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Abstract

This paper examines information and incentive problems that can exist in the market for conduit mortgages, which are commercial mortgages placed in pools that are repackaged and sold as CMBS. We find that mortgages that are originated by institutions with large negative stock returns in the quarters prior to the origination date tend to have higher credit spreads and default more than other mortgages with similar observable characteristics. Properties financed with these mortgages also exhibit weaker post-securitization operating performance. In addition, the time between the origination date and when the mortgage is sold as part of a CMBS is shorter for mortgages originated by stock price losers, suggesting that stock price loser institutions are anxious to sell the mortgages they originate more quickly. Finally we find that credit rating agencies account for the due diligence of the originator when they rate CMBS deals by requiring higher levels of subordination for CMBS deals (i.e. viewing these deals as riskier) that include more mortgages originated by underperforming originators. This evidence is consistent with reputation models in which poorly performing originators have less incentive to carefully evaluate the credit quality of prospective borrowers, thereby letting relatively riskier mortgages pass through their weaker screening standards.

1 Introduction

Securitization involves pooling cash flow claims from financial instruments to form publicly traded securities. Financial instruments that are commonly securitized include residential and commercial mortgages and commercial and consumer loans, which historically, were both originated and held by banks, savings and loans and insurance companies.

With the introduction of securitization, the evaluation and risk bearing functions of financial institutions can be split. The institution that initially underwrites the loan, and evaluates the borrower, need not be the same institution that ultimately bears the risks associated with holding the loan. The advantage of separating these functions is that the loan originations are best performed by institutions with good local knowledge, while risk is most efficiently borne by large internationally diversified institutions.

Offsetting this advantage are potential incentive/information problems that exist when an originator with better local knowledge sells loans to less informed investors. In particular, there may be a tendency, on the part of the originator, to expend too little effort evaluating individual loans. Due to the repeated nature of the securitization business, such a tendency may not be severe during normal circumstances because originators have an incentive to maintain their reputation for originating high quality loans. However, there may be a tendency to reduce origination expenses when the originator is doing poorly and is more concerned about its short-run profitability than its reputation.

This paper examines these incentive/reputation issues within the context of what are called conduit mortgages, which are commercial mortgages that were originated with the intention of placing them in Commercial Mortgage Backed Securities (CMBS). The commercial mortgage backed securities market was introduced in the early 1990s and grew very rapidly, perhaps because of the advantages associated with liquidity and better risk sharing.[1] By 2006 there were more than $600 billion in CMBS bonds outstanding,[2] however,

[1] See Riddiough and Polleys (1999), Riddiough (2002), and Ambrose and Sanders (2003).

[2] In 2005 more than $165 billion in CMBS was issued in the United States, which represented more than 20% of the overall commercial mortgage market. These numbers are quoted from a January 8, 2006 press release of the Commercial Mortgage Securities Association (CMSA).

the CMBS market slowed considerably starting in the latter half of 2007, in part, reflecting concerns about the origination/underwriting process which is the focus of this paper.[3]

To understand the information issues that arise in the origination of commercial mortgages it is useful to contrast the commercial mortgage market with the market for residential mortgages. In contrast to commercial mortgages, which are not always securitized, most residential mortgages are now packaged into mortgage backed securities. One difference between these markets is that for residential mortgages originators tend to use what are known as credit scoring systems, which are purely mechanical systems that map quantitative information about the borrower and the property into a credit score that determines whether the loan is offered.[4] By using a credit scoring system banks ignore soft information (i.e., information that cannot easily be quantified), which plays an important role in the evaluation of commercial mortgages. In addition to evaluating hard facts like loan to value and coverage ratios, the originator of commercial mortgages evaluates the quality of the property, its alternative uses,[5] and the incentives and reliability of the owners. This type of information is likely to be costly to quantify, which means that the ultimate mortgage investors, who see only the hard information, must to a large extent rely on the originator's judgment and reputation.

There is a large theoretical literature that describes the tradeoffs between the short-term benefits of exploiting one's reputation, e.g., selling mortgages without bearing the investigation costs, and the long-term costs of operating in the future without the benefit of a favorable reputation.[6] These models suggest that when the originator has a long horizon, i.e., uses a very low discount rate to evaluate this tradeoff, there is a tendency to make choices that are likely to help its reputation. However, as we discuss below, an originator that is having financial difficulties may be more short-sighted, and make choices that can

[3] See, for example, Prudential Real Estate Investors Quarterly Report for October 2007.

[4] Keys, Mukherjee, Seru, and Vig (2008) explore the relationship between securitization, use of credit score rules and screening standards of subprime mortgage backed securities.

[5] Benmelech, Garmaise, and Moskowitz (2005) presents evidence that the redeployability of commercial real estate affects mortgage spreads.

[6] Klein and Leffler (1981), Shapiro (1983), and Allen (1984) provide models where buyers cannot observe product quality prior to purchase. In these multi-period models, sellers forgo the short-term cost savings associated with reducing quality in order to maintain their reputations and ability to credibly sell high quality goods in the future.

potentially hurt its future reputation.[7]

Our empirical analysis of these issues is based on the idea that originators that experience large stock price losses have a greater incentive to make short-sighted choices that help their current earnings at the expense of their reputation. As a result, the mortgages originated by such institutions are expected to be riskier and harder to evaluate. There are a number of reasons why this is likely to be the case. First, a poorly performing originator may be more likely to approve mortgages without the appropriate due diligence, letting some relatively risky mortgages pass through its more porous screens. Second, a poorly performing originator may be reluctant to forego origination fees by rejecting a mortgage application when its investigation reveals unfavorable information about the borrower or the property. Third, a poorly performing originator may place risky or more difficult to evaluate mortgages, that were not originally intended to be securitized, in CMBS deals because of the risks of holding them in their own inventory. Fourth, poorly performing institutions may lose key employees and in other ways experience a decline in the competence of their organization. Finally, because of their weaker screening standards, a poorly performing originator is likely to attract less credit worthy mortgagors.[8] As a result, relative to the hard information that is available to CMBS investors, the mortgages originated by institutions that experienced large stock price declines may be riskier.

To empirically test whether poorly performing institutions originate riskier mortgages, we examine more than 18,000 mortgages originated between 1996-2002. We analyze credit spreads of the mortgages, their default rates, post-securitization operating performance of underlying properties and also the process by which they are included into CMBS. Most of our analysis consists of estimates of what are known as difference-in-difference regressions that explain mortgage characteristics with measures of the originator's stock price performance along with controls for mortgage and property characteristics as well as originator fixed effects, monthly fixed effects and fixed effects for the state where the property is located.

[7] Maksimovic and Titman (1991) develop a model, based on Myers (1977), where the firm's cost of raising capital is higher when it is financially distressed. Because of its higher discount rate, the firm has less incentive to improve product quality that cannot be initially observed. One can generate similar results within the context of a model where the manager has shorter horizon following poor performance because of career concerns.

[8] See, for example, Titman and Trueman (1986) and Khanna, Noe, and Sonti (2006) which provide models where better quality underwriters attract better quality issuers.

For example, our credit spreads regression compares the differences between the spreads of mortgages originated by stock price losers in a particular month and these originators' average spreads, over all months, with the corresponding average of this difference across all originators for the same month. In these regressions, monthly fixed effects control for the fact that economy-wide shocks change the riskiness of real estate from month to month and the originator fixed effects allow us to control for the fact that some institutions tend to have riskier clientele than others.

The credit spread regressions indicate that institutions tend to originate mortgages with higher spreads following periods when their stock prices do poorly. We find that these higher spreads cannot be explained by either observable characteristics of the underlying properties or the terms of the mortgages, which are not reliably different for mortgages originated by stock price losers. The most direct test of the hypothesis that the mortgages of stock price losers are riskier comes from an analysis of the default histories of the mortgages. Using similar difference-in difference regressions we find that the mortgages originated by stock price losers tend to default more often, even after controlling for observable risk characteristics of the mortgages. This finding, which implies that these mortgages are subject to additional risk that cannot be easily quantified, suggests that the higher observed spreads reflect higher default risk. To further assess whether institutions originate lower quality mortgages following negative stock returns we examine post-securitization operating performance of the commercial properties that collateralize the mortgages. Controlling for property characteristics observable at origination, we find that properties whose mortgages are originated by institutions that experienced large stock price losses tend to have lower or negative growth in operating incomes in the post-securitization periods. The results of these three tests are consistent with the idea that poorly performing institutions originate mortgages that are riskier along a dimension that is not readily observable.

