tranche lose any of their principal. Figure 3 documents how subordination rates have steadily fallen until recently. In addition to the decline in subordination rates over time, there can be significant variation in subordination rates across similarly rates CMBS tranches at issuance. Until 2004, we noticed little difference in BBB CMBS spreads between tranches with different levels of credit support (Figure 4. After 2004, we observed a significant gap between the spread on BB CMBS spreads between tranches with different levels of credit support. This observation, and this Figure, is the primary motivation for this paper.

In the section section of this paper we provide a brief review of some of the recent papers on CMBS spreads and the impact of the 9/11 attacks. We then discuss the construction of our database in the third section. We collect both on-the-run CMBS spreads for and CMBS spreads on newly issued pools which allows us to control for changes in credit quality and pool composition. We then provide the results from both our time-series and cross sectional models in the fourth section and discuss our conclusions in the second section.

2 Literature Review

This paper draws from two seperate streams of literature, papers exploring pricing in the CMBS market and paper exploring the economic effects of the TRIA passage. This empirical work of this paper takes Maris, Segal (2002) as a starting point. As they did, we take the spread on newly issued CMBS as our dependent variable. We also attempt to replicate many of their principal conclusions, such as the effects of the size of individual CMBS pools and their component tranches on spreads at orginiation and the relationships between CMBS spreads and macroeconomic variables. Our primary extension to Maris and Segal, other than the inclusion of an additional eight years worth of data, is to explore whether the spread on newly issued CMBS was response both to varations in credit risk and the passage of TRIA.

Similar papers on the determination of spreads in secondarry markets include

Rothberh, Nothaft, and Gabrial (1989), Ambrose and Sanders (2003), and a recent working paper by Deng, Gabriel, and Sanders (2008). This last paper explored the role of demand from the CDO market for CMBS in explaining the decline in spreads in the early to mid 2000s.

Work on the effects of TRIA was largely qualitative and descriptive in nature. There were many papers laying out the pros and cons of the proposal and discussing possible market responses to the passage of TRIA. Hubbard and Deal (2004) argued forefully for the passage of TRIA. However there have been few empirical studies as to the actuall observed impact of TRIA on markets. One of the few, Brown et. al. (2004) performed an event study to see if company level equity prices in affected industies responded postively or negatively to a series of legislative events leading up to the passage of TRIA. The authors find that the passage of TRIA was primaryly negative on the affected industries, with the possible exception of property-casulty insurer, and interpret this as evidence that TRIA pre-empted possibly more efficient market responses. We believe that the CMBS market should be more responsive changes in terrorism risk than broader industry catagories used in Brown et. al.

3 Data

We estimate two different sets of models in this paper, one set using the on-the-run CMBS spread and one set using the spread on newly issued CMBS. A list of the variable names and brief definitions are provided in Table 1. The first set of models use weekly on-the-run spreads for AAA and BBB CMBS from January 1997 to May 2008, provided by Morgan Stanley. The AAA spread is the difference between the 10-year AAA rated fixed-rate CMBS conduit yield and the 10-year U.S. Treasury yield. The BBB spread is the difference between the

10-year BBB rated fixed-rate CMBS conduit yield and the 10-year U.S. treasury yield.

The independent variables in the model of on-the-run spreads are chosen to capture how changes in macroeconomic conditions might affect the spreads on CMBS. They are all at a weekly frequency, just as the CMBS spreads are. The first variable is the spread on corporate-rated 10-year bonds over the one-the-run 10-year Treasury. The 10-year corporate bond yield is computed using the Nelson Siegel yield curve based on corporate bond data from the Merrill Lynch database. The AAA and BBB rated corporate bond spreads are used respectively for the models of the AAA and BBB CMBS spreads. These corporate bonds are close complements of the similarly rated CMBS bonds, and they should move in tandem.

Following the specification in Maris and Segal (2002), we included the spread between BBB and AAA corporate bonds as a measure of credit risk. The a priori hypothesis is that as credit risk increases, and the spread between BBB and AAA corporate bonds widen, CMBS spreads might also widen. This hypothesis, which Maris and Segal found evidence of, might not hold in our sample which includes the period following the Enron and related corporate scandals. Over that period, faith in corporate bonds declined, corporate spreads widened, and demand for CMBS bonds spiked as investors viewed them as relatively safer bets.

We also included the spread between the 10-year and 3-month Treasury as a measure of the yield curve, the implied volatility on the 10-year Treasury yield and the the S&P 500 Volatility Index. For models of residential MBS, the yield curve and volatility of the 10-year Treasury help control for refinancing risks. The significant prepayment penalties in the CMBS market likely mitigate those effects. However the volatility of the 10-year Treasury yield, and the S&P 500 Volatility index might be correlated with increased volatility of commercial property prices.

Given that most commercial mortgages involve large balloon payments at the end of their terms, sudden declines in the value of commercial property may significantly increase default risk, and hence widen spreads. We therefore use these two volatility measures as proxies for default risk.

