From Origination to Renegotiation:

A Comparison of Portfolio and Securitized Commercial Real Estate Loans

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This paper uses unique bank stress test data to compare portfolio and securitized commercial real estate loans. We document how the types of loans banks hold in portfolio differ substantially from the types of loans the same banks sell. Banks tend to hold loans that are "non-standard" in some observable dimension. Among the portfolio and securitized loans of similar type, we analyze loan distress and renegotiation. We find that bank loans are riskier than securitized loans and banks are more likely to extend loans in distress. Our results suggest that banks have a comparative advantage in funding risky assets with contracts that may need to be renegotiated.

Keywords: Securitization, CMBS, Commercial banks, Asymmetric information, Renegotiation

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1. Introduction

One of the most important trends in credit markets over the past thirty years has been the steady increase in debt held by investors in some sort of securitization structure. The commercial real estate (CRE) asset class is no exception to this trend. Since the late 1990s the dollar amount of securitized CRE has increased five-fold to more than one-half trillion dollars. Yet despite this rapid growth rate, the share of securitized CRE is still only about 20 percent of the total CRE mortgage debt. Of the remaining 80 percent, the majority of the loans are held on the balance sheets of banking institutions. Figure 1 shows the volume and share of securitized commercial mortgages from 1985 to the present. The role of securitization in the recent financial crisis and the extreme episodes of loan distress have highlighted the importance of understanding the differences between portfolio and securitized loans.

To address this issue, we use confidential supervisory loan level data on portfolio loans collected as part of the recent stress tests of U.S. banks mandated by the Dodd-Frank Act. Large banks are required to provide loan-level data on their commercial real estate loan portfolios in order to support the Comprehensive Capital Analysis Review (CCAR) and the Dodd Frank Stress Tests (DFAST) along with other supervisory programs. These data provide a unique opportunity to analyze portfolio loans from origination to renegotiation. We observe loan origination characteristics, loan performance over time, as well as bank efforts to renegotiate these loans in the event of distress.

We combine the stress test data with Morningstar data on loans pooled in commercial mortgage-backed securities (CMBS). The CMBS data include very similar information on loan characteristics and loan performance. We can observe the types of

loans in CMBS deals and the likelihood of a loan in distress being extended by the special servicer. In many cases, we can match the originator of the securitized loan to the same set of lenders in our stress test data set.

Based on these rich data, we document the substantial differences between portfolio and securitized commercial real estate loans. CMBS loans are almost entirely fixed-rate loans on stabilized income-producing properties. These types of loans typically imply a stream of steady and predictable cash flows for investors. In contrast, CRE loans that are held in commercial bank portfolios tend to be "non-standard" in some observable dimension. For instance, a large number of bank loans are floating-rate loans, construction loans, and owner-occupied loans. These types of loans do not appear in loan pools for CMBS deals. This is the first indication that banks have a comparative advantage in funding commercial real estate projects that are less suitable for arm's length capital markets.

One of the factors that likely determines the portfolio-versus-securitization choice is the potential of banks to renegotiate loans. This renegotiation potential could stem from a variety of sources. Banks may have repeated interactions with the same borrower or enjoy other informational advantages that allow them to better monitor loan performance. Given the design of our study pairing securitized and portfolio loans originated by the same entities, it may be the case that the original underwriting produces information that is particularly useful in case of distress. Finally, there may be legal agreements that hamper a CMBS special servicer's flexibility to resolve troubled loans. All of these informational stories combine to form the basis of our empirical investigation. Because banks appear to have a comparative advantage in renegotiation, there will be a market segmentation

between portfolio and securitized loans. This yields two predictions: *banks fund riskier loans than CMBS investors* and *banks are more likely to extend loans in distress*.

To test these predictions, we do a direct comparison of loan characteristics and performance for a sample of portfolio and securitized loans that were originated by the same group of lenders. This approach is similar to Ghent and Valkanov (2013) and Downs and Xu (2014). We restrict the sample to fixed-rate, income-producing loans, to produce a sample of loans with overlapping characteristics in both the CRE portfolios and CMBS deals. This narrows our sample to the loans that, based on the underlying loan and property characteristics, could potentially have qualified for CMBS financing. In addition, we only include loans from banks that do both portfolio and securitization lending. This allows us to use bank-fixed-effects to analyze the portfolio-securitization decision *within* a bank over time. We study the loan originator's actions and incentives both at the time of origination as well as later in the loan history, with a particular emphasis on behavior in the case of borrower distress.

Our analysis proceeds in three steps. We first look at which types of loans within our overlapping sample are more likely to be securitized. We then look at whether portfolio or securitized loans are more likely to go into distress. Lastly, conditional on loan default, we analyze whether portfolio or securitized loans are more likely to be extended.

To preview our results, even within our overlapping sample of fixed-rate loans on income-producing properties, we find significant differences between portfolio and securitized loans. In particular, we find that portfolio loans have a higher interest rate than securitized loans, which could be an indication of greater risk. To more directly examine whether banks fund riskier loans, we turn to loan performance.

In the next part of our analysis, we test for differences in loan performance conditional on observed risk factors. In this regard our paper builds on the existing literature on commercial mortgage defaults (Snyderman 1990; Vandell, Barnes, Hartzell, Kraft, and Wendt 1993; Esaki, L'Heureux, and Snyderman 1999; Ciochetti, Deng, Lee, Shilling, and Yao 2003). Numerous papers have examined the concern that the poor performance of securitized loans stemmed from the reduced incentives to maintain underwriting standards (Keys, Mukherjee, Seru, and Vig 2010; Agarwal, Chang, and Yavas 2012). Adverse selection in the CMBS market might also explain some of the differences between loans that are securitized versus loans that are retained (An, Deng, and Gabriel 2011). Our results actually show that commercial mortgages originated by a bank and held on the balance sheet are more likely to encounter some kind of distress. Our conclusion is that banks hold these risky loans because of their comparative advantage in managing loan distress.

Lastly, we examine the likelihood of banks and CMBS special servicers to renegotiate loans in default. In particular, we test whether banks are more likely to extend loans in distress. Piskorski, Seru, and Vig (2010) find a significantly lower foreclosure rate associated with bank-held loans when compared to similar securitized loans and Agarwal, Amromin, Ben-David, Chomsisengphet, and Evanoff (2011) find that bank-held residential mortgages are 26-36% more likely to be renegotiated than comparable securitized mortgages.[1] This could potentially help explain why certain types of borrowers

[1] In contrast, Adelino, Gerardi, and Willen (2013) find similarly small renegotiation rates for securitized loans and loans held on banks' balance sheets that become seriously delinquent, in particular during the early part of the financial crisis.

turn to banks for financing. The benefits of renegotiation may explain some of the differences between banks and CMBS at origination. In the comparison of portfolio and securitized CRE loans, our results suggest that the differences, even at origination, are largely due to market segmentation. Borrowers with risky collateral are financed by commercial banks, which are more efficient at renegotiating distressed loans.

The paper is organized as follows. Section 2 reviews the literature and discusses our contribution. Section 3 provides a heuristic sketch of a model for framing the empirical analysis. Section 4 describes the data and outlines the methodology for the analysis. Section 5 presents the empirical results, including a set of results using propensity score matching to control for endogenity. Section 6 concludes.

2. Related Literature

The role of securitization in the financial crisis has motivated a large and growing literature on the structure and implications of securitization. Much of this literature has focused on adverse selection and the "lemons problem," building on early models of information asymmetry as in Akerlof (1970). However, a growing literature has begun to explore the observable differences between portfolio and securitized loans that may reflect the comparative advantages of banks and capital markets.

A number of post-financial-crisis papers explore distortions in the origination of loans underlying residential mortgage-backed securities (RMBS). Puranandam (2011) finds evidence that the underwriting standards for securitized residential loans is affected by the capital structure of the originator. Keys, Mukherjee, Seru, and Vig (2009) compare securitized residential mortgages with those held on-balance-sheet and find that the securitized mortgages are lower quality. Much of this work focuses on the incentives for

loan monitoring. Coleman, Esho, and Sharpe (2006) find that the degree of loan monitoring does indeed affect the terms of a loan.

