# CMBS and Conflicts of Interest: Evidence from a Natural Experiment on Servicer Ownership*

Maisy Wong†

*University of Pennsylvania*

April 2015

**Abstract**

I study a natural experiment in commercial mortgage-backed securities (CMBS) where some special servicers changed owners (treatment group) from 2009-2010 but not others (placebo group). The ownership change linked *sellers* (special servicers who liquidate CMBS assets on behalf of bondholders) and *buyers* (new owners), presenting a classic self-dealing conflict. Average loss rates for liquidations are 11 percentage points higher (implying additional losses of $3.2 billion for bondholders) after treated special servicers changed owners, but not for the placebo group. I provide the first direct measure of self-dealing that links buyers and sellers in securities markets in the United States.

*I am grateful to Joe Gyourko and Todd Sinai for their advice. I thank Serdar Dinc and Nikolai Roussanov for comments. Hye Jin Lee, Ying Chen, Xuequan Peng, Laura Nugent, Xin Wan and Justine Wang were excellent research assistants. I would like to thank the Research Sponsors Program of the Zell/Lurie Real Estate Center at Wharton, the Jacobs Levy Grant and the Wharton Dean's Research Fund for research support. All errors are my own.

†Wharton Real Estate. 3620 Locust Walk, 1464 SHDH, Philadelphia, PA 19104-6302. Email: maisy@wharton.upenn.edu.

# 1 Introduction

Reducing conflicts of interest is central to strengthening investors' trust in the asset-backed securities (ABS) market (Zingales, 2015). Such conflicts can arise at various stages of the securitization chain. This paper studies one potential conflict during the final stage of a distressed securitized asset: liquidation.

I estimate the causal impact of a sharp change in the likelihood of agency conflicts on the performance of liquidated commercial mortgage-backed securities (CMBS). The CMBS market is the second most important source of credit in the commercial real estate sector with total assets of $572 billion (FRB, 2014). Each CMBS trust comprises a pool of mortgages that are in turn collateralized by non-residential properties.

The key player in this natural experiment is the special servicer, a debt firm managing distressed mortgages on behalf of CMBS bondholders. When a mortgage in a CMBS portfolio is non-performing, the special servicer decides whether to liquidate it and at what price with the goal of maximizing the net present value of assets for CMBS bondholders. Liquidations of mortgages typically involve selling the underlying collateral (non-residential properties). Higher liquidation values increase the net present value for bondholders.

Between 2009 and 2010, four of the five major special servicers were transferred to new owners. These events were highly controversial. According to the Wall Street Journal, special servicers were "burdened by conflicts of interest caused in part by new ownership..." and allegedly "cutting bad deals and often failing to disclose conflicts of interest" (Yoon, 2012). The key conflict arises because special servicers, who *sell* distressed mortgages (on behalf of CMBS bondholders), prefer to liquidate at *higher* prices to maximize the net present value for bondholders. At the same time, their new owners who are *buyers* prefer *lower* prices, which leads to more losses for CMBS bondholders. The change in ownership linked sellers and buyers, presenting a classic tunneling or self-dealing problem (Shleifer and Vishny, 1997).

To identify the causal impact of these changes in ownership, I use a research design with event studies involving special servicers in a treatment group (those that changed owners) or a placebo group. The key source of variation is the sharp change in ownership for the treated special servicers around the four event dates (from 2009 to 2010). I first show that special servicers did not liquidate much before 2009 so there was little concern over self-dealing conflicts since there were so few sales by special servicers. As special servicers began selling more distressed mortgages

after 2009, the changes in ownership linked major sellers to potential buyers in the commercial real estate market, sharply increasing the likelihood of self-dealing around the event dates. There is no sharp change for the placebo group because they did not change owners and the major special servicer in the placebo group is not an active buyer of commercial real estate assets.

I report results from pre versus post comparisons at the special servicer-month level to estimate the causal impact of ownership changes on losses to bondholders. Special servicers that were sold liquidate 116% more CMBS assets ($53 million more per month per special servicer) after their sale compared to the months before. Average loss rates for liquidations (as a share of loan balance before loss) are 11 percentage points greater, implying greater loss severity for loans and additional aggregate losses of $3.2 billion during this period. Crucially, special servicers in the placebo group do not liquidate more during this time period and their liquidations do not result in greater losses.

There are two primary ways a change in ownership can lead to lower liquidation values (higher loss rates) for assets sold by these special servicers. First, there is the direct effect of *self-dealing* where special servicers liquidate mortgages at discounted prices to the new owners. There is also an indirect effect due to *adverse selection* where unaffiliated buyers price all assets liquidated by these special servicers at a discount because they are concerned that special servicers may direct the best assets to their new owners, leaving adversely selected assets for unaffiliated buyers. In other words, losses can result from actual self-dealing or adverse selection due to heightened concerns over self-dealing conflicts.[1]

To further quantify the extent of tunneling, I complement the main regression analysis by providing the first direct measure of tunneling in securities markets in the United States that links buyers and sellers at the transactions level.[2] Tunneling, also known as self-dealing, has been alleged in ABS markets because distant bondholders who have cash flow rights have limited control rights. However, it is hard to study tunneling in ABS markets because incentives for tunneling behavior are endogenous and it is hard to trace the chain of ownership of securitized assets.