There is a significant amount of autocorrelation in CMBS spreads. One alternative to this is to use a more sophisticated econometric technique (Deng, Gabriel, Sanders 2008). However, such a technique is not easily adapted to our models of the spread on new issuance, which is not strictly time series data. In the interest in maintaining consistency across our different models, we instead include the average CMBS spread over the previous month to control for any autocorrelation. A examination of the residuals, not shown, indicates that this approach successfully controls for the autocorrelation in the spreads. These residuals also suggest that the uses of year or month dummies, or some trend term is not required.

The last set of variables included in the weekly CMBS spreads models are our treatment effects. We include dummy variables covering the period after the 9/11 attacks and before the passage of the first TRIA act, November 11, 2002. The second window covers the period after the passage of the first TRIA act, up through it's renewal in 2005 and 2006, to the onset of the ongoing subprime crisis, February 28, 2007. We will use these event windows both in the weekly on-the-run spreads models and the models of the spreads on newly issued CMBS.

The main goal of this paper is to used spreads on newly issued CMBS, for which we can observed differences in credit quality and composition, to determine if investors demand premiums for characteristics of new CMBS issuance and how these premiums have changed in response to exogenous shocks. The models of new issuance include all of the variables present in the weekly on-the-run models plus measures of the credit quality and composition of the new issuance.

We use the CMAlert database for information on the pricing and composition of new CMBS issuance. The database provides both top level information on the pool composition and tranche level data on pricing, rating, and credit support. As we did the the weekly on-the-run model, we convert the AAA and BBB spreads from spread over swaps to spreads over Treasury. In recent years, there has been a proliferation in the number of AAA rated tranches present in a given CMBS pool. In addition to tranches that vary by expected term (5 versus 10 year) or composition (tranches tied to multifamily properties in pool and sole directly to the GSEs), we have seen the development of three different levels of credit support in AAA tranches. The super-senior AAA tranches will have 30% subordination rate, the senior AAA [JOE - check name] tranches will have 15%, and the junior tranches will have the minumim required by the rating agencies, usually around 11%. In order to correctly identify the premium paid for differences in credit quality, we limit our analysis to these junior AAA tranches, providing us with 826 tranches from 1997 to 2008.

We add to our base model for the tranche level data measures of the liquidity of the new CMBS issuance, the log of the notational tranche amount and the log of the notational pool amount. Following Maris and Segal (2002), a large amount of issuance might increase liquidity and as a result push spreads down. On the other hand, if the amount of issuance is too large for prevailing level of market demand to absorb easily, spreads might widen.

We include four different measures of credit quality in the analysis. If the average rate on the mortgages in the pool the weighted average coupon (WAC), was higher, investors should in turn receive a higher spread. We assume that tranches in pools with more leverage, i.e. a higher average loan-to-value (LTV), would be more risky and investors would demand higher spreads. Similarly, if the pools have lower income to debt payment ratios, or debt-service coverage ratios (DSCR) they would also be more risky and have higher spreads. Finally, the tranche in question had lower credit support, defined as the percent of the pool required to default before that tranche hold risks loss of principal - i.e. the subordination rate, investors should demand higher spreads in return for the higher risk.

The model also includes measure of the composition of the pool, including the percent of the pool made up of hotel properties, retail properties, and warehouses. The final and most significant pool level measure of the presence of a large loan on a single property in the pool, defined as either a pool that consists of only a single large loan or a pool where the large loan is combined with a group of smaller loans, i.e. a fusion pool. In the wake of the 9/11 attack, and the increase in perceived risk on the high profile buildings often behind these large loans, the CMBS market responded by an increase in the use of these fusion deals, as can be seen in Figure 2. By the end of 2003, fusion deals grew to dominate CMBS issuance. If spreads on CMBS responded to increased risk of terrorism attack after 9/11 and if the passage of TRIA helped assuage these concerns, we should see spreads on these deals with large loans spike after the attacks, and then fall back after the passage of TRIA.

In order to test how the premium for credit quality has changed over time, and how the premium for CMBS pools with large loans susceptible to higher terrorism risk changed in response to the passage of TRIA, we interact our event windows with the DSCR, subordination rate, and the dummy for the presence of a large loan in the pool. The signs on these will allow us to test whether the premiums demands from investors have significantly changed in response to these exogenous events.

4 Empirical Results

The results from the weekly on-the-run CMBS spreads are shown on Table 2. Columns (1) and (3) show the results from the base model for AAA and BBB spreads respectively. The coefficient for the corporate spread of comparable rating is positive for both models, but only significant for the AAA model. The sign of the corporate credit spread is significant and negative for both models, counter to the Maris Segal (2002) result. This is consistent with the scenario discussed in the previous section where CMBS developed into an alternative to corporate bonds in the wake of Enron and related scandals. When we fit our model over date prior to 1999, consistent with Maris Segal (2002), the sign on the corporate credit spread is significant and positive.