We also run additional cross-sectional tests that provide indirect evidence that is consistent with the observation that stock price losers originate lower quality mortgages. First, we find that the time lag between when a mortgage is originated and the selling date of the CMBS deal that includes the mortgage is shorter for mortgages originated by institutions with poor stock price performance. This last finding is consistent with poorly performing originators being anxious to sell the mortgages they originate before negative information about the mortgages is revealed. We also find that the ratings agencies act as though the past

stock returns of the originators provide information about a mortgage's risk. Specifically, the ratings agencies require higher subordination levels (a lower percent of the issued bonds are rated AAA) for CMBS issues that include more mortgages originated by underperforming originators.

Although our focus is on the CMBS market, our analysis relates to the broader literature that examine how the reputation of underwriters relate to the quality of the corporate securities they issue.[9] However, in contrast to this literature, which views the reputation or prestige of the underwriting institution as a permanent attribute,[10] our focus is on how the credibility of an institution can change over time. Indeed, our empirical tests include institution fixed effects and thus control for differences in their "average" reputations, and focus on how the quality of the origination process changes when the institutions suffer large stock value losses.

The organization of this paper is as follows: next analyzes the CMBS securitization process. Section 3 describes the data. Our main results, including robustness checks, are discussed in Section 4. Additional tests are presented in Section 5. Section 6 concludes the paper.

2 The CMBS Securitization Process

In this section we describe institutional details of the process through which a typical CMBS security is created. The process starts with a financial institution (the originator) that provides a mortgage that is collateralized by commercial property. If the mortgage is originated with the intention of including it in a CMBS, it is called a conduit loan and the originator

[9] Theoretical literature includes Pennacchi (1988) that shows that a bank's ability to sell loans to investors depends on investors' perceptions of the bank's ability to monitor loans they sell. In addition, in Chemmanur and Fulghieri (1994), the reputation of a financial intermediary mitigates the moral hazard problem associated with the incentive to lower the underwriting standards. Empirical studies of Beatty and Ritter (1986) and Carter and Manaster (1990) find that the prestige of investment banks is associated with the pricing of IPOs. Michaely and Shaw (1994) document that IPOs underwritten by reputable investment banks experience less underpricing and also show that they perform better in the long run. Livingston and Miller (2000) and Fang (2005) finds that debt issued by more prestigious underwriters have lower yields.

[10] Carter and Manaster (1990) measure prestige of investment banks its place in the hierarchy of bank names in "tombstone announcements." Michaely and Shaw (1994) and Fang (2005) use a measure of investment bank reputation based on bank's relative size and/or market share.

has to follow certain loan origination guidelines in assessing the mortgage risk. The originator has to assess a variety of risk factors related to property type, location, the physical quality of the property, lease structure, the quality of the management team and the quality of the tenants.[11] Some of these risk factors, such as property type, size of the property and the current lease structure are either observable or relatively easy to assess. However, in addition to this hard information, they must make more ambiguous assessments of softer information, such as local competition and the quality of the property and its tenants. This soft information can be expensive to obtain and may be difficult to verify.

When the mortgage terms are finalized the originator transfers (or sells) the mortgage along with other mortgages to a CMBS underwriter. Normally there is a time lag between when the mortgage is originated and when it is transferred to a CMBS underwriter. The underwriter screens the mortgages and creates a pool of mortgages from different originators. Using this pool as collateral the underwriter issues bonds with different seniorities (or tranches) that are sold to investors.[12]

After the pool composition is finalized, but before the securities are issued, the credit rating agencies analyze the portfolio of mortgages in the pool, considering the above mentioned characteristics of the mortgage as well as portfolio characteristics, like the property type composition and geographical diversification. In many cases the credit agencies reexamine the quality of the mortgage origination process and conduct individual site inspections.[13] Based on their assessment of the risk factors, rating agencies determine the subordination levels for each credit rating. For example, AAA subordination is the percentage value of the total CMBS pool that are in securities rated below AAA. Since a higher subordination level reduces the default risk of the bonds, subordination levels for each rating category will be higher when the pool of mortgages is deemed to be riskier.

3 Data Overview

Our data set, which was provided by Standard & Poors, includes information on over 19,000 commercial mortgages that were originated between 1992 and 2002. As reported in Panel

[11] See Fabozzi et al (2000).

[12] See Riddiough (2002) for a description of the underwriters role in the CMBS markets.

[13] See Fabozzi and Jacob (1998).

1 of Table 1, very few mortgages were originated prior to 1996, so we limit our study to the Jan-1996 to Dec-2002 period with 18,221 mortgages. Most of the mortgages in our sample are conduit mortgages, issued specifically for inclusion in a commercial mortgage backed security (CMBS).[14] The data set includes detailed information on characteristics of the mortgaged properties along with the mortgage contract specifications and information on mortgage originators and CMBS deals. Our data set also includes the dates when the mortgage is originated as well as the dates when the CMBS that includes the mortgage is issued. The time between these dates, i.e., the "time lag," average 159 days with a standard deviation of 141 days. The time lag for some mortgages is several years.

For most mortgages we have information on the CMBS deal to which the mortgage was subsequently sold. Specifically, we have data on 97 CMBS deals that include a total of 14,169 mortgages.[15]

3.1 Property Characteristics

The data set also includes information on the mortgaged properties. The information we use includes the property type and the appraised property value as well as its annual net operating income (NOI) at the time of the origination.[16] In addition, about half of the properties in the data set have information on NOI for some post-securitization date. Summary statistics describing the properties are presented in Panel 3 of Table 1. The property types include multifamily apartment complexes, unanchored retail, anchored retail, medical facilities, industrial, warehouse, mobile home parks, office buildings, properties of mixed use, limited service hotels, full service hotels, and self storage. In addition we have information on the state where the property is located.

[14] Our sample also includes a small number of mortgages that were included in CMBS pools more than 2 years after origination.

[15] For about 4,000 mortgages we cannot identify the CMBS deals to which the mortgages were sold.

[16] The Net Operating Income (NOI) is defined as gross annual revenue less maintenance and other operational expenses before taxes and depreciation for the 12 month period prior to the mortgage origination date.

3.2 Mortgage Characteristics

The data includes the following financial information for individual mortgages: origination date; mortgage rate; loan to value ratio; whether the mortgage is non-amortizing, amortizing, or semi-amortizing; and the maturity of the mortgage. The loan to value ratio (LTV), which is generally between 60% and 80%, is measured as the loan amount divided by the appraised value of the property. Non-amortizing mortgages represent approximately two-thirds of the mortgages with the rest being amortizing and semi-amortizing mortgages, where the loan amortization rate is defined as $1 - \frac{\text{Principal Value at Maturity}}{\text{Initial Principal Value}}$ (See Panel 3 of Table 1). The majority of the mortgages have 10 year maturities and, due to prepayment penalties, are effectively not prepayable.

3.3 Originator Characteristics

The mortgages in our final sample were originated by 50 different institutions, which include large commercial banks, investment banks, insurance companies, and financing arms of large companies (e.g. GMAC). In Panel 4 of Table 1, we list the 30 largest originators that have at least 100 mortgages in the data set. Mortgages originated by these institutions constitute about 97% of the mortgages in the data set. We also include information on average spread, LTV ratios and delinquency rates across the originators. As reported in the summary statistics, seven originators issued more than 1,000 mortgages each. Mortgage LTV ratios do not vary significantly across originators, but the delinquency rates do vary across originators.

The originator characteristic that we are most interested in is their cumulative stock returns in periods prior to the mortgages they originate. Panel 5 of Table 1 reports cumulative stock returns (and standard deviations) across originators measured during two look-back windows of three and six month prior to mortgage origination. Given that our sample periods includes the Asian currency crises, the Russian default, as well as the period after 9/11, there is time-series variation as well as cross-sectional variation in these stock returns.

4 Main Regression Analysis

Our goal is to estimate the extent to which the originators' past performance influences the characteristics of the mortgages they originate. We will explore this issue from three different angles. First, we will examine the relation between the originators' past stock returns and the spreads on the mortgages they originate. Second, we will analyze the relation between the originators' past stock returns and the mortgage default probabilities. Finally we will measure a post-securitization operating performance of the mortgaged properties to see whether it depends on the past performance of the originating institutions. For these three tests we will use a similar regression approach and control variables, which we describe in the following section.

4.1 Cross-Sectional Regression Specifications and Control Variables

As we mentioned in the introduction, our empirical analysis is based on the idea that originators that experience large stock price losses have a greater incentive to reduce origination scrutiny and to accept riskier mortgages. To identify originators that are "stock price losers" we introduce two stock price loser dummies for two different look-back windows, defined as follows:

1) Dummy variable=1, if the originator's stock return is less than -15% during the 3 calendar months prior to the 1st of month of the mortgage origination date [-3mo, 0], and zero otherwise.