I use a novel dataset that identifies sellers, buyers, lenders and brokers for a sub-sample of

[1]The indirect effect could lead to higher loss rates even without many connected transactions between special servicers and affiliated buyers as long as buyers believe there are agency problems due to the link between special servicers and their new owners. Several media and analyst reports of transactions that linked these special servicers with their new owners fueled concerns amongst investors. For example, a Wall Street Journal article in May 2012 discussed an analyst report that presented twelve large mortgages as the "poster children of questionable behavior" (Yoon, 2012).

[2]Previous studies include analyses for markets in China (Jiang et al., 2010), Hong Kong (Cheung et al., 2006), Korea (Baek et al., 2006) and Bulgaria (Atanasov, 2005). Kroszner and Strahan (2001), Engelberg et al. (2012) and Porta et al. (2003) examine lending behavior amongst connected lenders but focus on non-securitized debt.

liquidated CMBS properties. Since all real estate transactions are recorded publicly, I am able to match properties in real estate transactions with properties in the CMBS data to identify whether special servicers sold properties underlying liquidated mortgages to their affiliates and whether they directed ancillary services for each liquidation (such as lending and brokerage services) to affiliates. Direct purchases of liquidated properties at discounted prices and fee revenue from ancillary services are examples of benefits from tunneling.

My analysis indicates that tunneling can only explain part of the patterns above. This case study at the property level hand-matched more than 1000 commercial real estate transactions to properties underlying the CMBS loans data for all loans liquidated by one of the four treated special servicers.[3] Eighteen transactions are linked to affiliates of the special servicer, for a combined transaction value of around $300 million. A back-of-the-envelop accounting exercise that compares the benefits from owning a special servicer to the $100 million equity cost to purchase the special servicer suggests the purchase of the special servicer is a positive net present value transaction. The estimated benefits from the affiliated transactions are $39 million, compared to $102 million in revenues from special servicing fees during the same period. This exercise suggests the direct effect of self-dealing appears to be moderate, lending support to the adverse selection concerns and trust issues raised above.

The main empirical challenge is any sharp change in economic conditions around the event dates because these events occurred during the real estate crisis. The absence of discontinuities for event studies using the placebo group addresses this concern. If the discontinuities for the treated group are only driven by sharp changes in general economic conditions, these should also lead to discontinuities for special servicers in the placebo group. A second concern is that loans may not be randomly assigned to servicers in the treated versus control groups. I show that loan quality (at origination) seems balanced across the two groups and changes in loan quality over time follow parallel trends for special servicers in the treated and control groups. My results are robust to a restricted sample with a narrower event window and controls for quadratic time trends around the event date, akin to a regression discontinuity approach (Lee and Lemieux, 2010). My primary dataset includes CMBS loans liquidated between 1997 and 2012. The restricted sample includes liquidations within 36 months of event dates. I discuss other threats to identification in section 6.

[3]The number of transactions is comparable to other studies on tunneling. Baek et al. (2006) study the private sales of equity-linked securities by 262 issuing firms and 70 purchasing firms in Korea. Cheung et al. (2006) study pricing for connected transactions in 375 filings by 261 publicly listed firms in Hong Kong between 1998 to 2000.

I provide suggestive evidence that these ownership transfers have reduced trust in the CMBS market,[4] accompanied with real economic consequences (Guiso et al., 2008). While total outstanding commercial real estate debt has remained relatively stable between 2008 and 2014, CMBS debt has lost market share compared to other commercial real estate debt instruments. Furthermore, within CMBS, treated special servicers have also lost market share.

This paper is related to the literature on agency problems and adverse selection in loan sales (Akerlof, 1970; Myers and Majluf, 1984). Ivashina (2009), Drucker and Puri (2009) and Gorton and Pennacchi (1995) demonstrate the impact of asymmetric information on prices in loan sales. For securitized debt, most of the papers on adverse selection investigate whether securitized assets are adversely selected compared to non-securitized assets (see, for example, Keys et al. (2010); Downing et al. (2009); An et al. (2009); Benmelech et al. (2012) and see Gorton and Metrick (2013) for a review).

However, there is relatively less work on conflicts of interest and adverse selection *after* securitization (Keys et al., 2013), despite the fact that a large share of the ABS market is actively managed by intermediaries, including all MBS debt and some collateralized loan obligations (Gorton and Metrick, 2013).[5] Agarwal et al. (2011) and Piskorski et al. (2010) study the effects of securitization on how RMBS servicers resolve distressed residential mortgages by comparing securitized loans against bank-held loans. Maturana (2014) studies the incentives of RMBS servicers to workout distressed mortgages. The innovation of this paper is to use the change in servicer ownership as a natural experiment that sharply changes the likelihood of agency conflicts associated with intermediaries in the ABS market. In an ideal setting, asset values should depend on the attributes of the asset but *who* the intermediary is should not impact asset values. The findings above illustrate how conflicts of interest among intermediaries in securitized markets can have significant price effects

[4] As an example, Jack Taylor, Head of the Global Real Estate Finance Group for Prudential Real Estate Investors commented during an industry-wide panel that these ownership transfers are "a very important topic for the CMBS market's growth and resurgence. A fundamental lack of trust in the CMBS market and deal structures has grown in what I will call "end user" or "ultimate investor" as opposed to day traders. For the CMBS market to significantly grow again, this trust needs to be reinvigorated. One of the pillars of that reinvigoration will be resolution of the conflict issues...." (Lancaster et al., 2012).