The measure of the yield curve is insignificant in both models. For the AAA model, the measure of 10-year Treasury volatility is significant and negative while the S&P 500 Volatility Index is significant and positive for the BBB model. These results are consistent with the hypothesis that prepayment risk, measured by the yield curve, matters little in the CMBS market, but increase volatility in financial markets does push up spreads in the CMBS market, as uncertainty regarding the value of the underlying properties increases.

The measure of the lagged CMBS spreads is significant and positive for both models, reflecting the significant degree of autocorrelation present in CMBS spreads. Examination of the residuals from these base models, not shown, indicate that further autocorrelation corrections are not required, nor are the use of a trend variable or year dummies.

Columns (2) and (4) in Table 2 show the results from the base model, when the event windows are included. The coefficients for the other time series variables are largely unchanged, except for the corporate spread on similarly rated corporate bonds. There seems to be no movement in CMBS spreads after 9/11 and large jumps in spreads after the on-set of the subprime crisis. Interestingly, spreads on BBB-rated CMBS bonds seemed to have started to widen prior to the onset of the CMBS crisis. Given that concerns regarding the weaker underwriting and declining levels of credit support in the CMBS market were widely air prior to the onset of the crisis, it is clear that investors were starting to demand a higher premium for holding BBB CMBS paper. The shifting composition and credit quality of the CMBS pools complicates this analysis and leads us to our next set of models of spreads on newly issued CMBS pools.

Table **??** presents the results from the model of AAA-rated CMBS tranches at origination. Column (1) presents the base model, which has the identical specification as the weekly on-the-run spreads model, except for the inclusion of the size of the tranche and the size of the pool. The signs on the variables are identical to those seen in the on-the-run model, with the coefficients for the corporate spread, Treasury volatility, S&P Index volatility, and the average of the spread over the previous month all significant and positive. As was the case in the earlier model, the sign for the corporate credit spread is significant and negative. The sign for the amount of the tranche is significant and negative and for the amount in the pool significant and positive, similar to the Maris Segal results. This supports there conclusion that large tranches are more liquid, so investors will accept lower spreads, but larger pools must offer higher spreads in order to attract sufficient investor demand.

Column (2) extends the base model by including measure of the composition and credit quality of the pools and tranches. Once we included these additional variables, the volatility measures, which had been out proxy for default risk, ceased to be significant. Most of the measures of credit quality were also insignificant, not unexpected for AAA rated tranches. However the amount of credit support, measured by the subordination rate, was significant an positive.

Even for AAA rated CMBS, investors will demand different spreads depending on the variation in the level of credit support. The only other measure of the pool composition that seemed to effect spreads was the presence of large loans in the pool. Investors required and additional 10 basis points for tranches in pools with such loans.

Columns (3) and (4) repeat the models from columns (1) and (2), with the event windows included. The only significant change in the coefficients is that the corporate credit spread and the level of credit support for AAA CMBS is no longer significant. The model shows, after controlling for market conditions and the presence of large loans in the pool, spreads actually dropped after 9/11. The model also captures how spreads widened significantly after the onset of the subprime crisis. The final column included interactions between the event windows and the dummy variable for the presence of large loans in the pool, the average DSCR in the pool, and the average subordination rate. These interaction terms are largely insignificant. This result is not entirely unsurprising, and the early models showed that the AAA spreads are somewhat insulated from the increased risks associated with the 9/11 attacks and the onset of the subprime crisis. IF the market truly responded to such changes in perceived risks, we would notice that response first and most strongly in the BBB CMBS spreads.

Table 4 shows the results from the models of BBB CMBS spreads at issuance. The signs on the time-series variables are identical to those seen in the on-the-run and AAA models, with the coefficients f or the corporate spread, Treasury volatility, S&P Index volatility, and the average of the spread over the previous month all significant and positive and the sign for the corporate credit spread significant and negative. As was the case before, the sign for the amount of the tranche is significant and negative and for the amount in the pool significant and positive.

The main difference from the earlier results was the role of the measures of credit support and pool composition seen in Column (2). For the AAA model, the only measures that were significant were the subordination rate and the presence of a large loan in the pool. For the model of BBB spreads, which logically should be more responsive to credit risk, investors demand higher spreads for tranches from pools with higher average leverage or lower credit support. Pools with a higher concentration of hotels also results in higher spreads, while an increase in the share of loans on warehouses in the pool actually results in lower spreads. Interestingly, the presence of large loans in the pool and the debt service coverage ratios both seem insignificant in the base model.

Columns (3) and (4) include the event windows. For the basic model with no measures of credit quality and pool composition, spreads jumped almost 30 basis points after the 9/11 attacks, fell about 6 basis points after the passage of TRIA, and jumped again after the onset of the subprime crisis. The model with both the event windows and measure of credit quality and pool composition only shows the jump after the onset of the 9/11 crisis.

The final column contains the most significant results from the paper. Up to now, we have shown some evidence of widening in spreads after the 9/11 attacks, but the continually changing nature of CMBS issuance, in particular the transition toward the wide spread use of fusion loans, has complicated the analysis. The final column contains the results from the model with these measures of credit quality and pool composition interacted with our event window. There are two main conclusions. First, investors started to demand premiums for lower credit quality, defined as lower DSCR, and lower credit support, defined as the subordination rate, *prior* to the onset of the subprime crisis. This results is entirely consistent with our original motivation, the growing gap in BBB spread between tranches with higher and lower subordination rates seen in Figure **??**. This figure shows that the gap started to grow in 2004, three years prior to the subprime meltdown.