The literature on commercial mortgages is slowly growing. Many early studies focused on the determinants of commercial mortgage defaults using data from one or more life insurance companies (Snyderman 1991; Esaki et al. 1999; Vandell et al. 1993; Ciochetti et al. 2003). The literature on the CMBS market has grown along with the securitization of commercial mortgages. A number of these papers have also focused on the defaults of loans in the securitized pool (Ambrose and Sanders 2003; Archer et al. 2002; and Deng et al. 2004). In addressing this issue, these papers document the correlation of loan performance with observable underwriting characteristics such as loan-to-value (LTV) ratio and debt-service-coverage-ratio (DSCR). An, Deng, and Gabriel (2011) analyze loans in CMBS deals to show that loans originated by conduit lenders enjoy a 34 basis point pricing advantage over loans originated by portfolio lenders.

Our paper is related to other recent work on securitized commercial loans exploring issues associated with the loans in CMBS deals. For instance, Titman and Tsyplakov (2010) and Black, Chu, Cohen, and Nichols (2012) show that originators' financial health and organizational form affects the quality of securitized loan underwriting. Furfine (2010) finds evidence that the increasing complexity of CMBS deals allows originators to include lower-quality loans in CMBS pools.

The analysis in our paper builds on recent work exploring market segmentation and renegotiation. Our focus on commercial real estate is most closely related to Ghent and Valkanov (2013) and Downs and Xu (2014), who also examine the differences in portfolio and securitized CRE loans. Using a different data set, Ghent and Valkanov compare loan

characteristics of retained and securitized loans and find that loan size is an important predictor of securitization. Their result on loan size leads them to conclude that diversification is likely to a primary motive for securitization. Ghent and Valkanov find no meaningful differences in loan performance between securitized and portfolio loans. However, consistent with our paper, they find that securitized loans that default take more time to resolve. Downs and Xu find once a loan is in distress, portfolio loans are more likely to be foreclosed upon that are securitized loans. Like Ghent and Valkanov, Downs and Xu also find that resolution times are slower for securitized loans than portfolio loans. Our focus on one particular type of resolution—renegotiation and extension—is more closely related to residential mortgage papers of Piskorski et al. (2010) and Agarwal et al. (2011). We contribute to the literature by using unique bank portfolio data to highlight banks' renegotiation of distressed loans. Our results suggest that this is a key factor in determining whether commercial mortgages are originated for the portfolio or for securitization.

Our approach to modeling differences between portfolio and securitized loans also relates to models of investment flexibility. Titman, Tompaidis, and Tsyplakov (2005) calibrate their model of investment flexibility using data on office buildings and commercial mortgages. In our paper, we focus on the investment flexibility of bank lenders relative to the more constrained optimization of CMBS servicers.

3. Data and Descriptive Statistics

Data on Bank Loans

As part of the Dodd Frank Stress Tests(DFAST) stress tests, the Federal Reserve collects loan-level data on banks' portfolios of commercial real estate loans.[2] These data contain the most detailed information on CRE loans the Federal Reserve has ever collected.[3] All bank holding companies with $50 billion or more in consolidated assets must complete the FR Y-14 regulatory reporting form for Wholesale Risk, which includes granular data on commercial real estate loans. The loan-level characteristics include measures both at origination and throughout the observed history of the loan.[4] This includes origination date, loan balance, property type, interest rate, fixed-versus-floating, maturity, loan-to-value, and loan purpose (construction, income-producing, owner-occupied). The loans have a minimum size of $1 million. The data provide a quarterly snapshot of the loan portfolio of each CCAR bank beginning in the first quarter of 2012.[5]

Figure 2 shows the distribution of loan types in the portfolios of our sample of banks in 2012:Q1. Fixed-rate income producing loans account for only 13% of the portfolio, with construction loans, adjustable-rate income-producing loans, and owner-occupied loans all having equal or greater shares.

Figure 3 graphs the differences in original maturity across the different types of loans. Naturally, construction loans tend to have short 1-3 year maturity schedules.

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[2] FR Y-14Q Reporting Form and Instructions: http://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDZGWnsSjRJKDwRxOb5Kb1hL

[3] We expect that over time, as the collection matures, it will become an invaluable source of information regarding the CRE market and the banks' participation in that market.

[4] As the FR Y-14 is a new data collection, we do not have reliable data for all of the fields that we require for analysis prior to 2012:Q1. As a result we have a left-censored database. We observe the portfolio loans that are still current as of 2012:Q1, but not those that have been originated, held in portfolio, and then resolved prior to that date.

[5] Although this misses the height of the crisis, there is still significant stress on the loans in the sample.

Owner occupied and fixed rate income producing loans have similar maturity profiles. Adjustable rate income producing loans have a wider range of maturity terms, with both more shorter and longer term loans.

Table 1 documents significant differences across bank loan types in terms of size, underwriting, and pricing. Note, too, the broad range of bank lending that is apparent in the FR Y-14 data. Our analysis below will focus on the risk and renegotiation properties of the income-producing fixed-rate category, which is smallest category in Table 1. Since this category is also the least risky category in the bank CRE portfolios, we believe that many of our conclusions will apply to the other loan categories as well.

Data on Securitized Loans

The paper also uses CMBS data from Morningstar LLC. This compilation of loan-level data includes every CRE loan in publicly issued (including 144A) CMBS deals over the period of our sample. It includes loan level credit characteristics including the vacancy rate on the property, net operating income (NOI), loan-to-value (LTV), and other key components. Morningstar also tracks loan performance, with detailed information on delinquency and, to a lesser extent, loss-given-default.

Constructing Our Sample For Comparison

We combine these data by restricting our CMBS database to those loans active as of the first quarter of 2012, which corresponds to the sample period for which we have

available FR Y-14 bank data.[6] We also focus exclusively on the set of banks active in originations for both securitization and portfolios. The availability of the granular information on banks' portfolios allows us to directly compare at the loan level securitized and portfolio loans originated by the same institution. In other words, our sample only includes lenders that originated CRE loans for their loan portfolio and for securitization. By narrowing the sample to these banks, we are able to focus on the active decision this group of banks made about whether to securitize a loan.

Because banks have a comparative advantage in information production, the CRE loans in bank portfolios may be observably different than the CRE loans in CMBS pools. Loans in bank portfolios tend to be smaller, of shorter maturity, and more likely to be floating rate. Each of these characteristics causes a loan to be "non-standard" in a way that makes it difficult to securitize.

We limit our analysis to fixed-rate income-producing loans. In other words, we focus on these loans as those that are capable of being securitized. These are bank loans that are comparable to the standard CMBS loan. This highlights the "margin" on which both banks and borrowers evaluate the benefits/costs of the securitization decision. We will defer a deeper examination into the other segments of CRE bank lending (i.e., construction loans and non-income-producing) for further research.

We restrict the sample to the main five property types (office, retail, industrial, hotel, and multifamily), excluding mixed- use and other non-standard property types.

Once we account for observations that are missing key variables we have 5,941 bank loans and 19,529 CMBS loans in our analysis.

[6] The Morningstar data extends back to the mid-1990s. FR Y-14 data available prior to 2012:Q1 lacks key variables needed for our analysis.

A Comparison of Similar Bank and Securitized Loans

Table 2 and Figures 4 and 5 show simple comparisons of some of the loan and price characteristics of CRE loans retained in bank portfolios and those sold into CMBS pools.[7] Consistent with the findings of Ghent and Valkanov (2013) and Downs and Xu (2014), securitized loans are significantly larger. We also find that average loan to value ratios (LTVs) at origination are slightly lower for portfolio loans (about 60%) compared to securitized loans (69%), possibly reflecting the fact that property-level fundamentals in the portfolio loans are more risky, therefore the lenders require more equity buffer in exchange for financing. This hypothesis is supported when we compare the current occupancy rates reported for each sample, with the average for properties financed by securitized loans at 89% and the average for those financed by bank loans slightly lower at 85%. Portfolio loans also require higher debt yield at origination and wider spreads over treasuries, suggesting that banks are pricing the higher risk seen in these loans.