[5] Many of these intermediaries have ties to major financial institutions and may face similar agency conflicts. In fact, self-dealing conflicts amongst mortgage servicers in RMBS and their business affiliates are under scrutiny by regulators and are part of on-going lawsuits alleging servicers directed businesses to benefit affiliates. For example, the Superintendent of the New York Department of Financial Services has raised "the possibility that management has the opportunity and incentive to make decisions ... that are intended to benefit ... affiliated companies, resulting in harm to borrowers, mortgage investors..." (see Lee (2014) for a discussion).

on asset sales.[6]

This paper is also related to the literature on corporate governance and tunneling (Shleifer and Vishny (1997), Djankov et al. (2008)). Within this literature, there has been relatively less focus on securitized debt due to the data constraints discussed above. Finally, this paper contributes to a large body of work on mortgage-backed securities during the recent crisis. See Gorton and Metrick (2013) for a review of papers for RMBS. Within the CMBS literature, Ghent and Valkanov (2014) and An et al. (2009) investigate whether securitized loans are adversely selected, Stanton and Wallace (2012) studies CMBS subordination levels and ratings. Titman and Tsyplakov (2010), Gan and Mayer (2006), Ambrose et al. (2001), Ashcraft et al. (2014) study other aspects of agency problems in CMBS.

The rest of the paper proceeds as follows. Section 2 provides background of the CMBS market, section 3 describes the data, section 4 lays out the empirical framework, section 5 describes the results. Section 6 discusses alternative interpretations and threats to identification. I conclude in section 7.

# 2 Background

## 2.1 CMBS Structure and Role of Special Servicer

The commercial mortgage-backed securities market is the second most important source of financing in the commercial real estate market, with total debt outstanding of $572 billion (FRB, 2014). At its peak in 2007, annual issuance was $230 billion but since the crisis, annual issuance has been low, ranging between $3 billion in 2009 and $94 billion in 2014 (PREA, 2015). Most of this decline in issuance activity is no doubt related to declines in commercial real estate (CRE) and ABS market conditions. However, as the market has recovered, other CRE debt instruments appear to have expanded relatively more than CMBS, leading to lower market shares for CMBS.[7]

[6] In models with fire sales, the debt capacity of the *seller* could affect asset values (Shleifer and Vishny, 1992, 2011), but not attributes of the intermediary. A related literature studies reputation effects and agency problems amongst intermediaries such as investment banks (Ritter, 2003), floor brokers in the New York Stock Exchange (Battalio et al., 2007) and realtors in housing markets (Levitt and Syverson, 2008; Rutherford et al., 2005) but there is less work on the role of intermediaries for securitized assets.

[7] Total debt outstanding in the CRE market has remained relatively stable ranging from $3.4 trillion in 2008 to $3.3 trillion in 2014 but total debt outstanding for CMBS, collateralized debt obligations (CDO) and other ABS issuers has dropped from 23% of total debt in 2008 to 17% in 2014 (FRB, 2014).

A typical CMBS deal comprises a pool of mortgages collateralized by income-producing commercial real estate property, including apartments, hotels, warehouses and retail property. This pool is then tranched into bonds and sold to bondholders. After securitization, these assets belong to a CMBS trust, with a governance structure that is detailed in a pooling and servicing agreement. As in RMBS, each CMBS trust has a master servicer which services all loans that are current or expected to be recoverable.

If a loan in a CMBS trust is delinquent beyond applicable grace periods (typically 60 days), the servicing of the loan will be transferred to the special servicer. The special servicer acts on behalf of bondholders to exercise the rights of the lender under the mortgage document. Its objective is to maximize the net present value of assets for CMBS bondholders. This includes the right to decide whether to foreclose on the property or to modify the delinquent loan. In contrast to RMBS, special servicers are needed for CMBS because commercial properties require active management in the event the borrower defaults and walks away from the property. Special servicers are appointed by the controlling class holder (usually the most junior tranche in the CMBS structure, commonly known as the B-piece or the equity tranche). B-piece buyers often appoint themselves as special servicers.[8]

Special servicers are often CRE firms with experience in CRE lending. Besides servicing, some firms also originate and buy and sell in CRE debt. These firms need to be rated every year by rating agencies to qualify as special servicers. It is a highly concentrated industry with 5 key players (Berkadia, C-III, CW Capital, LNR, Midland) servicing 73 % of loans (by loan amount) in my data.

Special servicers have grown in importance after the crisis in light of the rise in delinquent loans. CMBS 30-day delinquency rates rose from less than 2% before 2008 to around 9% in 2011 before falling to around 5% in 2014 (PREA, 2015). Loans in special servicing grew from $5 billion dollars in 2007 (0.5% of CMBS loans) to $90 billion dollars (12%) in 2012 before falling to $70 billion dollars (10%) in 2013 (Morningstar, 2013). Special servicers liquidated approximately $65 billion in loans that lost a total of $28 billion between 2008 and 2013 (O'Callahan, 2013).