The second significant result is the effect of the 9/11 attacks and the passage of TRIA on CMBS spreads. Prior to the 9/11 attacks the presence of a large loan in the pool have no impact on the spreads demanded by investors. After the attacks, investors demand a premium of 75 basis points. After the passage of TRIA in 2002, this premium disappeared. Now it would be overstating the result to point to TRIA as being solely responsible for the decline in this premium. As fusion pools became more common in CMBS in the years after the 9/11 attacks, the premium required for them no doubt fell. However it is important to note that, as shown in Figure 2, fusion pools did not start to dominate the CMBS market until 2004. At the time of the attacks, only 20% of CMBS pools had large loans. By the time TRIA was initially passed in 2002, that share had risen to 60%. During the event window after the attacks, on average about half of the pools had large loans in them and half did not, lending increased confidence in our result that the presence of these large loans did in fact result in higher spreads.

5 Conclusions

There is significant heterogeneity in CMBS, both across and within vintages. This poses a significant problem to the researcher who wishes to use a model of on-the-run spreads the explore the impact of events, such as the 9/11 attacks and the onset of the subprime crisis. Our goal in this paper was to model the spreads on newly issued CMBS, where we can observe details about the composition and credit quality of individual tranches of CMBS pools.

Our model shows that investors will demand higher spreads on a tranche with lower credit quality and weaker credit support than a similar tranche of the same credit rating. In addition, this credit quality premium was increasing prior to the onset of the ongoing subprime crisis, and has jumped dramatically since then.

The degree of credit support behind the individual tranche was the most significant measure of credit quality, with the debt-service coverage ratio only affecting pricing more recently.

The composition of CMBS pools are not only highly heterogeneous, they also are quite responsive to market conditions. Since the middle of last year, issuers have been steadily increasing the amount of credit support behind CMBS tranches, as well as tightening underwriting conditions. The market responded to the increase in the risk of attack on high profile commercial buildings after 9/11 by increasing the use of fusion pools, which diversified some of the risk by combining large loans with a pool of smaller loans. Our model results showed a sharp jump in the premium investors demanded for these fusion pools after the 9/11 attacks. Once the Terrorism Risk Insurance Act passed and the use of these fusion pools became wide spread in the CMBS market, and this premium disappeared.

The contribution of this paper was to use spreads on new issuance to test whether investors demand different prices for CMBS pools that differ based on the composition and amount of credit support and how this premium responded to exogenous shocks. An extension of this paper would be to use secondary market prices for existing CMBS bonds, and see if the pricing on these bonds responded to these shocks, and if the response differed based on the composition and credit quality of the pools.

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FIGURE 1: Commercial Mortgage Flows