When we turn to realized default rates, however, we see that the share of the portfolio currently past due or having been previously extended as of 2012:Q1 is lower in among the bank loans (5.4%) than what in the CMBS loans (14.8%). We include loans that were previously extended in this measure as we believe that those represent distressed loans where the extension was part of a loss mitigation strategy adopted by the lender. The left censoring of the data makes it difficult to interpret the meaning in this observed differences. We do not observe any of the distressed loans that were resolved

[7] All of the loans in our sample are income-producing, which means that the initial construction phase has been completed and the vacancy rate has stabilized to normal levels.

prior to this period, just those that are still in the portfolio. This is why we limit ourselves later in the paper to an analysis of future distress using a sample of loans that are both current and have never been extended as of 2012:Q1, in order to better isolate the risk drivers of loans entering distress.

Perhaps most interesting in these univariate comparisons are the distributions of loan term in Figure 4. There appears to be a significant clustering in the CMBS data, with about 80% of the CMBS data having an original loan term of ten years. By contrast, about 40% of the loans in the retained portfolio have original loan terms distributed in the 1-7 year range. This fact is consistent with our market segmentation story where lenders for risky projects might want to shorten the term of the loan so as to speed up the timing of the information production process.

It is well-known that property type is an important determinant of CRE loan risk. The bar chart in Figure 5 suggests that the property type representation is fairly similar across lender types. The main differences appear to be that large retail properties are more likely to be funded through the CMBS market, while loans on multi-family properties are somewhat more likely to be kept on the originator balance sheet.

Table 3 shows the percentage of CRE loans securitized by year, conditional on the loans being active as of 2012:Q1. The first two columns report the number of loans held in CMBS and in bank portfolios for each year from 2000 to 2012[8]. These levels indicate that the propensity for a loan to be securitized increased in the years prior to the crisis, as shown with the aggregate data in Figure 1. The left censoring of the data does introduce

[8] Originations in 2012 are limited to those loans originated in 2012Q1.

a bias into some of these measures. If banks tend to originate loans with shorter terms, as we documented in Figure 5, those loans that were originated at the same time as a longer-term CMBS loan have resolved and are not included in this analysis. This may introduce an upward bias in our measurement of the propensity to securitize in earlier origination years.

Table 4 compares the rate of default from 2012:Q1 to 2014:Q3 in the data for CRE loans in CMBS and those held by banks. Of the loans securitized, 5.7 percent go into default during the period of our sample. Default rates for portfolio loans over this period were lower (2.1 percent) than for the loans in CMBS. As we mentioned above, while this result at first appears to be counter to our hypothesis, it is important to account for the impact of renegotiation of distressed loans. Table 4 also shows that portfolio loans were far more likely to be extended over this period (12.6 percent) than securitized loans (2.0 percent), consistent with Downs and Xu (2014). This difference is even more pronounced when we limit the analysis to defaulted loans. Over a third (34,2 percent) of defaulted portfolio loans were extended compared to a small fraction of defaulted securitized loans (1.6 percent).

4. Empirical Methodology

Commercial real estate loans are exposed to risk as economic conditions change over time. Although lenders underwrite CRE loans based on ex-ante financials and other information, some loans will enter distress. The possibility of financial distress has implications for origination and renegotiation. In the remainder of the paper, we analyze bank loans and securitized loans with a focus on the likelihood of distress and the ability and incentive of the lender to renegotiate in distress.

For our analysis it is important to remember that renegotiation can occur prior to default or after default. Once a loan enters distress, the lender may choose to proactively renegotiate the loan in an effort to avoid costly default. The lender can choose to amend the terms of the loan. A loan modification can be a simple extension, a partial write-down, or any alteration of the original terms that mitigates the distress. In the event of project failure, the lender has the right to seize and liquidate the assets funded by the loan. Following default, the lender again has a decision whether to renegotiate or liquidate.

Banks differ from arm's-length investors in their ability to renegotiate loans in distress. The legal constraints governing lenders' actions are different. CMBS loans cannot be modified until after they have been transferred to a special servicer, which only occurs after or immediately prior to a default. Special servicers are also bound by both the Real Estate Mortgage Investment Conduit (REMIC) tax rules and the pooling and servicing agreements (PSAs) for each specific deal. In addition the special servicer must "maximize recovery to the certificate holders as a collective whole on a net present value basis," (Stafford, Linder, and Jones. 2010). The special servicers therefore have to consider the impact of the interruption of coupon payments to senior tranche holders as well as potential realized losses to holders of junior tranches. This is a significantly different standard than the ones facing banks attempting to resolve distressed loans.

Alternatively, banks may be better able to assess liquidation values, or local economic conditions, managerial talent, or any type of information that would lead to better decisions in case of distress.[9] In addition, the incentives may differ. Even when special servicers have the legal authority to renegotiate, it may not be in their interests.

[9] This relates to differences between decentralized and hierarchical firms (Stein 2002).

These differences in lenders provide empirical predictions about the funding structure of projects (An et al. 2011) and the actions of lenders in the event of distress. We examine the following two predictions.

Our first prediction is that *banks fund riskier loans on balance sheet*. Controlling for observable risk characteristics, ex-ante loan rates should be higher for these lenders with comparative advantage at producing information compared to the less information-sensitive lenders. Ex-post, financial distress will be higher for this group as well.

Our second prediction is that *banks are more likely to extend loans in distress*. Banks may proactively avoid default by extending loans prior to default. In addition, following default, banks should be more likely to extend loans rather than liquidate. This could either reflect a greater ability of banks to renegotiate or a legal constraint among servicers of CMBS deals.

Regression Specifications

The empirical analysis begins with an examination of the probability of a loan being securitized, conditional on the loans being active (including loans in various stages of default) as of 2012:Q1. Before we can consider the effects of securitization, we need to understand the characteristics of loans associated with securitization. To do so, we will use the following specification for the probability of loan *i* that is currently active as of 2012:Q1 being securitized by bank *j*:

(1) $P(\text{Loan Securitized}_{ij}) = f(\text{log of loan amount}_i, \text{LTV at origination}_i, \text{debt yield at origination}_i, \text{spread}_i, \text{property type fixed effects}_i, \text{bank fixed effects}_j, \text{origination year fixed effects})$

where P(•) indicates probability and *i* and *j* indicate loan and bank respectively. The dependent variable is a dummy variable that is one if the loan was securitized in our sample horizon. This specification uses origination characteristics when available as well as a few other conditions that reflect the general risk characteristics of the loan; however, the analysis is cross-sectional at origination. We also include the spread of the interest rate on the loan to the rate on a treasury security with the same maturity at the time of origination. The bank fixed-effects control for any differences in propensity to securitize across banks and the origination year fixed effects control for aggregate changes in market conditions across quarters.

The second part of the empirical analysis is an examination of the probability of a loan defaulting. Given that there are observable differences between CRE loans that are retained and those that are sold, the default likelihood will also differ across these loans. In addition, there may be unobservable differences across portfolio and securitized CRE loans that could increase or decrease likelihood of default. For this analysis, we use the following specification:

(2) $P(\text{Loan Defaults}_{ij}) = f(S_{ij}, \text{log of current balance}_i, \text{property type fixed effects}_i, \text{current LTV}_i, \text{current occupancy rate}_i, \text{debt yield}_i, \text{spread}_i, \text{bank fixed effects}_j, \text{origination year fixed effects}_i)$

where S_{ij} is dummy variable indicating whether the loan was securitized or not. We estimate this model over a sample of the loans that were current in their payments as of 2012:Q1. The right hand side variables is an indicator for whether the loan defaulted (i.e. transitioned to a 60 days past due status) at any time from 2012:Q1 to 2014:Q1.