This paper studies the liquidation behavior of special servicers. When a non-performing loan is transferred to its special servicer, the special servicer decides whether to negotiate with the borrower to modify the loan or to foreclose on the loan. If it decides to foreclose, the special

[8] See Gan and Mayer (2006); Ashcraft et al. (2014) for studies related to this issue.

servicer puts the foreclosed property up for sale (usually in a foreclosure auction).[9] This paper studies the liquidation behavior of special servicers. When a non-performing loan is transferred to its special servicer, the special servicer decides whether to negotiate with the borrower to modify the loan or to foreclose on the loan. If it decides to foreclose, the special servicer puts the foreclosed property up for sale (usually in a foreclosure auction).[10]

Foreclosures and liquidations are quite common compared to other resolutions for distressed securitized loans. Agarwal et al. (2011) reports that amongst private label securitized residential loans that have been non-performing for 12 months, 56% are in foreclosure or have been liquidated, 24% have been renegotiated and 20% remain non-performing with no action taken yet. Since each liquidation is effectively a sale of the underlying collateral (non-residential property), the buyer and seller of this transaction is recorded on county records, as most real estate transactions are. Section 3 provides more details on how I trace the recorded buyer to affiliates of the special servicer.

Figure 1 shows that liquidation trends appear to be correlated with market conditions. When commercial real estate prices are high (dashed line), there is naturally less liquidation as not many loans are distressed. The solid line shows annual liquidation values remain below $2 billion through early 2009 in my data. As commercial real estate prices plummeted between late 2007 and 2009, total liquidation remains low. Special servicers (in fact, most lenders) were more likely to extend the maturity date of distressed loans during the most recent crisis instead of liquidating at fire sale prices. After 2009, the total value of liquidation increases as more loans are liquidated and at higher prices, coinciding with the uptick in commercial real estate prices.

## 2.2 Change of ownership amongst special servicers

I study the following four events: The transfer of ownership for Berkadia (December 2009), C-III (March 2010), LNR (July 2010) and CW Capital (September 2010). These firms were four of the five major special servicers before the crisis. Their balance sheets were heavily-ladened with junior tranches of CMBS bonds (B-pieces) as well as Collateralized Debt Obligations (CDO's)

[9] In CMBS, liquidations of distressed mortgages typically also involve the sale of properties. Technically, special servicers have control rights to sell distressed *mortgages* in the CMBS portfolio. However, these mortgages are collateralized by commercial real estate properties, giving special servicers the right to foreclose and sell the properties in the commercial real estate market.

[10] In CMBS, liquidations of distressed mortgages typically also involve the sale of properties. Technically, special servicers have control rights to sell distressed *mortgages* in the CMBS portfolio. However, these mortgages are collateralized by commercial real estate properties, giving special servicers the right to foreclose and sell the properties in the commercial real estate market.

that plummeted in value when CMBS spreads widened dramatically after November 2008. Soon after, they required capital infusion because they were levered. The fifth major special servicer, Midland, was part of PNC bank and did not require capital infusion from outside investors.

There are several ways the change in ownership can affect the liquidation behavior of special servicers. First, special servicers may directly purchase the foreclosed property by exercising a *fair value option*. This option allows the special servicer to purchase any foreclosed property in the CMBS trust at the fair value. Most Pooling and Servicing Agreements give quite a lot of control to special servicers in the determination of the fair value. This option introduces a conflict of interest because special servicers (as *sellers* of CMBS assets on behalf of bondholders) should set the fair value to maximize the net present value of CMBS assets whilst their owners (as *buyers*) have an incentive to purchase distressed assets at a lower price.

Second, the special servicer could direct ancillary services (such as brokerage and lending services) associated with the liquidation to its affiliates and earn fees for these services. Many special servicers are part of vertically integrated firms that provide bundles of CRE services. In some ways, special servicing is complementary to these other businesses as some special servicers promote themselves as a one-stop-shop for CRE services. For example, Andrew Farkas, Chairman and CEO of Island Capital compared his acquisition and growth strategy of C-III to his previous firm, Insignia, which he founded in 1990 during the previous CRE crisis and grew to become one of the largest owners, operators and service providers of real estate: "The creation of C-III represents the adaptation and implementation of the Insignia strategic and operating model to the present environment. Back in 1990 we started acquiring real estate oriented equity derivatives and building a property and asset management business to service the assets controlled by the derivatives. With C-III we are seeking to acquire real estate oriented debt derivatives and to build special servicing and ancillary businesses to manage those." (Cohen, 2010)

In addition to directly benefiting from the liquidation process, the change in ownership could also lead to changes in liquidation outcomes because the new owners could have different return expectations than the previous owners. This difference in management expectations could affect how special servicers generate fees and structure workouts and liquidations.