2) Dummy variable=1, if the originator's stock return is less than -15% during the 6 calendar months prior to the 1st of month of the mortgage origination date [-6mo, 0], and zero otherwise,

where date 0 is the first of the month in which the mortgage is originated. Figure 1 illustrates the time line of the construction of this variable.

It should be noted that this dummy variable will have the same values for all mortgages originated by the same originator during any date within a given calendar month. For example, if the mortgage is originated on any date between March 1 and March 31 of 2000, the dummy for the 3-month look-back window will equal 1 if the cumulative stock return of the originator is less than negative 15% for the period between December 1, 1999 to

March 1, 2000 and zero otherwise. The coefficient of this dummy measures the incremental spread (or other characteristics) of mortgages originated by stock price losers relative to other mortgages originated during the same months. Since we control for observable risk characteristics, this variable captures the effect of risk that is not readily observable, i.e. the risk associated with soft information.

The negative 15% return cutoff was chosen because it is approximately one standard deviation from the mean return, as shown in Panel 5 of Table 1. Using this metric, about 14% of the mortgages in our sample were originated by institutions that are characterized as stock price losers, but this quantity varies considerably across time. For example, more than 40% of the mortgages were originated by stock price losers in both the fourth quarter of 1998 (the period after the Russian default) and the fourth quarter of 2001 (the period after 9/11). In contrast, no mortgages were originated by stock price losers in the first half of 1996.[17] As reported in the last two columns of Panel 4 of Table 1, all top institutions (except two) during their lifetime between 1996-2002 originated mortgages at least once after periods when their stock prices declined by at least 15%.

The characteristics that we use to proxy for the riskiness of the mortgaged properties include the NOI/Value ratio, which proxies for the expected growth of net operating income,[18] and the value of the property to capture size effects.[19] We also include property type dummies to control for differences in the risk of each type of property. In addition we include variables that describe the mortgage terms, which include the LTV ratio, the loan amortization rate, and the mortgage maturity. The loan amortization rate and the mortgage maturity measure how fast the loan is paid off.

[17] Alternative measures for the periods when originators perform poorly may include periods with low ROE, EPS ratios or capitalization ratios as well as periods of debt ratings reduction. However, these alternative indicators may be less suitable given the heterogeneity of originators. The concern is that we cannot directly compare financial ratios across originators that include not only banks and financial institutions, but also insurance companies and arms of large corporations (GMAC). Using periods with large stock return losses as an indicator for poor performance is not subject to such a concern.

[18] Properties with larger NOI/Value ratios are likely to have higher payouts and lower NOI growth in the future. As shown in Titman, Tompaidis and Tsyplakov (2004), NOI/Value should be positively related to credit spreads.

[19] First, there may be economies of scale associated with the transaction costs of providing a mortgage. Second, more reliable individuals may be acquiring the larger properties. Finally, the larger properties may have less risky cash flows because they may be more diversified and the owners may have more market power.

Most of the regressions also include calendar month fixed effects that control for the fact that economy-wide shocks change the riskiness of real estate from month to month. In addition, to control for possible differences across originators we use originator fixed effects, and to control for the possibility that some geographical regions are riskier relative to the entire market, we introduce fixed effects for the state where the property is located. Thus, for example, given the controls we introduce in the spread regressions, our "stock price loser" dummy variable captures the average difference between characteristic- and market condition adjusted yield spreads of mortgages originated by institutions when they are stock price losers and the adjusted yield spreads when they are not stock price losers. The t-statistics of these regressions are calculated with observations clustered for mortgages originated by the same institution, in the same state and in the same month.

4.2 Cross-sectional Results for Credit Spreads

Our first test is to examine whether originators with large negative stock returns are more likely accept mortgages with unobservable risk factors, and whether their mortgages have higher credit spreads, after controlling for observable mortgage and property characteristics. In the tests on credit spreads we define mortgage spreads as the difference between the mortgage rate and the rate on Treasury bonds with the same maturity as the mortgage, observed on the mortgage origination date. The equation we estimate, described below, is a regression of mortgage spreads on several indicator (Dummy) variables that identify the originators with large negative past stock returns, along with control variables that measure property and mortgage characteristics and originator and monthly time dummies.

$$\begin{aligned}\text{Spread} = \text{intercept} &+ \alpha(\text{dummy=1 if originator is a "stock price loser"}) \\ &+ \sum \beta_i(\text{property characteristics variables}) \\ &+ \sum \gamma_i(\text{mortgage characteristics variables}) \\ &+ (\text{property type dummy variables}) \\ &+ (\text{originator dummy variable}) \\ &+ (\text{dummy for state where the property is located}) \\ &+ (\text{origination time dummy variables}) + \epsilon.\end{aligned} \tag{1}$$

Estimates of regression 1, which are reported in Table 2, are consistent with our hypothesis that poorly performing institutions originate riskier mortgages. The coefficient of the "stock price loser" dummy is 4 and 5 b.p., for look-back windows of 3 and 6 months respectively. The positive and statistically significant estimate for the "stock price loser" dummy is consistent with the hypothesis that poorly performing institutions originate mortgages that are riskier along a dimension that is not readily observable.

The estimated coefficient of the property control variables are consistent with our expectations. In particular, we find that mortgages on riskier property types have larger spreads, e.g., multi-family apartment complexes and mobile home parks have the smallest spreads and hotels and medical facilities the largest. In addition, the coefficient of the NOI/Property Value ratio is significantly positive, which is consistent with theory that suggests that a higher expected growth rate in operating income leads to narrower spreads. We also find that the coefficient of the logarithm of property value is significant and negative, which is consistent with larger properties being less risky as well as with economies of scale in origination and default costs.[20]

In contrast, the estimated coefficients for the mortgage characteristics provide weak support for standard pricing model. For example, the estimated coefficients of the LTV variable are economically weak. It is likely that the weak relation between spreads and mortgage characteristics is due to the fact that these are endogenous variables; to obtain mortgages on riskier properties, originators are likely to require lower LTV and shorter duration. This, of course, can create a bias in our estimates of the mortgage characteristics coefficients, but more importantly, it can create a bias in the coefficient of past stock returns if there is a

[20]In an alternative specification, instead of using monthly time dummies, we introduce variables that control for changes in the marco-economic credit environment and changes in real estate fundamentals. The variables we include are shown to account for changes in credit spreads of commercial mortgages (e.g. Maris and Segal (2002) and Titman,Tompaidis and Tsyplakov (2005)). These include spread of AAA-rated corporate bonds; slope of the Treasury curve, which is measured as Yield of 10-year Treasury minus Yield of 1-year maturity Treasury; cumulative return of NCREIF for prior four quarters, average rate of commercial real estate write-offs for prior four quarters; average delinquency rate of commercial real estate for prior four quarters. In this specification, the latter three macro-economic variables are available on quarterly basis only, therefore we include time fixed effects that correspond to different origination years. The estimated coefficient for the "stock price loser" dummies in this specification are statistically significant and have slightly greater values than in the regression that includes monthly time dummies. The results of this regression are available upon request.

correlation between mortgage characteristics and past stock returns. For example, if mortgages originated by institutions with relatively worse stock returns have high LTV ratios, the coefficient on the past stock returns will be biased upwards, because the LTV coefficient does not appropriately capture the effect of LTV on spreads. In Section 5 we examine how past stock returns influence mortgage LTV choice to help us gauge the extent to which this is a problem.

4.3 Default Analysis

Our reputation hypothesis suggests that originators with poor past stock returns are more likely to originate mortgages with unfavorable soft information, which means that they are likely to default more often, even after controlling for observable mortgage and property characteristics. Ideally to examine this hypothesis we would like to have data on the mortgage histories up until their maturities. Unfortunately, most of the mortgages in our data set have not matured, so the complete default analysis is not possible. However, we have information about the "servicer status" of the mortgages which are marked as "matured", "prepaid", "performing", "special", "in foreclosure" or "REO",[21] and a separate data field called "months in delinquency". All this information was recorded at the time the data set was created. Our data set includes a total of 259 mortgages that are marked as either "special",[22] "in foreclosure" or as ROE,[23] or with at least one month in delinquency. While there are differences between these four types, given our limited data we view them all as defaulted mortgages[24]. Panel 4 of Table 1 reports a summary statistics on default rates across top 30 originators; Panel 1 of Table 3 reports distribution of defaults across origination years.

The 259 mortgages that we label as defaulted represent 1.4% of our total sample. In comparison, the default rate of mortgages originated by stock price losers over the three month look-back window is 2.9% and 2.4% for losers over the six month look-back window.

[21] REO is the property acquired by the Special Servicer on behalf of the Trust through foreclosure or deed-in-lieu of foreclosure on a defaulted loan. A Special Servicer assigned to each CMBS deals is responsible for managing loans that have gone into default.