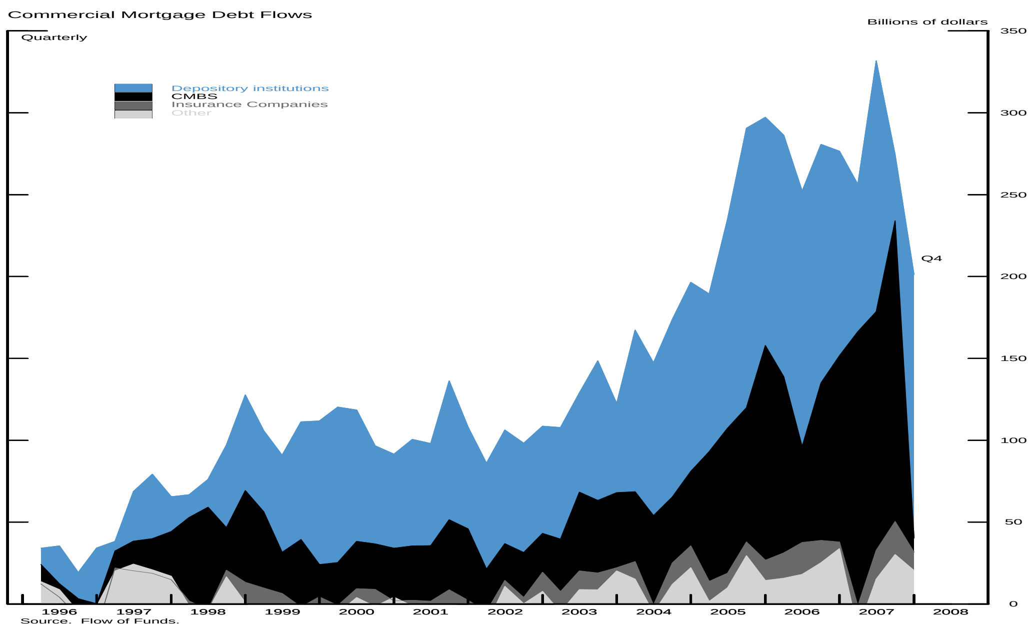

FIGURE 2: Large Loans in CMBS

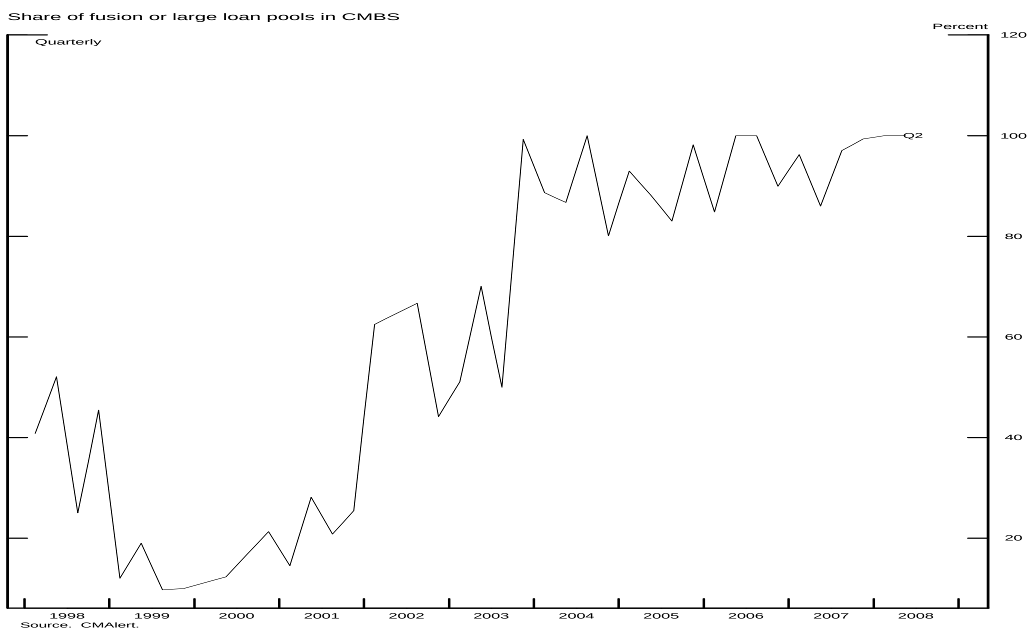

FIGURE 3: CMBS Subordination Rates

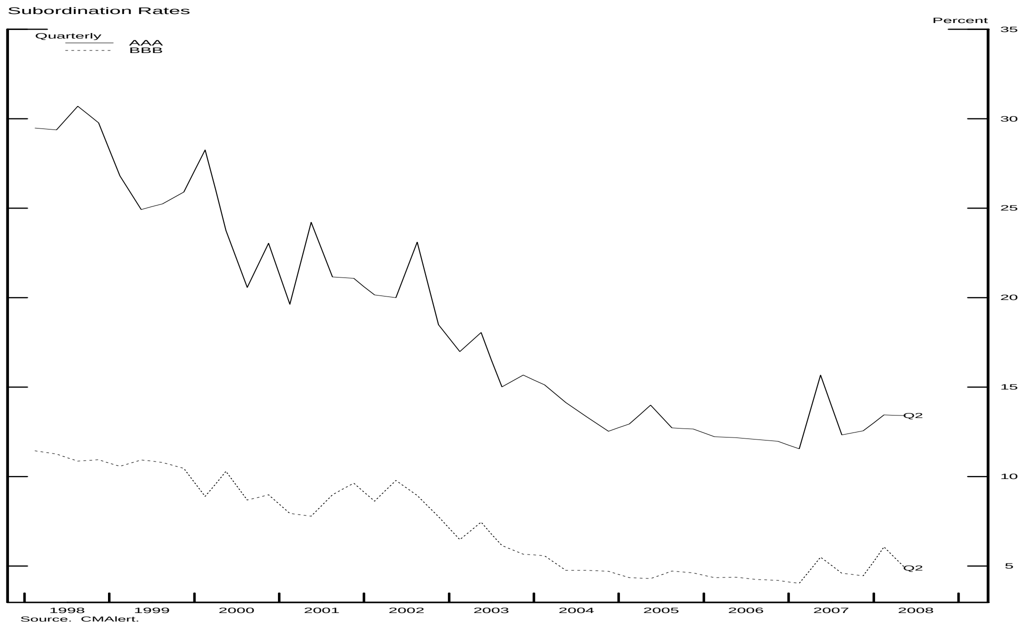

FIGURE 4: CMBS Spreads by Credit Support

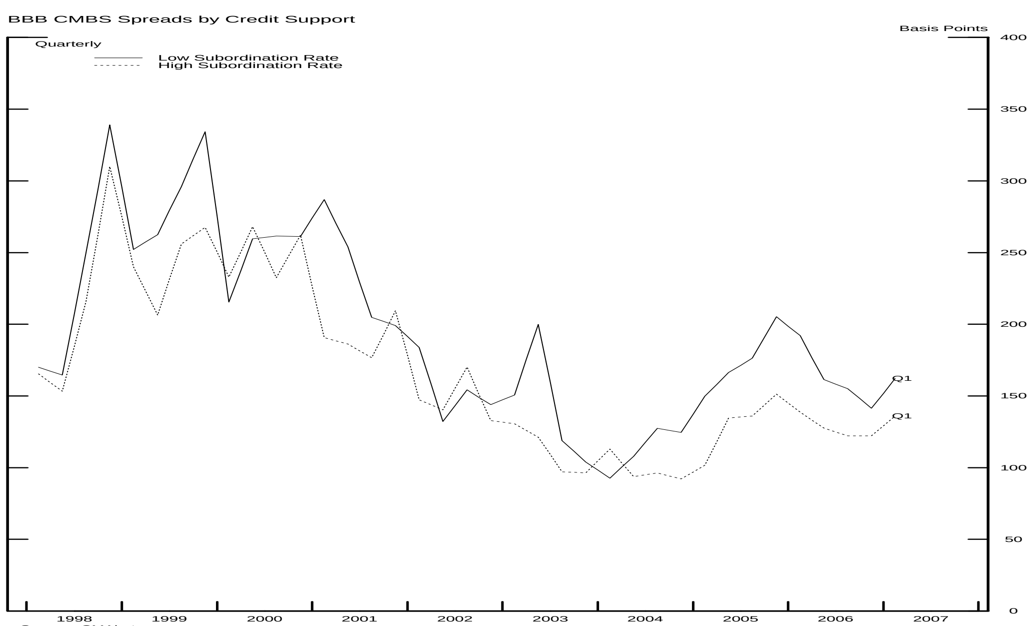

TABLE 1: Variable Definitions

AAA CMBS Spread	Spread between AAA fixed rate CMBS and 10-year Treasury
BBB CMBS Spread	Spread between BBB fixed rate CMBS and 10-year Treasury
Corp Spread	Spread between corporate bonds of similar rating and 10-year Treasury
Corp Credit Spread	Spread between BBB and AAA corporate bonds
Treasury Spread	Spread between 10-year and 3-month Treasury
Treasury Vol	Implied volatility on 10-year Treasury
Treasury Spread*Vol	Treasury Spread interacted with Treasury Vol
S&P Vol	S&P Volatility Index
Prev CMBS Spread	Average of CMBS spread of similar rating over previous month
Post 9/11	After 9/11/2001 and before 11/11/2002
Post TRIA	After 11/11/2002 and before 2/28/2007
Subprime Crisis	After 2/28/2007
Log Tranche Amount	Log of the original face value of the individual tranche
Log Pool Amount	Log of the original face value of the entire pool
Large Loan in Pool	Deal is classified as a loan or fusion deal
LTV	Average Loan-to-Value ratio of all mortgages in pool, weighted by loan amount
DSCR	Average Debt-Service Coverage ratio of all mortgages in pool, weighted by loan amount
Subordination Rate	Subordination rate on individual trance
WAC	Weighted average coupon of all mortgages in pool