We include an indicator variable for securitization to test whether securitized loans are more or less likely to default than retained loans. The hypothesis of market segmentation is that banks specialize in retaining risky loans that do not have the standard features of more vanilla financial instruments. Under this hypothesis, the coefficient on S_{ij} is predicted to be negative, because securitized loans should be *less* likely to default. The alternative is the adverse selection hypothesis. Banks' advantage in information production may imply that banks use private information to "cherry pick" good loans and sell bad ones. Under this hypothesis, the coefficient on S_{ij} is predicted to be positive, because securitized loans are likely to suffer a lemons problem and should be *more* likely to default. As we saw on Table 2, portfolio loans had a 7.2 percent default rate and securitized loans had a 5.8 percent default rate.

To account for renegotiation prior to default (as shown in Table 4), we estimate an alternate specification of our default model where the dependent variables is whether the loan defaulted **or** was extended.

The analyses on probability of securitization and default will lead us to our primary analysis on loan renegotiation. The financial crisis resulted in an unprecedented number of defaults in commercial real estate. We will focus on the period beginning in the first quarter of 2012 to examine loan renegotiation in the event of loan distress using a

sample of loans that defaulted post 2012, resulting in a sample of 114 portfolio loan and 946 securitized loans.

For our third specification, we look at the probability of renegotiation conditional on default. This specification takes the following form:

(3) $P(Loan\ Renegotiaion_i \mid Defaults_i) = f(\widehat{D}_{ij}, S_{ij,}\ log\ of\ current\ balance_i, property\ type\ fixed\ effects_i, LTV\ at\ origination_i,\ change\ in\ LTV\ since\ origination_i, current\ occupancy\ rate_i, debt\ yield\ at\ origination_i, change\ in\ debt\ yield\ since\ origination_i, spread_i, bank\ fixed\ effects_j, origination\ year\ fixed\ effects)$

where and S_{ij} is the securitization indicator variable. In some specifications we will also include the variable $\widehat{D}_{ij}$ which is the predicted probability of a loan going into default from equation (2). We include this term to explore some of the sorting incentives that we spoke to at the onset. Risky borrowers may be naturally attracted to bank finance because of the implicit option to renegotiate in case of default. In this case, default is "expected" by the lender and we would expect a positive coefficient on $\widehat{D}_{ij}$.

Using this analysis, we expect to find that commercial banks are more likely to renegotiate loans in default. This provides borrowers with a unique value, because the flexibility of the bank may prevent immediate liquidation upon default. The analysis may also shed light on important issues discussed during the crisis, such as the role of securitization in facilitating the problems in the CRE market.

5. Results

In this section we provide estimates of the models expressed in equations (1) - (3). All models are estimated with logit specifications. For the securitization model we use the sample of CRE loans originated by the set of large banks that submit data to the FR Y-14 data set. While we do find differences in loan characteristics between securitized and portfolio loans, it his helpful to remember that we have already filtered out some of the differences between the two loan types when we narrowed the sample to fixed-rate income-producing loans.

The dependent variable is a binary variable taking value of one if the loan is securitized (and, thus, observed in the Morningstar data), and zero otherwise. The originations data span the 2000-2012 period. Although, as mentioned above, we do have a left-censoring problem in that we do not observe portfolio loans that may have been originated in the early 2000s but paid off before our sample collection period began.

The explanatory variables include loan-specific risk factors such as the loan size, the debt yield at origination, the LTV at origination and the type of property backing the loan. We also include the spread of the loan rate over the comparable Treasury yield that prevailed at the time of origination. This latter variable helps to proxy for risk factors that are unobserved by the econometrician, but are observable to the lender and are priced. All our specifications contain a full set of year dummies and lender fixed effects.

The results are in Table 5. We have more than 22,000 observations on securitization choices. Unconditionally, nearly 80 percent of the sample was securitized. All specifications are estimated without a constant. The dispersion of the estimated coefficients on the property type indicators show that the property type is an important determinant of the ultimate source of CRE funding. Holding all variables in the model

constant, loans on retail properties (e.g., malls and shopping complexes) and hotels are more likely to be securitized. Loans backed by industrial, multi-family, and office are relatively more likely to be retained in the banks' portfolios.

LTV at origination is positively associated with securitization. This result goes against our prior that banks would specialize in holding riskier loans, which would tend to have higher values for these variables. It is possible that this reflects endogeneity in the loan characteristics data. For a fundamentally risky loan where future cash flows or market conditions are uncertain, lenders may require higher borrower equity, for example, in order to make and hold a loan in portfolio. The negative coefficient on the loan rate appears to confirm this intuition. Conditional on the other variables in the logit model, rates on loans retained by the banks tend to be higher than rates on securitized loans, suggesting the presence of greater risk. The results persist when we limit our sample to just loans with 10-year terms, in the fourth column.[10]

While the securitization model gives some indication that portfolio loans are riskier than securitized loans in an ex-ante sense, the best test of this is to look at actual defaults. In Table 6 we estimate the default model outlined in equation (2). Note again that we see a strong positive association between default and the interest rate spread on the loan.

Not too surprisingly, traditional risk factors such as the updated LTV and the occupancy rate have the expected signs. Properties with comparatively higher occupancy rates and lower LTVs had lower default rates. At least in columns (i) and (ii) we see a positive correlation between the local unemployment rate and loan default.

[10] This robustness test was made in response to a comment from a discussant, as almost all CMBS loans in our analysis are 10-year term loans.

In columns (i) and (ii) the coefficient on the securitization dummy variable is positive and statistically significant. This result fits with the data in Table 2 showing that portfolio loans had lower unconditional default rates. However, this result is at odds with our finding that loan spreads were negatively related to securitization, controlling for observable risk factors.

One possibility for this result is that bank loans really are riskier, as the pricing data would suggest, but retained bank loans have lower conditional default rates because default is avoided by a loan extension or a renegotiation. To address this possibility we augment the definition of a default to include both recorded defaults and (for portfolio loans) current loans that we identify as having been extended. These results are in columns (iii) and (iv) of Table 6. The coefficient on the securitization variable switches from positive to negative with this measure of loan distress in column (iii). While the securitization dummy in column (iv) is insignificant, the difference in the sensitivity of initial contract rate and subsequent distress is even more pronounced. This correlation between default and the risk premium in the original loan pricing appears to be confined to portfolio loans, as evidenced by the negative sign on the interaction term of the rate spread x securitization. This suggests that even if portfolio loans are ceterius paribus less likely to become distressed, portfolio loans where the lender did require a higher initial contract rate are more likely become distressed than a similarly priced securitized loans. The result may either suggest a higher sensitivity to the pricing or risk in retained loan or a wider range in retained loans of underlying unobserved risk characteristics that are not reflected in the reported underwriting measures but are reflected in the pricing.

We draw two conclusions from these developments. First, since it is unlikely that a bank would extend or renegotiate a loan that is not impaired in some way, we interpret the result as confirmation that the incidence of financial distress in the retained loan portfolio is higher than in the securitized portfolio. Second, this result speaks to an important role that banks play as financial intermediaries. Default is costly for both borrowers and lenders. Banks appear to be able to achieve lower default rates than in the securitized portfolio not because of better underwriting or screening, but by avoiding the default state altogether when financial distress occurs.[11]

To explore the loan extension decision more carefully we next estimate the loan extension model in equation 3. The results are in Table 7. The model is estimated on the set of loans that were current as of 2012:Q1 and entered default over the next ten quarters (hence the much smaller sample size). We estimate two different specifications. The results in columns (i) and (ii) of Table 7 are based on logit models. With the fairly small number of observations we were unable to get the logit models to converge when we included bank and time fixed-effects. Thus, for robustness, we also estimated linear probability models with the complete set of fixed-effects in columns (iii) and (iv).

We were not able to find observable variables that consistently account for the loan extension event. Indeed, the only reliable predictor of extension is whether the loan was retained in the bank portfolio. To be sure, this last result could be due to the fact that CMBS servicers face different contractual obligations to their investors and are simply not allowed the same flexibility to renegotiate as banks. .