These events raised concerns amongst CMBS participants. For example, Standard and Poor issued a comment on these events in March 2012 that stated that "... combined with several ownership changes pertaining to some of the largest commercial mortgage servicers, the rise in special servicing activity has drawn increased market focus on potential conflicts of interests, several

market participants, including CMBS investors, have expressed concern over special servicers' exercising "fair market value" purchase options, their use of affiliates, and the practice of charging additional fees in connection with loan restructurings." (Steward et al., 2012). See also Lancaster et al. (2012), Wheeler (2012), Berger (2012) for related commentary on potential agency conflicts.

# 3 Data

The main loan-level dataset was obtained from Realpoint (since owned by Morningstar) in November 2010. It is similar to the data provided by Trepp that has been used in the CMBS literature. This dataset includes the universe of all securitized loans. The appendix provides more details of the sample construction. After dropping government and international CMBS deals, the final sample includes 121,627 securitized loans.

The Realpoint dataset includes loan attributes at origination (such as the loan to value ratio (LTV), the loan amount, the loan term, the origination date, the master servicer, and the special servicer), details about the collateral (such as the property type, age and the street address of the property). There are 4 treated special servicers and 31 special servicers in the control group (Midland is the largest placebo special servicer). In addition to the attributes above, some loan attributes are updated every month (such as current LTV, current balance). I use these variables to construct post trends for treated and control group special servicers. Table 1 reports the summary statistics for the sample.

Crucially, Realpoint also publishes a realized loss summary that includes all securitized loans that have been liquidated each month, between September 1997 and November 2012. The final estimation sample includes 11,332 loans. One common data constraint in the CRE context is the small sample size. Since CRE properties are expensive, there are few transactions each year. For example, the sample of 11,332 liquidated loans is small compared to the residential context where millions of homes were foreclosed in a similar timeframe, but the total value of these liquidated CMBS loans (close to $60 billion in my sample) remains sizable.

*Property level analysis*

One benefit of studying securitized real estate assets is that we can trace the chain of ownership for the liquidated mortgages because each liquidation is essentially a sale of the collateral underlying the mortgages (non-residential properties) and most real estate transactions are recorded publicly.

The goal of the analysis is to link the CMBS dataset of liquidated loans to property transactions to identify affiliates of special servicers that bought foreclosed properties liquidated by the same special servicer. I use two databases of property transactions, CoStar and Real Capital Analytics. Both databases include information such as the transaction price, transaction date, address as well as the identity of the buyer, seller, broker and lender. These databases focus on large CRE transactions (typically greater than $2.5 million) but also report most transactions affiliated with CMBS since information for CMBS property transactions is easier to find compared to private CRE transactions.

The process of merging loan transactions in the CMBS dataset with property transactions for non-residential properties is quite time consuming. I restrict my analysis to liquidations by one of the four treated special servicers, C-III (which changed owners in March 2010). I chose this special servicer because regressions by special servicer indicate that the patterns are most robust for this special servicer. The sample for the property-level analysis includes 1,074 properties that were liquidated from 2010 to 2012 by C-III.

I begin by handmatching properties liquidated by C-III (in the CMBS data) with property transactions in CoStar and Real Capital Analytics (to match properties associated with liquidated loans with property transactions). Since both property databases are proprietary, each property address for the 1,074 properties had to be entered individually into these databases. This process was time consuming because most CRE properties have addresses that are not standardized and they also have relatively larger footprints compared to single family homes (latitudes and longitudes for the same property in different databases are unlikely to be identical making it hard to match properties using mapping software).

Most CRE transactions are structured so that buyers are limited liability companies (LLC). For example, the buyer for an apartment complex, Cherry Grove, is recorded publicly as RFI Cherry Grove LLC. Oftentimes, the address of the LLC's can be linked to the true owner. For example, the address for RFI Cherry Grove LLC is written in the deed as "RFI Cherry Grove LLC, c/o C-III Acquisitions LLC, 717 Fifth Avenue in New York". Another commonly used address by C-III affiliates is 5221 North O'Connor Blvd, Suite 600, Irving, Texas. CoStar and Real Capital Analytics also utilize other resources (including having their analyst call brokers and owners) to identify the true seller and buyer of each transaction. For transactions that were identified as being bought by C-III, I also obtained deeds of sale to confirm that the buyer is affiliated with C-III.

Finally, Real Capital Analytics also reports the broker and lender of each transaction, whenever

available. I searched for all transactions during this period that used an affiliate of C-III as the lender or the broker. Then, these transactions were hand-matched to the set of liquidated CMBS assets.

# 4 Empirical framework

The goal of the empirical analysis is to estimate the causal effects of the change in ownership. This is motivated by concerns raised at the end of section 2 that the change in ownership for the four special servicers increased agency conflicts, potentially leading to losses for bondholders.

I focus on liquidation behavior because most of the concerns relate to the liquidation of assets by these special servicers. I have two outcomes that proxy for "quantity" and "price" effects, respectively. The first liquidation outcome is $log(\textit{total balance of liquidated loans}_{it})$ which is calculated by aggregating over the current loan balance (before losses) for all loans liquidated by special servicer $i$ in month $t$. This measures the dollar amount of loans liquidated, using the most current loan balance, instead of the liquidation value. Using the liquidation value would conflate both the price of the liquidated asset (which could be endogenously set by special servicers) and the quantity of loans liquidated by the special servicer in a month.