Percent Hotel	Share of pool consisting of loans on hotels
Percent Retail	Share of pool consisting of loans on retail properties
Percent Warehouse	Share of pool consisting of loans on warehouses

TABLE 2: Model of On-the-Run Weekly CMBS Spreads

	(1)	(2)	(3)	(4)
Intercept	**-24.644****	**-28.677****	**-41.364****	**-103.559****
	(4.866)	(5.769)	(12.117)	(13.452)
Corp Spread	**0.219****	**0.144***	0.129	**-0.232***
	(0.048)	(0.056)	(0.121)	(0.117)
Corp Credit Spread	**-0.132****	**-0.083***	**-0.448****	0.018
	(0.038)	(0.037)	(0.191)	(0.177)
Treasury Spread	-0.029	0.009	-0.127	0.058
	(0.032)	(0.031)	(0.079)	(0.072)
Treasury Vol	**4.781****	**7.224****	4.469	**16.937****
	(1.283)	(1.301)	(3.076)	(3.029)
Treasury Spread*Vol	-0.004	**-0.010***	0.010	**-0.028****
	(0.005)	(0.005)	(0.011)	(0.011)
S&P Vol	0.400	**0.343***	**0.817***	**1.481****
	(0.163)	(0.181)	(0.407)	(0.397)
Prev CMBS Spread	**0.847****	**0.773****	**1.125****	**1.054****
	(0.025)	(0.030)	(0.011)	(0.013)
Post 9/11		4.443		14.281
		(4.719)		(11.008)
Post TRIA		-0.383		**27.435****
		(2.879)		(5.778)
Subprime Crisis		**21.866****		**95.725****
		(2.862)		(7.454)
R^2	0.874	0.889	0.966	0.974

Note: The dependent variable in columns (1) and (2) is the AAA CMBS spread. The dependent variable in columns (1) and (2) is the BBB CMBS spread. The standard deviations are presented in parentheses. *** represents significance at the 1% level, ** represents significance at the 5% level, and * represents significance at the 10% level.