[11] To test this hypothesis that banks engage in efficient recontracting for distressed loans in their portfolio we would ideally compare ultimate loss rates for retained and securitized loans. Unfortunately we do not observe losses or recoveries in the bank data over a sufficient time period.

Interestingly, in column (iv) we see that the predicted probability of default from equation 2 has a strong positive coefficient in the extension regression. Thus, even for this sample where every loan actually defaulted, loans that were ex ante viewed as more likely to default turn out to have a higher rate of loan extension and renegotiation. This could be due to the fact that predicted default probabilities in this setting are high because market conditions have deteriorated (e.g., LTVs have gone up), and lenders condition on other, borrower and loan-specific terms when making their decision. However, the relationship between occupancy and extension is not precisely estimated to confirm this interpretation. It could also be the case that high default probabilities signal very low recovery values and lenders are simply gambling on keeping the loan alive and hoping for an improvement in economic conditions. Unfortunately our other loan-specific variables (debt yield and LTV) are not estimated precisely enough to disentangle what it is about high default probability loans that makes them more likely to be extended.

To summarize, the results in Tables 5-7 are consistent with our basic narrative that banks specialize in making risky loans and managing them more closely in the event of default. Loans that end up in the loan portfolio tend to have higher rates even though many of the most important risk factors appear to be at safe levels at the time of origination. The interpretation is that banks demand high rates in compensation for risk and also take steps to manage these risks right from the point of origination. The risky loans retained by the banks are more likely to default. But in the case of default, banks appear to be more willing to work with borrowers and extend the loan.

Robustness checks

One potential concern in the analysis so far is the possibility for endogeneity between the outcomes of interest (i.e., securitization, default and extension) and the loan characteristics that serve as control variables in our models (i.e., LTV, debt yield, maturity). In this section we use a propensity score matching technique to mitigate this problem. Propensity scores are computed in order to match retained portfolio loans with similar securitized loans. With matches in hand, we then discard all observations from the data set that were not matched. It is in this way that the propensity score matching routine produces a more apples-to-apples comparison between the default and extension behavior of the securitized versus unsecuritized loans.

The first stage of the matching is the logit specification for securitization in column (iii) of Table 5. The propensity scores are the fitted probabilities from this logit model. We then select matches based on a nearest neighbor approach. We do not allow for observations in one group (say, retained portfolio) to match to multiple observations in the other group (securitized). Note that this approach, by necessity, will result in the discarding of a substantial number of observations. As can be seen in Figure 6a, the distribution of fitted probabilities of securitization differs quite substantially for loans that were actually securitized (red solid line in Figure 6a) compared to loans that were retained (blue dashed line in Figure 6a). However, the matching process does much to eliminate these extreme cases and shows instead a set of retained and securitized loans with a much more similar distribution of securitization probabilities (Figure 6b).

With our matched sample in hand we are able to re-run the default models presented in Table 6. Hopefully, by using the matched sample, we will have purged out

observations that are found to be too dissimilar according to the first-stage securitization model, and thus are not comparable even in a default model with control variables.

The results of this exercise are in Table 8. As we can see, the sample size drops markedly from over 16,000 observations in the unmatched sample in Table 6 to just over 3,000 observations. The results generally confirm our story about borrower risk and bank behavior in case of risk. In columns (i) and (ii) of Table 8, where the definition of default is simply whether the loan is 90-days past-due or not, we now get no significant differences in default rates for securitized loans versus retained loans. In column (iii) and (iv) of Table 8 we employ the expanded definition of distress that includes defaulted loans *and* loans that were extended prior to maturity. Column (iii) bears out our earlier result that distress is more likely for retained loans than securitized loans. The coefficient of -0.4136 on the securitization dummy translates to an odds ratio of -0.66, so securitization is associated with a lower rate of distress that is both statistically and economically significant. While the coefficient on securitization alone in column (iv) is positive (but insignificant), when the rate spread is evaluated at the mean level (.018) we see that the combined or total effect of securitization in column (iv) is strongly negative. Thus, the propensity score matching exercise confirms our basic story that banks retain the riskier CRE loans.

Unfortunately it is more difficult to apply our propensity score matching approach to the defaulted loan sample, where we look at the loan extension probability conditional on default. The sample size is already quite small at about 600 observations in Table 7.

6. Conclusion

Securitization of commercial real estate loans has grown dramatically over the past twenty years. Despite this growth, a substantial majority of the commercial mortgages outstanding still remains on the balance sheets of banking institutions. This outcome reflects an equilibrium where certain types of investors and lenders have comparative advantage in funding certain types of loans.

We use confidential supervisory loan level data on portfolio loans collected as part of the recent bank stress tests in the U.S. In conjunction with loan-level data from commercial mortgage-backed securities, we can explore the differences between portfolio and securitized loans.

This newly available bank loan data highlights the substantial differences between portfolio and securitized commercial real estate loans. Loans in CMBS deals are almost entirely fixed-rate loans on stabilized income-producing properties, whereas bank loans include floating-rate loans, construction loans, and other types. This suggests that banks may have a comparative advantage in funding "non-standard" loans.

The analysis in this paper focuses on loan distress and renegotiation. Banks appear to have a comparative advantage in renegotiation that yields two predictions: *banks fund riskier loans* and *banks are more likely to extend loans in distress*. Based on an overlapping sample of similar portfolio and securitized loans, we develop our analysis in three steps: the likelihood of securitization, the likelihood of distress, and the likelihood of extension.

We find some evidence that bank lenders specialize in funding riskier CRE loans as compared to the capital market investors. While ex-ante loan characteristics are not significantly different across the bank loans and loans in CMBS, this finding likely

reflects the endogenous response by banks to tighten underwriting standards for loans on properties that are fundamentally riskier than those in CMBS.

We also find that banks are far more active in using loan extensions to mitigate default risk. The probability of loan extension or renegotiation prior to default and conditional on default both appear to be higher for bank loans.

These results are consistent with a market segmentation story where borrowers with risky, difficult to assess projects are matched with lenders with comparative advantage in renegotiation. The observable differences between portfolio and securitized loans point to a fundamental difference between these two sources of funding. In particular, banks appear to have a unique role in managing risk for loans in distress.

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Table 1: Characteristics of Bank loans by loan type. The table below reports the characteristics of bank portfolios by loan type for a set of banks active in origination for both securitization and their own portfolios as of 2012 Q1.

	Construction	Income Producing - Fixed	Income Producing – Adjustable	Owner Occupied
Current Balance ($ millions)	$ 5.6	$ 3.7	$5.3	$2.7
Current LTV	59.1%	55.6%	56.1%	58.4%
Current Interest Rate	3.7%	5.6%	3.8%	4.2%
Number of Loans	10,119	8,620	26,115	21,860

Table 2: Characteristics of Bank and CMBS loans. The table below compares a set of characteristics of the portfolio of CMBS loans to those of the portfolios of bank loans on income producing properties as of 2012 Q1. Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios. The averages reported are all weighted by the current outstanding balance of the loans.

	CMBS	Banks
Current Balance ($ millions)	$ 13.8 (35.3)	$ 3.7 (9.9)
Balance at Origination ($ millions)	$ 15.0 (40.6)	$ 4.7 (10.2)
Current LTV	62.5% (12.8)	56.1% (20.2)
LTV at Origination	69.1% (11.3)	59.6% (20.8)
Current Occupancy Rate	88.9% (17.6)	85.1% (26.8)
Current Debt Yield	15.6% (67.7)	18.1% (82.7)
Debt Yield at Origination	11.7% (8.8)	18.0% (119.3)
Spread to Treasuries	1.5% (0.7)	1.9% (2.2)
Percent in Past Due Or Previously Extended	14.8%	5.1%

Note: Standard Deviations are reported in ( )s.