The second liquidation outcome is the $\textit{average loss rate}_{it}$ for special servicer $i$ in month $t$ where the loss rate for a liquidated loan, $l$, is calculated as the realized loss for loan $l$ (reported in the CMBS data) divided by the balance before loss for loan $l$, then, averaged over all loans that were liquidated by special servicer $i$ in month $t$. This measure captures the severity of losses suffered by bondholders as a result of liquidations by a special servicer in a month.

My research design is an event study that compares liquidation outcomes for special servicers in the months before and after they were sold.

$$y_{it} = \alpha + \beta POST_{it} + f(Months_{it}, \delta) + \gamma X_i + \varepsilon_{it} \tag{1}$$

where $y_{it}$ is the outcome for special servicer $i$ in month $t$, $POST_{it}$ is 1 if month $t$ is after special servicer $i$ was sold, $f(Months_{it})$ is a quadratic time trend (centered around the event date for special servicer $i$), $X_i$ includes pre-event controls at the special servicer level and $\varepsilon_{it}$ is an idiosyncratic error term.

The parameter of interest is $\beta$ which tests whether outcomes change discontinuously after spe-

cial servicers changed owners compared to the months before. To interpret the change in ownership as proxying for a sharp change in the likelihood of self-dealing conflicts requires the following assumptions. First, there was little potential for self-dealing before the crisis because very little CMBS debt was distressed and liquidated (Figure 1). Second, the new owners are buyers of CRE assets. In other words, the events represent a sharp change in the likelihood of self-dealing because the change in ownership linked potential buyers with major sellers. Moreover, media and analyst reports of several high-profile connected transactions also increased investors' concerns over self-dealing conflicts. At the same time, special servicers in the placebo group did not experience a sharp change in demand for CMBS debt (liquidated by them) around the event dates because there was no change in ownership and the major special servicer in the placebo group (Midland) is not an active buyer of CRE assets. The appendix provides more details on who the new owners are.

The key identification assumption is that other unobserved determinants of $y_{it}$ did not change discontinuously around the event date, conditional on the time trends and the controls. The main empirical challenge is the rapidly changing economic environment. As discussed in section 2, these events happened around the time of the real estate crisis. The concern is omitted variables (such as economic conditions) were also changing sharply around the event dates. Figure 1 shows that commercial real estate values declined from 2007 and bottomed out around 2010 followed by a robust recovery. More importantly, it also shows that liquidation values appear to be correlated with market conditions.

To address this, I repeat the analysis in equation (1) using special servicers that were not sold during the sample period as the placebo group, where the placebo event date is July 2010 (the date for LNR, which is in the middle of the four event dates). I also use other placebo dates (see section 6). If $\beta$ is confounded by discontinuous changes in general economic conditions, then, event studies for the placebo group should also show discontinuous changes around these dates.

A second concern is that treated and placebo group special servicers are not comparable because loans are not randomly assigned across special servicers. To address this, I first test whether loans serviced by both groups are similar, using at-origination loan attributes (determined before the change in ownership). This balance check is performed at the loan level and includes all current loans in the dataset by all special servicers. Each row in Table 2 reports results from an OLS regression with $X_{il}$ (the attribute at origination for loan $l$ serviced by special servicer $i$) as the dependent variable and a dummy that is 1 if special servicer $i$ is a treated special servicer. Columns 1 to 3 compare treated special servicers against non-treated special servicers. Columns 4 to 6 com-

pare treated special servicers against Midland. This addresses the concern that special servicers in the control group (other than Midland) are not comparable in size and stature to treated special servicers since Midland is also one of the top five special servicers.

Columns 1 to 3 show that treated and control group special servicers have loans with similar loan quality but some slight differences in loan composition. Notably, the loan-to-value (LTV) ratio and the debt service coverage ratio (DSCR)–two important loan attributes commonly used to underwrite loan quality–are not statistically different. Another variable commonly used to predict CMBS loan performance (a dummy for loans originated between 2005 and 2007) is also not statistically different. However, loans serviced by special servicers are more likely to have larger loan balances, have balloon payments, are more likely to have fixed interest rates, and are more likely to belong to hotel, office or retail property types (the last three attributes are likely correlated because the property types are mutually exclusive).

Columns 4 to 6 show the same loan attributes are more comparable between treated special servicers versus Midland. The cutoff loan balance is no longer different and the coefficients for other differences mentioned above are smaller in magnitude. Most coefficients that are statistically significant are around a fifth of the magnitude of the mean (Table 1), except the coefficient on apartment property type which is a third of the mean. I perform two checks to address the threat that results could be different between treated and control group special servicers due to these differences in loan compositions. First, I repeat the event study with Midland as the only special servicer in the placebo group and the results are similar. Second, I control for these loan attributes. If the results for the treatment and placebo group are driven by compositional differences, then adding these controls should matter.

I next show that loan quality also did not appear to change differentially *over time* for treated versus control groups. This is a more important balance test because $\beta$ is identified by time series variation and this test addresses the concern that liquidation outcomes changed differently for both groups of special servicers because their underlying loan quality changed differentially over time. However, I do not control for current LTV and current DSCR when estimating equation (1) as these attributes are not pre-determined. Instead, I control for loan compositions by including measures of at-origination loan attributes, determined before the ownership changes.