[22] These mortgages are defaulted mortgages that are being managed by the special servicer. About 40% of the mortgages marked "special" are more than one month in delinquency.

[23] There are only 22 mortgages that are already in ROE.

[24] Archer, Elmer, Harrison, and, Ling (2002) classify mortgages as having defaulted if they were late by at least 90 days.

These default rates are about twice the rate for non-losers. To test whether these differences are statistically significant after controlling for mortgage and property characteristics, the origination month and originator fixed effects, we estimate the following probit regression:

$$\begin{aligned}\text{Probit "Defaulted=1"} = \text{intercept} &+ \alpha(\text{dummy=1 if originator is "stock price loser"}) \\ &+ \sum \beta_i(\text{property characteristics variables}) \\ &+ \sum \gamma_i(\text{mortgage characteristics variables}) \\ &+ (\text{property type dummy variables}) \\ &. + (\text{originator dummy variable}) \\ &+ (\text{dummy for state where the property is located}) \\ &+ (\text{origination month dummy variable}) + \epsilon.\end{aligned} \tag{2}$$

In this regression, the time dummies are defined by the securitization month rather than by the mortgage origination month. The reason for this is that the mortgages are held by originators for an average of 155 days before being sold to CMBS deals, so it is quite possible that their risk characteristics change. Since non-performing mortgages are unlikely to be included in the CMBS deals, we expect that the default probabilities of mortgages may be more closely related to when they are included in securitization deals rather than when they are originated.

If all of information associated with mortgage risk is captured by observable risk factors, then we would not expect the coefficient of the stock price loser dummy to be significant. Panel 2 of Table 3, which reports the results of this regression, reveals a positive and statistically significant (at 1% level) relation between whether the originator is a "stock price loser" over 3-month look-back window and whether the mortgage defaults.[25] These results hold even when we control for observable risk characteristics of the mortgage, which suggests that the "stock price loser" dummy for 3-month look-back window correlate with unobserved "soft" risk factors that positively relate to subsequent defaults. An estimated marginal impact of the "stock price loser" dummy for 3-month look-back window is 0.5% which implies an increase in default probability by almost 0.5%. Such an increase is default probability of

[25] The estimated coefficients for the "stock price loser" dummy for 6-month look-back window are positive but not statistically significant.

the mortgages originated by the stock price loser is economically significant given that the sample default rate is 1.4%.

In separate regressions we also include the credit spread as a determinant of default probability. If the credit spread captures all the risk factors observable at origination, its inclusion should drive out the significance of other explanatory variables.[26] As reported in the last two specifications in Panel 2 of Table 3, the spread is, as expected, positively related to subsequent defaults. However, the stock price loser dummy variable remains positive and is statistically significant when measured with the 3-month look-back window. This result is consistent with mortgages originated by stock price losers being overpriced.

4.4 Post-Securitization Operating Performance of Mortgaged Properties

This subsection examines the post-securitization operating performance of the properties that are financed by originators with poor past stock returns. Our hypothesis is that properties financed by poorly performing originators may subsequently exhibit poor operating performance. As we mentioned earlier, most of our observations includes the Net Operating Income (NOI) of the mortgaged properties on the origination date. In addition, for about half of the mortgages in the data set, the NOI values for some post-securitization date is also reported.[27] Based on these numbers we calculate an ex post indicator of the quality of the mortgaged property by measuring the change in the NOI of the properties.

Because the time lags between the origination date and the ending dates differ across properties, we annualize the change in NOI and calculate the average annual change in NOI by dividing the difference in NOI by the number of year between these two dates, and normalize this difference by the property value at origination. Specifically, for the 8,461 mortgages in the data set for which we have post-securitization NOI data, we create a

[26] Theoretically, credit spreads predict not only default probability but also expected recovery rates upon default. It is possible that our results can be explained by stock price losers systematically picking mortgages with higher recovery rates in the event of default. However, we partially control for differences in recovery rates by including fixed effects for property type.

[27] In the data set, this data point is called "Most recent NOI" and the date when NOI is measured is called the "most recent NOI date". In some cases the most recent date is less than one year after securitization. In other cases it is several years after the securitization date.

variable for the average annual change in NOI calculated as the ratio $\%\triangle NOI = \frac{\frac{NOI_t}{V} - \frac{NOI_{t_0}}{V}}{(t-t_0)}$, where NOI_t and NOI_{t_0} are the NOI at date t and t_0 (mortgage origination date) and V is property value, $(t - t_0)$ is the time between these two dates (in years). The average NOI/V at origination is 9.12% for the losers (measured over a look-back window of 3 months), and for non-losers it is 9.28%. For the mortgages originated by the poorly performing institution, the post-securitization annual NOI declined by 0.20% on average as percentage of the initial property value. In contrast, the NOI of properties financed by non-losers increased by 0.39% per year as percentage of initial property value. To test whether this difference is statistically significant after controlling for property characteristics, the origination month, state where the property is located, and originator fixed effects, we estimate the following regression:

$$\begin{aligned} \%\triangle NOI = \text{intercept} &+ \alpha(\text{dummy=1 if originator is "stock price loser"}) \\ &+ \beta(\text{property size}) \\ &+ \gamma(NOI_{t_0}/V) \\ &+ (\text{property type dummy variables}) \\ &. + (\text{originator dummy variable}) \\ &+ (\text{dummy for state where the property is located}) \\ &+ (\text{origination month dummy variable}) + \epsilon. \end{aligned} \tag{3}$$

Estimates of this regression, reported in Table 4, reveals a statistically significant and negative relationship between whether the originator is a "stock price loser" and the change in NOI, indicating that properties with mortgages originated by stock price losers tend to exhibit poorer operating performance after origination. The coefficient estimate of the "stock price loser" dummy variable is about -0.51%, which is similar to the above univariate comparison of the difference between properties financed by stock price losers and other institutions.

5 Robustness Checks: Endogeneity of LTV Ratios and Other Mortgage Characteristics

In this section we examine whether the mortgages originated by stock price losers have different loan to value ratios (LTVs) and other characteristics than those originated by other institutions. We examine this issue for two reasons: First, we are concerned about the possibility that originators perform poorly because of shocks that make their clients riskier. If this were the case, we would expect the poorly performing originators to require lower LTVs on the mortgages they originate. The second concern is that since LTV is endogenous, the estimates of its coefficients are biased towards zero, which means that the regressions on spreads and default do not adequately control for the effect of this characteristic. As a result, it is possible that the wider spreads (and more frequent defaults) of mortgages originated by stock price losers arise because mortgages that are originated by these institutions have higher LTV ratios. To address these issues, we estimate whether the relation between LTV and the originator's past stock returns by running the following regression:

$$\begin{aligned} \text{LTV} = \text{intercept} &+ \alpha(\text{dummy=1 if originator is "stock price loser"}) \\ &+ \sum \beta_i(\text{property characteristics variables}) \\ &+ (\text{property type dummy variables}) \\ &+ (\text{originator dummy variable}) \\ &+ (\text{dummy for state where the property is located}) \\ &+ (\text{origination time dummy variables}) + \epsilon. \end{aligned} \tag{4}$$

As we show in Table 5, which reports this regression, the coefficients for the dummy variables for stock price losers are not significant. In a similar unreported regression we also find that poorly performing originators do not issue mortgages with longer maturities, lower or higher amortization rates or shift towards risky property types (e.g. from less risky multifamily properties towards riskier properties such as hotels) or to properties with lower (or higher) ratios of NOI/Value. Furthermore, we find no evidence that poorly performing institutions originate mortgages in smaller size MSAs. These findings indicate that our result that poorly performing institutions originate riskier mortgages is not likely to be due to biased estimates of endogenous variables that describe mortgage terms.

6 Additional Tests and Alternative Interpretations

In the following sections we present a variety of additional indirect tests that provide additional evidence that is consistent with poorly performing institutions originating mortgages that are riskier along dimensions that are difficult to quantify. In the last subsection we argue that it is unlikely that the poor prior stock price performance is due to increases in specific risks of the properties that the originators finance.

6.1 The Time Lag Between Mortgage Origination and CMBS Issuance

Originators sometimes refer to what they call "shelf risk," which is the risk that an event will take place that lowers the value of a mortgage before the mortgage is packaged and sold to the ultimate investors. If mortgages initiated by a stock price loser have higher unobserved risk attributes, we would expect them to have greater shelf risk, which should in turn give the originator a greater incentive to go through the packaging and issuing process as quickly as possible. Hence, an analysis of the time span between mortgage origination and CMBS issuance can provide further indirect evidence that stock price losers originate riskier mortgages.