Table 3: Share Securitized by Year. The table reports the distribution by year of origination for the CMBS and bank loans that were still active in 2012Q1. Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios. We also use this data to calculate the propensity to securitize by year. It is important to note that this is a censored database, and does not include either CMBS or bank loans that were resolved, either through prepayment or liquidation, prior to 2012Q1. If banks tend to hold loans with shorter terms on their balance sheet, this would upwardly bias the CMBS share in earlier years.

	CMBS	Banks	CMBS Share
2000	1,114	245	82.0%
2001	308	75	80.4%
2002	1,263	186	87.2%
2003	1,984	280	87.6%
2004	2,192	316	87.4%
2005	3,796	424	90.0%
2006	4,152	597	87.4%
2007	3,985	1,119	78.1%
2008	56	706	7.4%
2009	13	315	4.0%
2010	160	568	22.0%
2011	554	826	39.7%
2012[1]	25	317	7.3%

[1] Originations in 2012 are limited to those originated in 2012Q1.

Table 4: Defaults and Extensions of CMBS and Bank loans. The table below compares the propensity of loans that were current as of 2012Q1 to default over the next ten quarters (till 2014Q3) for CMBS and for bank loans. Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios. We also report the share of loans extended for both loans that defaulted over this period and loans that remained current over this period.

	CMBS	Banks
Percent Subsequent Default[1]	5.7%	2.1%
Percent Subsequent Extended[2]	2.0%	12.6%
Percent Subsequent Extended, Defaulted Loans Only	1.6%	34.2%

[1] Default is defined as the transition of a loan to 60-days past due.

[2] Extension is defined as increase of more than 3-months in the maturity date of a loan.

Table 5: Probability of Securitization

	(i)	(ii)	(iii)	(iv)
Balance outstanding (log)	1.044***	1.040***	1.046***	0.992***
	-0.03	(.029)	(.031)	(.050)
Debt yield at origination	-.144	-.190	-.210	-.268*
	(.123)	(.126)	(.132)	(.155)
LTV at origination	2.086***	2.416***	2.229***	4.066***
	(.160)	(.167)	(.173)	(.298)
Rate spread	-26.791***	-18.885***	-15.152***	-105.7***
	(3.124)	(3.201)	(3.332)	(7.751)
Retail	-16.768***	-16.346***	-17.426***	-15.238***
	(0.466)	(.504)	(.822)	(1.305)
Industrial	-17.648***	-17.357***	-18.415***	-16.373***
	(.476)	(0.510)	(.823)	(1.310)
Hotel	-16.742***	-16.183***	-17.246***	-14.841***
	(.493)	(.532)	(.844)	(1.348)
Multi-family	-17.806***	-17.437***	-18.188***	-15.448***
	(.469)	(.506)	(.829)	(1.302)
Office	-17.546***	-17.161***	-18.188***	-16.015***
	(.476)	(.514)	(.829)	(1.315)
Unemployment rate			-.070***	-.053***
			(.011)	(.018)
Year-over-Year House Price			1.547**	2.892**
Appreciation			(.604)	(.939)
Bank fixed effects	no	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Observations	22,603	22,603	20,766	15,587

Table 6: Probability of Default

Logistic regressions of the probability of default. All observations conditional on loan being current in 2012.Q1.

	(i)	(ii)	(iii)	(iv)
Securitized	.783***	0.971***	-.359***	.023
	(.186)	(.332)	(.103)	(.182)
Balance outstanding (log)	.062	.060	.032	.026
	(.038)	(.038)	(.031)	(.031)
Current debt yield	-6.115***	-6.107***	-.066	-.072
	(.887)	(.886)	(.199)	(.199)
Current LTV	3.004***	3.008***	2.109***	2.134***
	(.384)	(.384)	(.233)	(.234)
Rate spread	21.409***	28.292***	26.109***	34.885***
	(7.082)	(12.256)	(4.365)	(5.623)
Rate spread x Securitized		-9.732		-21.044**
		(14.007)		(8.116)
Retail	-6.908***	-7.134***	-5.112***	-5.369***
	(1.194)	(1.244)	(.895)	(.903)
Industrial	-6.720***	-6.945***	-4.804***	-5.053***
	(1.194)	(1.242)	(.893)	(.901)
Hotel	-6.821***	-7.043***	-5.098***	-5.328***
	(1.207)	(1.253)	(.906)	(.914)
Multi-family	-7.221***	-7.449***	-5.246***	-5.511***
	(1.195)	(1.245)	(.895)	(.904)
Office	-6.156***	-6.381***	-4.527***	-4.777***
	(1.200)	(1.249)	(.899)	(.908)
Current occupancy rate	-1.720***	-1.720***	-1.267***	-1.274***
	(.153)	(.153)	(.130)	(.130)
Unemployment rate	.054***	.054***	.003	.003
	(.016)	(.016)	(.013)	(.013)
Year-over-Year House Price Appreciation	.515	.521	1.232**	1.261*
	(.821)	(.821)	(.669)	(.670)
Bank fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Including premptive extensions	no	no	yes	yes
Observations	15,533	15,533	15,533	15,533

Table 7: Probability of Extension

Logit regressions. All observations were at one time in default.

	(i)	(ii)	(iii)	(iv)
Securitization	-3.106***	-3.369***	-.191***	-.254***
	(.578)	(.780)	(.039)	(.055)
Probability of default		3.999		.311**
		(3.421)		(.159)
Balance outstanding (log)	0.001	-.016	-.007	-.001
	(.134)	(.222)	(.008)	(.008)
LTV at origination	-.388	-2.816	-.107	-.285***
	(1.337)	(1.834)	(.087)	(.093)
Change in LTV since origination	-.006	-2.803*	.164**	-.169*
	(.867)	(1.504)	(.071)	(.095)
Debt yield at origination	-4.707	1.305	-.102	-.003
	(5.372)	(2.220)	(.122)	(.110)
Change in debt yield since origination	-.040	.477	-.0004	.022
	(.419)	(.500)	(.022)	(.023)
Rate spread	18.137	20.096	.071	1.267
	(14.751)	(19.671)	(1.337)	(1.297)
Current occupancy	-.459	-.032	-.059	-.005
	(.756)	(1.154)	(.039)	(.040)
Retail			.819***	1.015***
			(.179)	(.217)
Industrial			.863***	1.057***
			(.179)	(.217)
Hotel			.776***	.966***
			(.179)	(.214)
Multi-family			.778***	.982***
			(.196)	(.245)
Office			.829***	1.002***
			(.180)	(.215)
Unemployment rate				-.005*
				(.003)
Year-over-Year House Price Appreciation				-.036
				(.096)
Specification	logit	logit	OLS	OLS
Bank fixed effects	no	no	yes	yes
Year fixed effects	no	no	yes	yes
Observations	677	589	677	589

Table 8: Default Models with Matched Sample

Logistic regressions of the probability of default. All observations conditional on loan being current in 2012.Q1. Sample is based on propensity score matching propensity score matching.

	Default		Distress Default + Extension	
	(i)	(ii)	(iii)	(iv)
Securitized	0.2385	0.4334	-0.4136**	0.2866
	(0.2766)	(0.5087)	(0.1814)	(0.3762)
Balance outstanding (log)	0.0601	0.0529	-0.0289	-0.0430
	(0.1605)	(0.1599)	(0.1239)	(0.1245)
Debt yield at origination	-13.6592***	-13.6494***	-2.8719*	-2.9650*
	(3.2847)	(3.2779)	(1.6852)	(1.6794)
Current LTV	1.1201	1.1050	1.5634***	1.5574***
	(0.8141)	(0.8219)	(0.5749)	(0.5807)
Spread	42.3805***	45.1132***	35.9490***	45.0821***
	(13.2136)	(14.4045)	(8.9809)	(11.0531)
Spread x Securitization		-10.8346		-37.3623**
		(23.3800)		(16.8923)
Current Occupancy Rate	-1.1430**	-1.1345**	-0.7148**	-0.7478**
	(0.4491)	(0.4479)	(0.3486)	(0.3430)
Unemployment Rate	0.0829**	0.0836**	-0.0169	-0.0130
	(0.0410)	(0.0409)	(0.0371)	(0.0369)
4Q Chg in HPI	5.7041**	5.7390**	3.7670*	3.9256*
	(2.6682)	(2.6784)	(2.0113)	(2.0386)
Constant	-6.7931*	-6.7725*	-4.7971*	-4.8622*
	(3.6581)	(3.6592)	(2.8832)	(2.9215)
Bank fixed-effects	yes	yes	yes	yes
Property type controls	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
N	2081	2081	2201	2201
pseudo R-sq	0.1675	0.1677	0.1229	0.1266

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, ***p<.01

Figure 1: Volume and Share of Securitized Commercial Mortgages. The blue line shows the amount of commercial mortgages held in asset-backed securities (ABS) in billions. The red line shows the share of all commercial mortgages that are securitized.