Figure 2 shows that monthly LTV's and DSCR's appear to be parallel between treatment and all control group special servicers (left panel) and between treated special servicers versus Midland (the two figures on the right). The ranges for the vertical axes for current LTV (55 to 63) and DSCR

(1.3 to 1.5) are quite narrow, about half of the standard deviation of issuance LTV (14) and half of the standard deviation of issuance DSCR (0.5), respectively. This analysis uses data on current loan attributes that was collected monthly between December 2010 and November 2012 (there is no pre-data for current loan attributes).

To control for loan compositions, some specifications include pre-determined controls for the portfolio of loans managed by special servicers. The list of controls includes averages of at-origination loan attributes for special servicers, including the debt service coverage ratio (DSCR), loan-to-value (LTV), loan balance, share of loans that have a balloon payment, share of loans that have a fixed interest rate, share of loans originated between 2005 and 2007, share of loans collateralized by hotels, industrial properties, apartments, offices, retail properties, average number of properties in a loan, share of loans with multiple properties, average property age and its squared.[11] For the regression with treated special servicers, since I only have 4 special servicers, I control for special servicer fixed effects, instead of controlling for all the loan attributes above. Special servicer fixed effects control non-parametrically for fixed special servicer quality.

My analysis aggregates the loan level data to the special servicer-month level following the best practice guidelines in Cameron et al. (2008), Bertrand et al. (2004), Donald and Lang (2007), to address concerns of over-rejection. Since the data has been aggregated to the special servicer-month level, there is less concern about correlations within clusters. Nevertheless, I report inferences without clusters and with clustering at the special servicer level for completeness. I first report standard errors in parentheses with no clustering. Second, I report p-values in brackets where standard errors have been clustered at the special servicer level. Since there are fewer than 50 special servicers, standard errors are bootstrapped using the Wild bootstrap method, following Cameron et al. (2008). For the analysis including the four treated special servicers only, I employ the Wild Webb bootstrap (Webb, 2014) which is recommended for cases with fewer than ten clusters. I used 10,000 replications for the bootstrap. Following Donald and Lang (2007) and Cameron et al. (2008), I also tried clustering the aggregated data over months. The conclusions are similar if I cluster over months and the p-values are generally smaller.

To summarize, the consensus in the literature is to aggregate the data to the special servicer-

[11] This list of loan attributes covers most controls used in loan-level analyses in the CMBS literature (see Ghent and Valkanov (2014) for an example), whenever the attributes used in the literature are available and appropriate for this context. The share of loans originated between 2005 and 2007 indicate the three vintages of CMBS issuances that are regarded to have relatively worse loan quality because they were originated right before the crisis with record high issuance volumes during those years.

month level since the treatment (ownership change) is at the special servicer level. After aggregating, there are three common options used in the literature for standard errors: no clustering, clustering on special servicers and clustering over time. I report the first two as they are more conservative. I also did the third and find similar results with smaller p-values.

# 5 Main results

## 5.1 Main results

Table 3 reports results for the amount liquidated by special servicers in a month. Column 1 includes treated special servicers only and includes all months in the data. Column 2 restricts the analysis to within 36 months of the event dates and column 3 adds special servicer fixed effects. Columns 4 to 6 repeat the same for placebo group special servicers, assuming the placebo event date is July 2010. Column 6 controls for pre-determined attributes for loans managed by special servicers.

Column 1 shows that after the special servicers were sold, they liquidate 187% more than the amount liquidated the months before. This effect is smaller (123%) when I restrict to the narrower event window which drops all months that are more than 3 years before or after the event date (column 2). The post minus pre difference is smaller in column 2 because we drop the pre-event months (between 1997 and 2006) when there was very little liquidation. After adding special servicer fixed effects in column 3, the estimate falls slightly to 116% but is not statistically different from the estimate in column 2. This 116% effect translates to $53m more liquidations per month per special servicer, using the $46m average amount liquidated per month per special servicer before the events. These effects are all statistically significant at the 1% level (without clustering) and at the 5% level (with clustering).

Importantly, the placebo tests show that special servicers that were not sold did not liquidate significantly more after July 2010 (the results are similar using other placebo dates). The results are significant in column 4 but become insignificant once we restrict the sample to the narrower window. This suggests that the findings in columns 1 to 3 are not due to changes in general economic conditions that are common to special servicers in the treatment and control groups. I also repeated the same placebo test, but only using Midland. The results (available upon request) are similar.

Table 4 reports results for the average loss rate (realized losses divided by the balance before

losses). This measures the performance of the liquidated assets, accounting for loss severity. This outcome is important because even if treated special servicers liquidated more after they were sold, bond investors could still be better off if these liquidations resulted in smaller losses.