To analyze whether the originators with poor past performance tend to sell their mortgages faster, we measure the time span between when the mortgage is originated and when it is included in a CMBS issue.[28] We call this variable the "time lag,"which is measured as the time between the cutoff date of the deal and the mortgage origination date. The cutoff date is the date when the composition of the CMBS deal is first fixed, typically the first day of the month in which the deal is sold.[29] For our mortgages, the average "time lag" is 155 days with a standard deviation of 132 days. In the regression the time lag is measured in days. To capture a possible relationship between the originators' poor performance and the

[28] Due to the data limitations stemming from the fact that for some mortgages we don't have information about which CMBS pool the mortgage is sold to, our sample size is somewhat smaller.

[29] Sometimes new loans are added after the cutoff date, which can result in a negative time lag We deleted small number of mortgages with a negative time lag along with a small number of mortgages that have "time lags" longer than 1000 days from this regression.

time lag, we run the following regression:

$$\begin{aligned}\text{Time Lag} = \text{intercept} &+ \theta(\text{Spread}) \\ &+ \alpha(\text{dummy=1 if originator is "stock loser" }) \\ &+ \sum \beta_i(\text{property characteristics variables}) \\ &+ \sum \gamma_i(\text{mortgage characteristics variables}) \\ &+ (\text{property type dummy variables}) \\ &+ (\text{originator dummy variable}) \\ &+ (\text{dummy for state where the property is located}) \\ &+ (\text{CMBS deal dummy}) + \epsilon.\end{aligned} \tag{5}$$

The right hand side variables in this regression are the same as in previous regressions except that, instead monthly time dummies, this regression includes CMBS deal dummies that control for the possibility that some CMBS deals are slower to come to market. In addition, we include mortgage spread as an explanatory variable to control for the possibility that higher risk mortgages are sold off more quickly. As one can see in Table 7, the mortgages originated by "stock price losers" tend to be sold in CMBS deals about 25-44 days quicker than other mortgages in the same deal.

This evidence is consistent with the idea that originators with large stock losses are more concerned about the shelf risk of their mortgages, perhaps, because they are concerned about unfavorable information being revealed prior to the sale. An alternative interpretation is that stock price losers sell their mortgages to CMBS deals faster because they need to raise cash faster. However, our estimates also indicates that mortgages with higher spreads are sold to CMBS deals faster than mortgages with lower spreads. Moreover, larger mortgages and mortgages with higher LTV ratios tend to be securitized faster, while mortgages with higher loan amortization rates and mortgages with higher NOI/(Property Value) ratios tend to be held by institutions longer before being securitized. These findings tend to support the idea that originators sell mortgages more quickly when they are viewed as riskier.

6.2 The Subordination Levels of the CMBS Deals

The final question we address is the extent to which credit agencies account for the credibility of the originator when they rate CMBS deals. To do this we examine the AAA subordination

levels of the CMBS deals, which is the percentage value of the total CMBS deal that are in securities rated below AAA. For example, as reported in Panel 1 of Table 8, in our data set, the average AAA subordination level is 27%, which means that, if $1 Billion in CMBS securities are issued in a deal, $730 million are senior securities that are rated AAA, and $270 million are junior in priority to the AAA securities and have lower ratings. Clearly, the default risk of the AAA securities are lower, ceteris paribus, if the subordination level is higher. Hence, if the rating agencies believe the mortgages in a pool are riskier, they will require a higher AAA subordination level.

Our data set, which contains information about the AAA subordination levels of 97 CMBS deals, allows us to test the extent to which the ratings agencies account for the credibility of the originator when determining the subordination level. Specifically, we regress the AAA-subordination level on various proxies that include the weighted-average characteristics of the mortgages included in the CMBS pool, along with the variable that calculates weighted-average fraction of stock price losers that sell mortgages to the deal where weights are relative sizes of mortgages in the deal

$$\begin{aligned}\text{Deal's AAA-Subordination} = \\ &\text{const} + \theta(\text{Weighted-Average Mortgage Spread in the Deal}) \\ &+ \alpha(\text{Weighted-Average Fraction of "Stock Price Losers" }) \\ &+ \beta(\text{Weighted-Average LTV in the Deal}) \\ &+ \phi(\text{Deal Size}) \\ &+ (\text{Deal Origination Month dummy}) + \epsilon.\end{aligned} \tag{6}$$

Panel 2 of Table 8 reports the results of this regression. The coefficient estimates for the weighted-average fraction of originators that are "stock price losers" in the pool are positive and statistically significant at the 5% level. These tests suggest that rating agencies require higher levels of subordination for CMBS deals that include more mortgages originated by underperforming originators. This finding is consistent with reputation hypothesis. The results also suggest that credit ratings increase with the number of mortgages included in the deal and declines with the weighted-average LTV. Interestingly, the weighted average spreads of the mortgages do not significantly affect subordination levels. We should also point out that the estimates for months dummies (unreported) tend to decline over time,

reflecting a general decline in subordination levels of CMBS deals since 1996.[30]

6.3 Alternative Explanations

The evidence presented in this paper is consistent with the idea that poorly performing institutions originate mortgages that are riskier along a dimension that is not readily observable. While this evidence supports the reputation hypothesis, it is possible that the direction of causality is the reverse of what we suggest and that the stock price loser dummy simply captures the riskiness of the real estate markets for which the originator provides financing. Specifically, the alternative hypothesis is that financial institutions tend to realize negative stock returns when the real estate that they finance becomes riskier.

Since our regressions include monthly time effects that control for changes in market wide risk, this alternative explanation requires shocks that affect the riskiness of the clients of some institutions more than others. In other words, this explanation can hold only if there are significant cross-sectional (rather than time series) differences in the risk changes in the various markets in which these institutions specialize. For example, one could get a significant coefficient on the stock price loser dummy if there are strong negative shocks to California real estate that affect both the stock prices of California financial institutions and the risk of the mortgages they originate, but have no effect on the stock prices and risk of mortgages of other institutions.

There are a couple of reasons why we do not think that these cross-sectional differences in real estate shocks are generating our results. First, most of the originators in our sample are large institutions (see Panel 4 in Table 1) and are relatively diversified across both regions and property types. Second, since the majority of these institutions have multiple lines of businesses, it is unlikely that large declines in their stock prices are primarily driven by changes in the riskiness of the commercial real estate markets in which they specialize.

[30] Riddiough (2002) suggests that the higher subordination levels in the earlier years was due to an initial lack of familiarity with CMBS products.

7 Conclusion

This paper provides indirect evidence of incentive and information problems that can arise when mortgages are originated with the intention of selling them to investors as part of CMBS pools. Specifically, we find that the credit spreads (i.e., the spread between the mortgage rate and a Treasury with the same maturity) of mortgages that are included in CMBSs are larger when the mortgage originator experiences poor stock price performance in the recent past. Moreover, mortgages that are originated in these situations are more likely to default and the properties that are collateralized by these mortgages perform more poorly. In addition, the rating agencies require a higher AAA subordination level for pools that include more mortgages originated by underperforming institutions. All of this evidence is consistent with the hypothesis that institutions originate riskier mortgages when they are doing poorly.

The issues that we address are likely to be equally applicable to commercial loans, which are also bundled and sold as securities. However, identifying the effects documented in this paper might be more challenging in a study of commercial loans, since corporate loan contracts tend to be somewhat more complicated and less standardized than commercial mortgages. Hubbard, Kuttner and Palia (2002) consider the relation between yield spreads and the financial condition of the lender and also find that spreads are larger when the financial condition of the lender is worse. However, they suggest that the larger spreads arise because lenders with low capitalization ratios expropriate their borrowers by charging higher rates. In other words, rather than exploiting their reputation with investors, the banks exploit their relation with their clients.

Its likely that the channel suggested by Hubbard, Kuttner and Palia (2002) is more applicable in their setting, since the corporate loans in their sample are held by the bank, while the channel suggested by us is more applicable in our setting, since relationships between borrowers and originators matter very little for mortgages that ultimately become part of CMBS pools. However, it is possible that the incentive to initiate riskier commercial loans when a bank's financial condition deteriorates is also likely to arise even when the loans are not sold (because there is still a trade-off between higher profits today versus the risk of default and lower profits in the future). Perhaps, future research can separately examine loans that are sold and loans that are held by the originating bank to more directly

examine how the origination process is influenced by the separation between the investors and originators of debt.