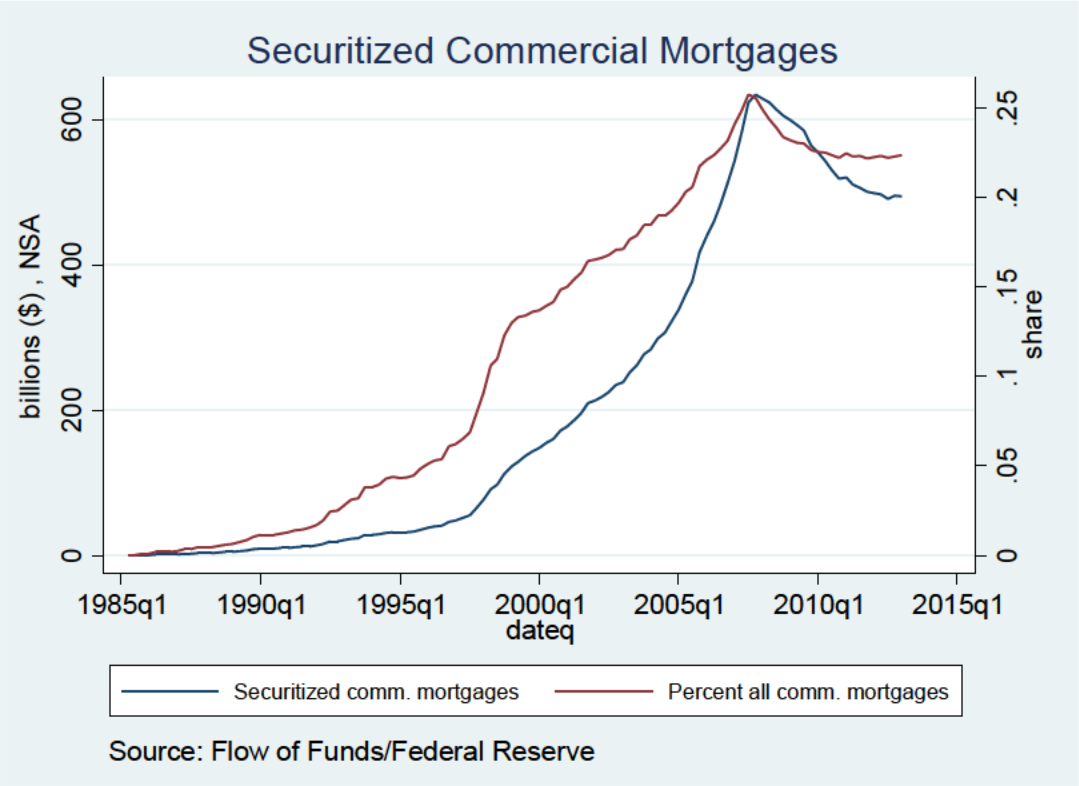
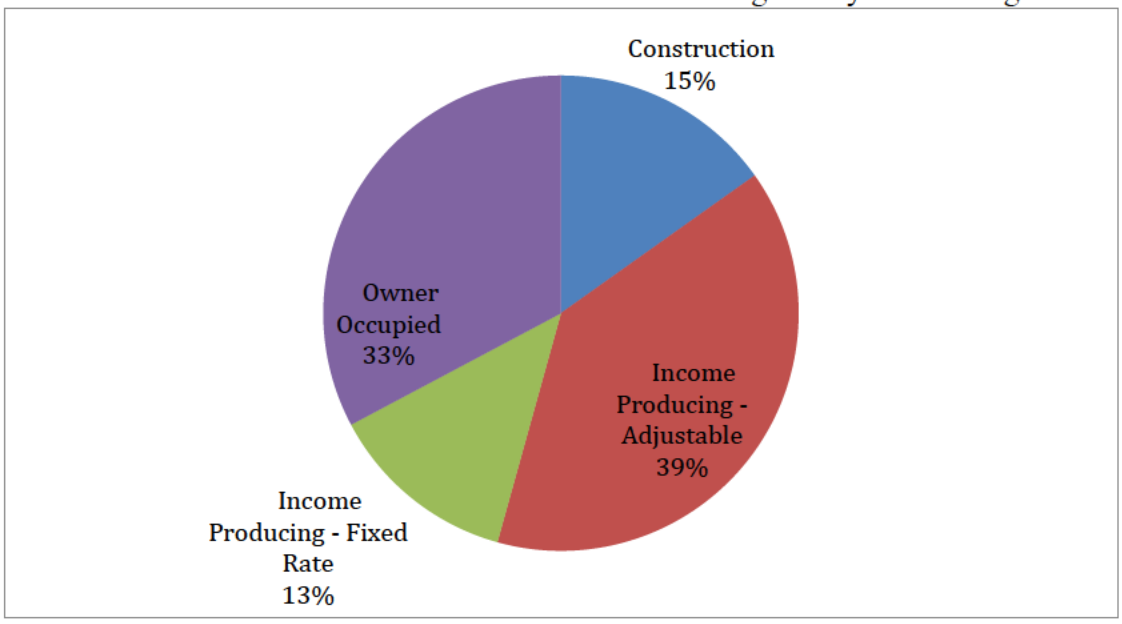


Figure 2: Share of Bank Portfolios by Loan Type. The pie chart below shows the share of the bank portfolios in the first quarter of 2012 at the set of banks that both originated CRE loans for the CMBS market and held them on their balance sheet. The distribution is based on the number of loans and is not weighted by outstanding balance.



Source: Federal Reserve (FR Y-14).

Figure 3: Distribution of Bank Portfolios by Original Term. The chart reports the distribution of the original term in years for loans in the portfolios of our sample of banks in the first quarter of 2012. The blue bars report the distribution for construction loans, the red for adjustable rate loans on income producing properties, the green on fixed rate loans on income producing properties, and the purple for loans on owner occupied properties.