TABLE 3: Model of AAA CMBS Spreads at Issuance

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	**-173.689****	**82.528****	**-83.211*****	**129.922*****	40.705	**-104.712*****
	(15.682)	(34.503)	(35.385)	(17.0512)	(49.902)	(35.683)
Corp AAA Spread	**1.0175****	**0.703*****	**0.577*****	**0.539*****	**0.733*****	**0.361*****
	(0.0702)	(0.0722)	(0.0882)	(0.0851)	(0.0852)	(0.0636)
Corp Credit Spread	**-0.260*****	**-0.0929***	0.0301	**0.120*****	**0.167*****	-0.0484
	(0.0503)	(0.0517)	(0.0672)	(0.0663)	(0.0643)	(0.0509)
Treasury Spread	**0.116*****	**0.116*****	**0.115*****	**0.108*****	**0.143*****	0.00452
	(0.0303)	(0.0297)	(0.0293)	(0.0292)	(0.0282)	(0.0419)
Treasury Vol	**11.627***	**11.842*****	**11.742*****	**10.188*****	**10.0353*****	**13.180*****
	(1.561)	(1.479)	(1.560)	(1.523)	(1.465)	(1.582)
Treasury Spread*Vol	**-0.0346*****	**-0.0354*****	**-0.0337*****	**-0.0302*****	**-0.0322*****	-0.00494
	(0.00454)	(0.00428)	(0.00448)	(0.00434)	(0.00419)	(0.00611)
S&P Vol	**-0.568*****	-0.0544	**-0.880*****	**-0.729*****	**-1.242*****	-0.276
	(0.210)	(0.214)	(0.234)	(0.224)	(0.225)	(0.188)
Prev CMBS Spread	**0.555*****	**0.581*****	**0.552*****	**0.542*****	**0.501*****	**0.152*****
	(0.0221)	(0.0228)	(0.0240)	(0.0234)	(0.0228)	(0.0197)
Log Tranche Amount	-0.669	0.643	0.593	0.869	0.498	**7.338*****
	(0.779)	(0.748)	(0.772)	(0.736)	(0.702)	(2.257)
Log Pool Amount	**12.233*****	1.668	1.345	-3.304	0.481	**-9.847*****
	(1.805)	(1.668)	(2.0428)	(2.117)	(2.0759)	(2.257)
Large Loan in Deal		**13.433***		**12.672***	**12.172*****	1.518
		(2.632)		(2.578)	(2.487)	(2.371)
LTV		**-1.0392*****		**-0.824*****	**-1.374*****	**0.607****
		(0.263)		(0.261)	(0.271)	(0.284)
DSCR		**-43.256*****		**-36.711*****	**-43.397*****	**11.310*****
		(5.00637)		(4.985)	(15.4521)	(4.227)
Subordination Rate		**-0.819*****		**-0.795*****	**3.540*****	**1.350*****
		(0.116)		(0.114)	(0.451)	(0.250)
WAC		**-7.404*****		**-8.639*****	**-9.116*****	3.151
		(1.747)		(2.531)	(2.498)	(2.0841)
Percent Hotel		**1.344*****		**1.211*****	**0.868*****	-0.252
		(0.153)		(0.151)	(0.152)	(0.185)
Percent Retail		0.0516		**0.136***	**0.198*****	**0.231*****
		(0.0735)		(0.0732)	(0.0698)	(0.0759)
Percent Warehouse		-0.133		-0.205	0.0883	-0.0541
		(0.132)		(0.155)	(0.151)	(0.148)

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Note: The dependent variable is the spread on newly issued AAA rated CMBS. The standard deviations are presented in parentheses. *** represents significance at the 1% level and ** represents significance at the 5% level, and * represents significance at the 10% level.

Table 2: Model of AAA CMBS Spreads at Issuance - Continued

	(1)	(2)	(3)	(4)	(5)	(6)
Post 9/11			**-18.639*****	**-25.391*****	-9.0453	**-30.459*****
			(6.0326)	(5.983)	(34.567)	(5.219)
Post TRIA			**6.831***	**-12.596****	**79.119*****	**-49.804*****
			(3.667)	(5.432)	(27.125)	(5.832)
Subprime Crisis			**32.0276*****	**9.494***	69.987	
			(3.670)	(5.273)	(180.924)	
Post 9/11*DSCR					28.304	
					(17.525)	
Post TRIA*DSCR					0.850	
					(14.633)	
Subprime Crisis*DSCR					-25.01678	
					(19.0642)	
Post 9/11*Subord					**-2.417*****	
					(0.738)	
Post TRIA*Subord					**-3.923*****	
					(0.738)	
Subprime Crisis*Subord					**-6.223*****	
					(0.493)	
Post 9/11*Large Loan						-3.292
						(4.508)
Post TRIA*Large Loan						0.315
						(3.773)
R^2	0.710	0.745	0.730	0.757	0.780	0.784

Note: The dependent variable is the spread on newly issued AAA rated CMBS. The standard deviations are presented in parentheses. *** represents significance at the 1% level, ** represents significance at the 5% level, and * represents significance at the 10% level.