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Table 1
Summary Statistics of the Commercial Mortgages in the Data Set

Panel 1: Distribution of Commercial Mortgage Originations Across Time Periods

Year of Origination	# of Mortgages
1992	20
1993	72
1994	199
1995	409
1996	1048
1997	2818
1998	5454
1999	3733
2000	1904
2001	1985
2002	1279

Panel 2: Distribution Across Property Types Originated in 1996-2002

Property Type	# of Mortgages
Multifamily	5299
Retail Unanchored	3778
Retail Anchored	2512
Medical Facility	231
Industrial	1293
Warehouse	122
Mobile Home Park	494
Office	2418
Limited Service Hotel	836
Full Service Hospitality	192
Self Storage	572
Mixed Use and Other Types	474

Table 1 –Continued

Panel 3: Mortgage and Property Characteristics at Origination Date for Mortgages Originated in 1996-2002

This table reports the mortgage rate spread over Treasury rate (i.e., the difference between the rate on the mortgage and the rate on Treasury bonds with the same maturity as the mortgage) observed on the mortgage origination date. The loan amortization rate is defined as 1-(Principal Value at Maturity)/(Initial Principal Value). NOI/Value ratio is the ratio of Net Operating Income divided by the property value at origination date. Loan-to-Value ratio (LTV) is the ratio of the face value of debt divided by the property value at the origination date.

	Mean	St. Dev	Minimum	Maximum
Spread over Treasury,%	2.23	0.73	0.19	6.14
Property Value in $M	8.19	17.59	0.05	695.00
Loan to Value (LTV)	0.70	0.11	0.04	1.00
NOI/(Property Value)	0.09	0.03	0.00	0.58
Loan Amortization Rate	0.29	0.31	0.00	1.00
Mortgage Maturity, years	11.29	3.63	0.54	30.08

Table 1 –Continued

Panel 4. Top 30 Originators for Mortgages Originated in 1996-2002

This table reports the top 30 Originators in the data set along with the characteristics of the mortgages they originate.

Name of Originator	# of Mortgages	Spread, %	LTV	Default %	Fraction of mortgages originated when institution's stock price declines by at least 15% in prior 3 months	Fraction of mortgages originated when institution's stock price declines by at least 15% in prior 6 months
Bank of America	1869	1.90	0.70	0.7%	22%	20%
First Union	1631	2.17	0.70	4.0%	19%	24%
FFCA	1411	3.71	0.76	2.3%	0%	1%
Lehman Brothers	1379	1.97	0.71	0.6%	3%	7%
GE Capital	1300	2.15	0.72	0.6%	11%	12%
Merrill Lynch	1030	2.05	0.70	2.6%	7%	7%
GMAC	1030	1.95	0.70	0.3%	14%	15%
Chase Manhattan	880	2.12	0.70	0.7%	24%	31%
Bear Stearns	774	2.05	0.62	0.8%	15%	18%
Salomon	610	2.14	0.71	0.3%	5%	4%
Morgan Stanley	558	2.05	0.68	0.9%	11%	11%
Wells Fargo	554	2.17	0.59	0.4%	3%	3%
Citicorp	518	1.63	0.71	1.0%	5%	5%
Morgan Guaranty Trust	501	2.06	0.69	1.2%	15%	6%
National Realty Funding LC	425	2.07	0.68	0.5%	10%	5%
KeyBank	389	2.33	0.71	0.3%	9%	15%
German American Capital	353	2.00	0.71	0.3%	17%	20%
ContiFinancial	346	2.25	0.68	2.3%	54%	42%
Captec	336	3.80	0.57	8.9%	32%	29%
Paine Webber	274	2.24	0.72	2.2%	19%	8%
Wachovia Bank	258	2.25	0.70	0.4%	6%	0%
Goldman Sachs	252	2.15	0.73	0.8%	27%	25%
Amresco	231	2.02	0.70	3.0%	21%	17%
PNC	193	2.28	0.75	1.0%	13%	16%
Impac	163	2.38	0.69	1.8%	0%	0%
CRIIMI MAE	125	1.52	0.67	0.8%	0%	0%
Midland	97	2.34	0.66	3.1%	32%	99%
Banc One	74	2.18	0.69	1.4%	38%	46%
Credit Suisse	70	2.49	0.72	1.4%	4%	20%
Prime Capital Funding	68	1.88	0.64	0.0%	41%	69%

Table 1 --Continued

Panel 5. Stock Returns of Mortgage Originators and "Stock Price" Losers

This table reports 1) average cumulative stock returns (and standard deviation) of originators for the look-back window of 3 and 6 calendar months prior to mortgage origination, 2) fraction of mortgages originated by institutions that lost at least 15% in the look-back window of 3 and 6 calendar months prior to the mortgage origination month. For example, the period of (-6mo, 0) means the period of 6 calendar months prior to mortgage origination, where date 0 is the first of the month in which the mortgage is originated. Figure 1 illustrates the time line of the construction of the look-back windows and "stock price loser" dummy variable.

Prior period of	Average Cumulative Returns	Standard Deviation	Fraction of mortgages originated by institutions that lost at least 15% in prior periods
(-3mo, 0)	4%	18%	0.135
(-6mo, 0)	8%	24%	0.144

Table 2

Results of Cross Sectional Regressions for Credit Spreads of Commercial Mortgages

The table presents the results of the following regression:

Spread=intercept +α(Dummy =1 if the originator lost at least 15% of its stock value in the prior periods)+$\sum\beta_i$(property characteristics variables)+$\sum\gamma_i$(mortgage characteristics variables)+(property type dummy variables)+(originator dummy variable) +(origination time dummy variables)+(dummy for the state where property is located) +ε,

where Spread is the difference between the rate on the mortgage and the rate on Treasury bonds with the same maturity as the mortgage, observed on the mortgage origination date, and measured in percentage points. Dummy variable=1, if the originator's stock return is less than -15% during the 3 (6) calendar months prior to the 1st of the calendar month of the mortgage origination date, and zero otherwise (see Figure 1). The loan amortization rate is defined as 1-(Principal Value at Maturity)/(Initial Principal Value). NOI/Value ratio is the ratio of Net Operating Income divided by the property value at the origination date. Loan-to-Value ratio (LTV) is the ratio of the face value of debt divided by the property value at the origination date. Reported t-statistics are adjusted for clustering for mortgages originated by the same institution in the same state during the same origination month.

Number of Obs.=18221	Coeff	t-stat	Coeff	t-stat
Const	2.34	12.59	2.34	12.46
Dummy =1 if cumulative stock return of mortgage originator				
is less than -15% for period (-3mo, 0)	0.04	2.33		
is less than -15% for period (-6mo, 0)			0.05	2.77
Mortgage and Property Characteristics				
Log(Property Value in $M)	-0.14	-27.97	-0.14	-27.74
LTV	0.10	2.01	0.10	2.04
NOI/Value	-0.13	-0.67	-0.13	-0.68
Loan Amortization Rate	-0.12	-2.58	-0.11	-2.56
Mortgage Maturity	0.00	-1.27	0.00	-1.32
Property Type Dummies (vs. Mixed Use Type)				
Multifamily	-0.28	-26.73	-0.28	-26.78
Retail Unanchored	0.04	2.91	0.04	2.91
Retail Anchored	-0.05	-4.81	-0.05	-4.8
Medical Facility	0.26	8.48	0.26	8.48
Industrial	-0.01	-1.09	-0.01	-1
Warehouse	-0.01	-0.21	-0.01	-0.2
Mobile Home Park	-0.17	-8.57	-0.17	-8.69
Office	0.03	1.34	0.03	1.32
Limited Service Hotel	0.42	20.94	0.42	20.96
Full Service Hospitality	0.42	14.05	0.42	13.88
Self Storage	0.11	5.39	0.11	5.38
Originator Dummy	Yes		Yes	
Origination State	Yes		Yes	
Time Dummy	Month		Month	
Adjusted R-squared		0.76		0.76

Table 3

Panel 1. Distribution of defaults across origination years

The table reports the number and the default % of the mortgages originated in 1996-2002 in the data set. For example, 93 mortgages originated in 1998 defaulted, by the time the data set was assembled in mid-2003, which constitutes 1.7% of all mortgages originated in 1998 in our data set.