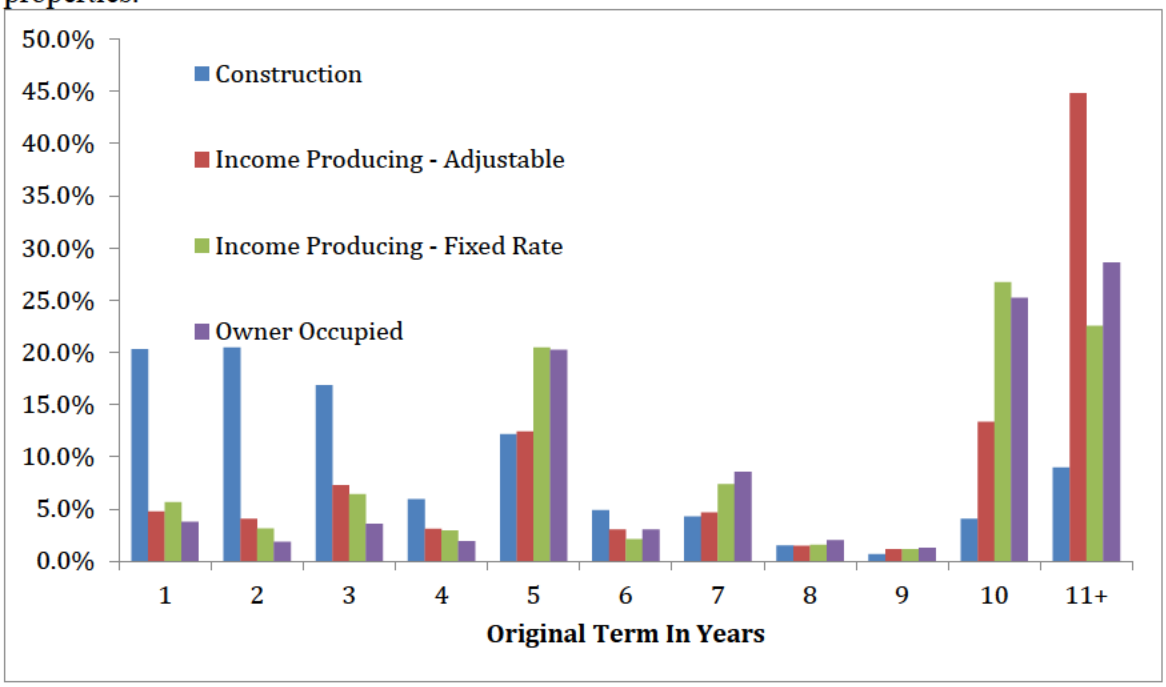
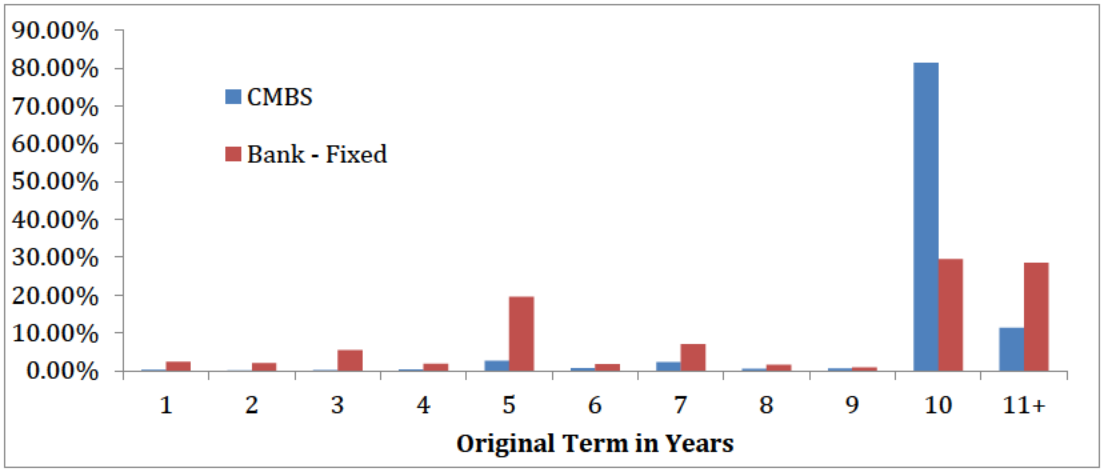
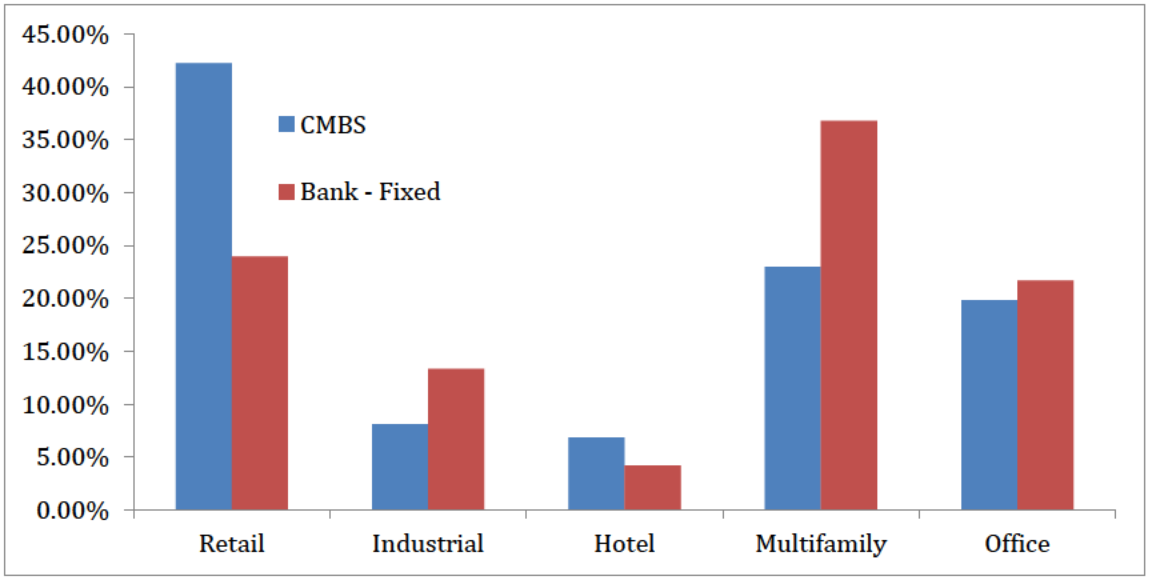


Figure 4: Distribution of Bank and CMBS Portfolios by Original Term. The blue bar shows the distribution by the original term of the loan in the CMBS market as of the first quarter of 2012. The red bars show the distribution of the original term of bank loans on income producing properties over the same period. Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios.



Source: Federal Reserve (FR Y-14) and Morningstar

Figure 5: Distribution of Bank and CMBS Portfolios by Property Type. The blue bar shows the portfolio share by property type in the CMBS market as of the first quarter of 2012. The red bars show the portfolio share by property type among banks loans on income producing properties over the same period. Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios.



Source: Federal Reserve (FR Y-14) and Morningstar

Figure 6a

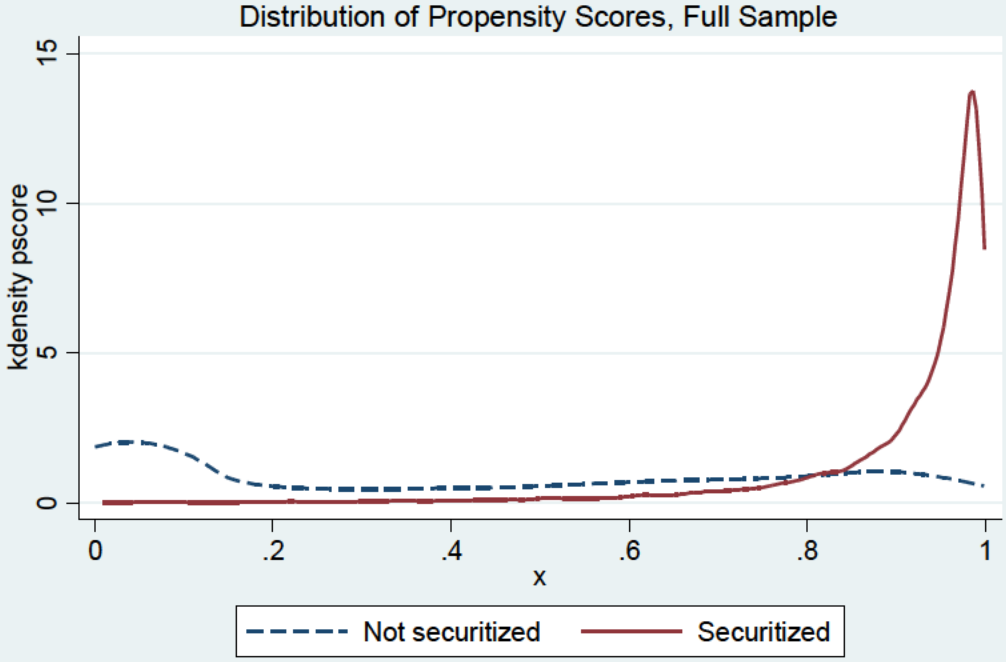


Figure 6b