TABLE 4: Model of BBB CMBS Spreads at Issuance

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	**-230.757*****	**-180.341****	**-115.709*****	**-156.388***	**-201.276****	**-251.744****
	(36.485)	(78.684)	(37.973)	(89.702)	(109.921)	(107.147)
Corp BBB Spread	**0.337****	0.130	0.181	0.0931	**0.315***	-0.00511
	(0.152)	(0.147)	(0.170)	(0.172)	(0.165)	(0.164)
Corp Credit Spread	**-0.830*****	**-0.477****	**-0.562****	**-0.442***	**-0.500****	**-0.465***
	(0.212)	(0.211)	(0.275)	(0.267)	(0.253)	(0.258)
Treasury Spread	-0.0490	0.0197	0.0163	0.0557	0.0696	0.0731
	(0.0668)	(0.0655)	(0.0651)	(0.0649)	(0.0611)	(0.111)
Treasury Vol	-3.461	3.685	4.427	6.601	5.302	**11.447****
	(3.635)	(3.552)	(3.848)	(3.771)	(3.560)	(4.717)
Treasury Spread*Vol	0.00807	-0.00644	-0.0202	-0.0111	-0.00867	-0.0187
	(0.0103)	(0.00996)	(0.0106)	(0.0103)	(0.00965)	(0.0170)
S&P Vol	**2.407*****	**3.192*****	**1.771*****	**2.416*****	**2.535*****	**2.0611*****
	(0.483)	(0.468)	(0.497)	(0.486)	(0.463)	(0.506)
Prev CMBS Spread	**1.143*****	**1.120*****	**1.0909*****	**1.0810*****	**1.0831*****	**0.689*****
	(0.0181)	(0.0180)	(0.0191)	(0.0191)	(0.0188)	(0.0472)
Log Tranche Amount	**-25.832*****	**-13.173*****	**-18.342*****	**-11.448****	**-15.0687*****	**-32.453*****
	(4.385)	(4.879)	(4.455)	(4.832)	(4.637)	(4.489)
Log Pool Amount	**36.719****	1.463	**13.938****	-7.0792	0.0212	-1.643
	(4.980)	(6.402)	(5.757)	(6.421)	(6.063)	(7.368)
Large Loan in Deal		6.974		6.760	**7.967***	**11.862***
		(5.197)		(4.980)	(4.811)	(6.363)
LTV		**2.521*****		**2.490*****	**2.321*****	**4.114*****
		(0.625)		(0.583)	(0.627)	(0.849)
DSCR		-12.600		-6.167	-8.611	**32.575*****
		(10.455)		(10.447)	(31.392)	(11.501)
Subordination Rate		**-9.552*****		**-8.522*****	**-4.307*****	-1.561
		(1.0671)		(1.0663)	(1.599)	(1.100)
WAC		5.471		8.456	0.716	3.868
		(3.781)		(5.462)	(5.256)	(5.861)
Percent Hotel		**1.392*****		**1.230****	**1.269*****	**1.354*****
		(0.372)		(0.365)	(0.353)	(0.502)
Percent Retail		-0.187		-0.0317	-0.0687	**0.396***
		(0.175)		(0.173)	(0.164)	(0.227)
Percent Warehouse		**-0.587***		**-0.731****	-0.403	0.178
		(0.587)		(0.343)	(0.327)	(0.416)

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Note: The dependent variable is the spread on newly issued BBB rated CMBS. The standard deviations are presented in parentheses. *** represents significance at the 1% level, ** represents significance at the 5% level, and * represents significance at the 10% level.

Table 3: Model of BBB CMBS Spreads at Issuance - Continued

	(1)	(2)	(3)	(4)	(5)	(6)
Post 9/11			17.0530	8.811	**-142.388****	-10.453
			(11.425)	(12.255)	(11.373)	(13.919)
Post TRIA			**18.0966****	4.649	**103.0838***	**-32.846****
			(7.0305)	(11.0318)	(54.480)	(15.819)
Subprime Crisis			**61.443*****	**359.654*****	**359.654****	
			(8.108)	(11.296)	(82.0656)	
Post 9/11*DSCR					36.463	
					(33.617)	
Post TRIA*DSCR					-19.293	
					(30.296)	
Subprime Crisis*DSCR					**-117.668****	
					(50.0535)	
Post 9/11*Subord					**7.614*****	
					(2.176)	
Post TRIA*Subord					**-12.215*****	
					(2.127)	
Subprime Crisis*Subord					**-33.266*****	
					(4.112)	
Post 9/11*Large Loan						-0.242
						(12.314)
Post TRIA*Large Loan						**-16.331***
						(9.643)
R^2	0.869	0.884	0.878	0.888	0.902	0.692

Note: The dependent variable is the spread on newly issued BBB rated CMBS. The standard deviations are presented in parentheses. *** represents significance at the 1% level, ** represents significance at the 5% level, and * represents significance at the 10% level.