Origination Year	Number of Defaulted Mortgages	Fraction of defaulted mortgages, %
1996	36	3.4%
1997	48	1.7%
1998	93	1.7%
1999	55	1.5%
2000	15	0.8%
2001	11	0.6%
2002	1	0.1%

Table 3
Panel 2. Default Analysis

The table presents the results of the following Probit regression predicting mortgage defaults:

Probit (Defaulted=1) =intercept + α(Dummy =1 if the originator lost at least 15% of its stock value in the prior periods) +θ(Spread)+$\sum\beta_i$(property characteristics variables)+$\sum\gamma_i$(mortgage characteristics variables)+(property type dummy variables)+ (Dummy for Originator)+ (CMBS deal dummy) +(dummy for the state where property is located)+ε,

where the Mortgage is viewed as "Defaulted" if it is classified either as delinquent, foreclosed, special or ROE(foreclosed and acquired by the CMBS Servicer). There are 259 "Defaulted" mortgages. Spread is the difference between the rate on the mortgage and the rate on Treasury bonds with the same maturity as the mortgage, observed on the mortgage origination date, and measured in percentage points. The loan amortization rate is defined as 1-(Principal Value at Maturity)/(Initial Principal Value). NOI/Value ratio is the ratio of Net Operating Income divided by the property value at origination date. Loan-to-Value ratio (LTV) is the ratio of the face value of debt divided by property value at origination. The table reports marginal effects of the change in one unit of the variable on marginal change in default probability. Reported t-statistics are adjusted for clustering for mortgages originated by the same institution in the same state during the same origination month.

Number of Obs.=18221	Marginal Effect	t-stat	Marginal Effect	t-stat	Marginal Effect	t-stat	Marginal Effect	t-stat
is less than -15% for period (-3mo, 0)	0.49%	2.78			0.65%	3.13		
is less than -15% for period (-6mo, 0)			0.16%	1.04			0.22%	1.12
Spread					0.38%	5.61	0.37%	5.12
Mortgage and Property Characteristics								
log(Property Value in $M)	-0.17%	-4.96	-0.18%	-4.87				
LTV	1.16%	4.63	1.24%	4.74				
NOI/Value	-5.54%	-4.77	-5.78%	-4.7				
Loan Amortization Rate	0.73%	6.74	0.77%	6.7				
Mortgage Maturity	-0.04%	-3.93	-0.04%	-3.87				
Property Type Dummies (vs. Mixed Use Type)								
Multifamily	-0.13%	-1.41	-0.14%	-1.53	0.03%	0.25	0.01%	0.11
Retail Unanchored	-0.01%	-0.1	-0.02%	-0.15	0.02%	0.19	0.03%	0.2
Retail Anchored	0.58%	3.35	0.57%	3.26	0.84%	4.01	0.85%	3.94
Medical Facility	1.75%	3.71	1.61%	3.51	0.99%	2.65	0.93%	2.48
Industrial	-0.04%	-0.31	-0.05%	-0.4	0.01%	0.05	0.00%	0
Warehouse								
Mobile Home Park	-0.13%	-0.88	-0.15%	-0.98	-0.08%	-0.36	-0.10%	-0.43
Office	0.08%	0.35	0.06%	0.25	0.07%	0.26	0.06%	0.22
Limited Service Hotel	1.14%	3.78	1.16%	3.75	0.68%	2.89	0.75%	2.96
Full Service Hospitality	0.76%	1.36	0.57%	1.1	0.13%	0.38	0.06%	0.18
Self Storage	-0.13%	-0.66	-0.12%	-0.55	-0.17%	-0.78	-0.16%	-0.64
Dummy for Mortgage Originator		Yes		Yes		Yes		Yes
Dummy for CMBS deal to which mortgage is placed		Yes		Yes		Yes		Yes
Dummy for Origination State		Yes		Yes		Yes		Yes
R-Squared	0.23		0.23		0.21		0.2	

Table 4

Change in Net Operating Income (NOI) of the mortgaged properties after securitization

Table presents the results of the following regression predicting changes in NOI:
(Average Annual Change in NOI)/(Property Value), expressed in %,=intercept + α (Dummy =1 if the originator lost at least 15% of its stock value in the prior periods)+ +θ(Spread)+ β(property size) +(property type dummy variables)+ (Dummy for Originator)+ (origination month dummy) +(dummy for the state where property is located)+ε,
where the (Average Annual Change in NOI)/(Property Value), expressed in %, is the ratio where in the numerator is the difference between the most recent NOI of the property (at some intermediate date between the securitization date and the date when data set was collected) and the NOI at the origination divided by the number of years between these two dates, and in the denominator is the property value at origination date. Specifically The variable $\%\triangle NOI = (NOI_t - NOI_{t_0})/((t-t_0)\cdot V)$, where NOI_t and NOI_{t_0} are the NOI at date t and t_0 (mortgage origination date); and V is property value; $(t-t_0)$ is the time (in years) between these two dates. There are 8,461 mortgages for which the information for the most recent NOI value is available. Reported t-statistics are adjusted for clustering for mortgages originated by the same institution in the same state during the same origination month.

Number of Obs.= 8,461	Coeff	t-stat	Coeff	t-stat
Const	8.08%	3.56	7.93%	3.51
Dummy =1 if cumulative stock return of mortgage originator				
is less than -15% for period (-3mo, 0)	-0.51%	-2.71		
is less than -15% for period (-6mo, 0)			-0.51%	-2.87
NOI_{t_0}/V	-64.91%	-4.99	-64.96%	-5.02
log(Property Value in $M)	-0.26%	-3.68	-0.27%	-3.76
Property Type Dummies (vs. Mixed Use Type)				
Multifamily	0.09%	0.54	0.09%	0.56
Retail Unanchored	0.23%	1.23	0.23%	1.27
Retail Anchored	0.07%	0.39	0.08%	0.46
Medical Facility	0.59%	1.62	0.62%	1.69
Industrial	0.07%	0.39	0.08%	0.41
Warehouse	-0.70%	-2.07	-0.67%	-2.01
Mobile Home Park	-0.04%	-0.16	-0.03%	-0.11
Office	-0.25%	-0.79	-0.23%	-0.72
Limited Service Hotel	1.28%	3.88	1.29%	3.92
Full Service Hospitality	0.58%	0.53	0.62%	0.57
Self Storage	0.41%	1.32	0.42%	1.34
Originator Dummy		Yes		Yes
Time Dummy		Month		Month
Dummy for Origination State		Yes		Yes
Adjusted R-squared	0.21		0.21	

Table 5

Robustness Check: Loan-to-Value Regressions

The table reports the results of cross sectional regressions of the LTV of the mortgages on mortgage and property characteristics along with dummies for the past returns of the originator. The regression we estimate is as follows:

LTV=intercept +α(Dummy =1 if the originator lost at least 15% of its stock value in the prior periods) +$\sum\beta_i$(property characteristics variables)+(property type dummy variables)+(originator dummy variables)+(origination month dummy variables) +(dummy for the state where property is located)+ε,

where Loan-to-Value ratio (LTV) is the ratio of the face value of debt divided by property value at origination. NOI/Value ratio is the ratio of Net Income divided by the property value. Reported t-statistics are adjusted for clustering for mortgages originated by the same institution in the same state during the same origination month.

Number of Obs.=18221	Coeff	t-stat	Coeff	t-stat
Const	0.50	16.81	0.50	16.85
Dummy =1 if cumulative stock return of mortgage originator				
is less than -15% for period (-3mo, 0)	0.00	1.24		
is less than -15% for period (-6mo, 0)			0.00	0.33
Mortgage and Property Characteristics				
log(Property Value in $M)	-0.01	-4.66	-0.01	-4.66
NOI/Value	0.55	8.92	0.55	8.92
Property Type Dummies (vs. Mixed Use Type)				
Multifamily	0.05	15.98	0.05	15.96
Retail Unanchored	0.00	0.82	0.00	0.82
Retail Anchored	0.03	11.21	0.03	11.21
Medical Facility	-0.02	-2.25	-0.02	-2.25
Industrial	0.01	2.6	0.01	2.62
Warehouse	0.02	1.98	0.02	1.98
Mobile Home Park	0.00	0.61	0.00	0.61
Office	0.00	0.54	0.00	0.51
Limited Service Hotel	-0.06	-12.65	-0.06	-12.66
Full Service Hospitality	-0.08	-8.65	-0.08	-8.67
Self Storage	-0.02	-4.55	-0.02	-4.56
Originator Dummy		Yes		Yes
Time Dummy		Month		Month
Dummy for Origination State		Yes		Yes
Adjusted R-squared	0.25		0.25	

Table 6
"Time Lag" Regressions

This table reports the results of the following regression:

Time Lag (in Days)=intercept + θ(Spread)+α (Dummy =1 if the originator lost at least 15% of its stock value in the prior periods)+$\sum\beta_i$(property characteristics variables)+$\sum\gamma_i$(mortgage characteristics variables)+(property type dummy variables)+(originator dummy variable) +(origination time dummy variables) +(dummy for the state where property is located)+ε,

where the Time Lag is the time span (measured in days) between when the mortgage is originated and when the CMBS composition is finalized. The loan amortization rate is defined as 1-(Principal Value at Maturity)/(Initial Principal Value). NOI/Value ratio is the ratio of Net Operating Income divided by the property value at origination date. Loan-to-Value ratio (LTV) is the ratio of the face value of debt divided by property value at origination. Dummies for each of the CMBS deals are included. Reported t-statistics are adjusted for clustering for mortgages originated by the same institution in the same state during the same origination month.

Number of Obs.=14169	Coeff	t-stat	Coeff	t-stat
const	381.0	10.51	407.3	11.21
Dummy=1 if originator's cumulative stock return				
is less than -15% for period (-3mo, 0)	-24.4	-5.91		
is less than -15% for period (-6mo, 0)			-44.0	-8.92
Spread	-22.4	-5.53	-20.8	-5.08
Mortgage and Property Characteristics				
Log(Property Value in $M)	-7.8	-5.46	-7.7	-5.41
LTV	-17.9	-1.31	-17.6	-1.29
NOI/Value	217.4	4.9	214.9	4.79
Loan Amortization Rate	30.6	3.47	30.7	3.46
Mortgage Maturity	0.4	0.7	0.4	0.64
Property Type Dummies (vs. Mixed Use Type)	Yes		Yes	
Originator Dummy	Yes		Yes	
Dummy for Origination State	Yes		Yes	
Time Dummy	Month		Month	
Adjusted R-squared		0.5		0.51

Table 7
Panel 1. Summary Statistics for CMBS Deals

In the table the numbers are weighted averages across mortgages included in the CMBS deal. The AAA subordination is the rating assigned by the rating agencies. AAA subordination of a CMBS deal is the percentage value of the total CMBS deal that is rated below AAA. There are 97 CMBS deals.

	Mean	Std Dev	Minimum	Maximum
Balance ($B)	0.96	0.5	0.14	3.4
Number of Mortgages	206	141	11	1003
LTV	0.69	0.04	0.55	0.78
AAA Subordination	0.27	0.04	0.15	0.38
Property Types Fractions				
Retail Unanchored	0.137	0.196	0.000	1.000
Retail Anchored	0.160	0.106	0.000	0.427
Warehouse	0.008	0.034	0.000	0.287
Industrial	0.060	0.046	0.000	0.244
Office	0.171	0.098	0.000	0.453
Multifamily	0.275	0.130	0.000	0.978
Mobile Home Park	0.021	0.030	0.000	0.218
Limited Service Hotel	0.056	0.051	0.000	0.259
Full Service Hospitality	0.029	0.044	0.000	0.273
Medical Facility	0.021	0.038	0.000	0.229
Self Storage	0.019	0.034	0.000	0.194

Table 7

Panel 2. Cross Sectional Regressions of AAA-subordination levels of the CMBS deals

The table presents the results of the following regression:

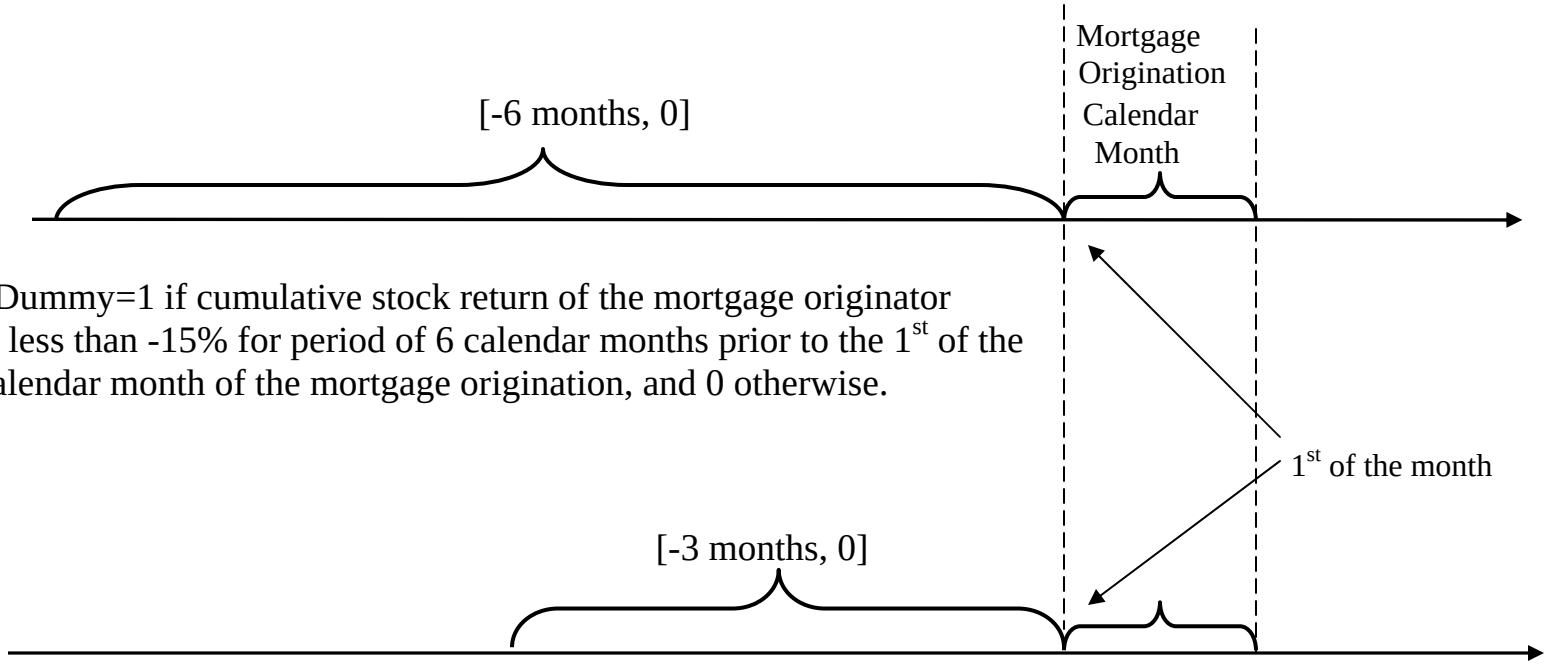
Deal's AAA-Subordination =intercept +θ(Weighted-Average Mortgage Spread)+α(Weighted Average Number of originators in CMBS Deal that lost at least 15% of their stock price values)+β(Weighted-Average LTV)+γ∑(Weighted-Average Fraction of five Property Types in the Deal)+ +φ(Deal Size)+φ(Number of Mortgages in the Deal)+(Deal Origination Month dummy)+ε,

where the AAA subordination level of a CMBS deal is the percentage of the total CMBS deal (by market value) that is rated below AAA. The explanatory variables are calculated as weighted averages across mortgages included in the deal.

Number of Obs.=97	Coeff	t-stat	Coeff	t-stat
Const	0.00	-0.01	0.02	0.12
Weighted Average Spread of CMBS Deal	0.00	-1.66	0.00	-1.79
Weighted Average Number of "Stock price losers" in CMBS Deal				
for period (-6mo, 0)	0.04	1.83		
for period (-3mo, 0)			0.08	2.89
Total Balance of the Deal in $B	-0.01	-1.33	-0.01	-1.31
Weighted Average LTV	0.34	1.83	0.30	2.09
Weighted Average of Property Types Represented in the CMBS Deal				
Retail Unanchored	-0.03	-0.32	-0.01	-0.15
Retail Anchored	-0.06	-0.76	-0.03	-0.39
Warehouse	-0.02	-0.13	-0.06	-0.46
Industrial	-0.09	-0.72	-0.11	-1.02
Office	0.06	0.61	0.06	0.63
Multifamily	0.02	0.32	0.02	0.25
Mobile Home Park	0.12	0.73	0.12	0.79
Limited Service Hotel	0.09	0.68	0.13	1.07
Full Service Hospitality	0.01	0.12	0.06	0.51
Medical Facility	0.19	1.32	0.21	1.63
Self Storage	0.01	0.06	0.02	0.09
Time Dummy For Deal Origination		Month		Month
Adjusted R-squared		0.66		0.7

Figure 1.

Defining Originator That is a "Stock Price Loser" Over Look-Back Windows of 3 and 6 Months



Dummy=1 if cumulative stock return of the mortgage originator is less than -15% for period of 6 calendar months prior to the 1st of the calendar month of the mortgage origination, and 0 otherwise.

Dummy=1 if cumulative stock return of the mortgage originator is less than -15% for period of 3 calendar months prior to the 1st of the calendar month of the mortgage origination, and 0 otherwise.

The “stock price loser” dummy variable will have the same values for all mortgages originated by the same originator during any date within the same calendar month. For example, if the mortgage is originated between March 1 and March 31 of 2000, when the dummy for 3-month (6 months) look-back window will equal 1 if the cumulative return of the originator is less than negative 15% for the period between December 1, 1999 to March 1, 2000 (between September 1, 1999 and March 1, 2000) and zero otherwise.