The results show that the greater liquidations discussed above are accompanied also by greater losses for bondholders. Column 1 shows that the average loss rate is 13.5 percentage points (p.p.) higher in the months after the change in ownership compared to the months before. The p-values are 0.08% (without clustering) and 4.3% (with clustering using the Wild Webb bootstrap for samples with fewer than 10 clusters). Column 2 restricts the sample to a narrower event window. This drops liquidations before 2006 which produces a coefficient that is slightly smaller in magnitude but not statistically different from column 1. Now, the average loss rate is 11.3 p.p. greater after the change in ownership (the p-values are 0.7% without clustering and 6% with clustering). Adding special servicer fixed effects in column 3 does not change the result much but the p-values are larger. The effect is 11 p.p. instead of 11.3 p.p. (the p-values are 0.6% without clustering and 10.5% with clustering). This is close to 34% of the pre-event mean (32%). An 11 p.p. higher loss rate translates into additional losses of $3.2 billion in aggregate.[12] As a benchmark, special servicers liquidated approximately $65 billion in loans that lost a total of $28 billion between 2008 and 2013 (O'Callahan, 2013). Again, there is no significant change for the placebo group once we restrict to the narrower event window.

## 5.2 Discussion of main results

The preceding analysis shows that special servicers that were sold liquidated more CMBS loans and with higher average loss rates. The effect on loss rates is notable as it represents sizable losses to bondholders and is consistent with their concerns over the changes in ownership. As discussed in the introduction, there are two ways the change in ownership could lead to lower liquidation values (greater losses) for bondholders. First, there is the direct *self-dealing* effect whereby special servicers sell liquidated assets at discounted prices to new owners. Second, there is the indirect *adverse selection* effect where assets sold by treated special servicers are priced at a discount after the change in ownership because of concerns that assets sold to unaffiliated buyers are adversely selected compared to assets sold to affiliated buyers. This sub-section discusses these two channels and related implications.

[12] Calculated by multiplying the 11 p.p. increase in the average loss rate by the total loan balance before losses for all liquidated loans after the event ($29b).

### 5.2.1 Adverse selection concerns and broader implications

Figure 3 provides suggestive evidence that adverse selection concerns have had real effects on CMBS issuance activity. This figure plots the issuance volume (in billions of dollars) and market shares for special servicers, by year of issuance. Two striking patterns emerge from this figure. First, annual CMBS issuance volumes have plummeted after the crisis. The first three bars represent the years of peak annual issuances (2005 to 2007) right before the crisis. The last three bars show recent issuances from 2011 to 2013 (issuances for 2008 to 2010 were small, ranging between $3 billion and $12 billion). As the CRE market recovers, the CMBS market has also lost market share relative to other CRE debt instruments (see footnote 7). Part of this decline could be due to uncertainty in ABS markets and high CMBS spreads. However, major investors have also remarked that reducing agency conflicts and improving trust amongst bondholders is central to the recovery of the CMBS market (see footnote 4).

Second, treated special servicers have lost market share. The first bar shows a total of $169 billion dollars of CMBS was issued in 2005. The numbers in the bar provide a breakdown of market shares across special servicers. Amongst CMBS deals issued in 2005, the market shares for the top-five special servicers were 10% (Berkadia), 8% (C-III), 8% (CW Capital), 25% (LNR) and 15% (Midland). The box at the bottom is the market share for other special servicers. Total market shares for treated special servicers (Berkadia, C-III, CW Capital and LNR) are represented with a bold border and market shares for the placebo group (Midland and other special servicers) are at the bottom of each bar with no bold border.

The pattern of treated special servicers commanding more than half of the market share persists through 2007, but is notably different for issuances after the crisis (the size of the bolded box is smaller). By contrast, the market share of Midland appears to have grown. Discussions with industry participants suggest that Midland has the reputation of being a neutral special servicer because it has no proprietary investment activity. While these are short run patterns only, they are consistent with the interpretation that investors' concerns with agency conflicts and adverse selection amongst treated special servicers could lead to real effects on broader investment activity.

Policy makers and researchers have so far focused on adverse selection concerns *before* securitization. For example, the risk retention rule proposed in Section 941 of the Dodd-Frank Act calls for the implementation of credit risk retention requirements in ABS. The rule requires the securitizer of eligible ABS to retain not less than five percent of the credit risk of the assets collateralizing the ABS. The idea is that risk retention would address concerns that securitized loans

are adversely selected compared to non-securitized assets. In this context, the CMBS governance structure provides a unique lens because most ABS structures do not have risk retention rules but risk retention is common in CMBS.

While the rule targets adverse selection before securitization, one unintended consequence is that it could enhance adverse selection concerns *after* securitization. The high costs of the risk retention requirements could limit competition from small issuers and servicers (Geithner, 2011). As the number of players in the securities market declines, the likelihood of self-dealing conflicts increases because the servicers that remain are likely those with ties to major financial institutions. Therefore, there is a higher likelihood that decisions by servicers could be conflicted with those for their business affiliates, further exacerbating self-dealing concerns. The results from the natural experiment of changes in servicer ownership provides suggestive evidence that a sharp increase in the likelihood of agency conflicts amongst treated special servicers raised agency conflict concerns amongst CMBS investors, leading to sizable losses to bondholders.

Adverse selection concerns after securitization are important because a majority of assets in the ABS market are actively managed by intermediaries (such as servicers in RMBS and CMBS and CLO managers). Many of these intermediaries have ties to major financial institutions and may face similar agency conflicts (see footnote 5 for examples of self-dealing concerns raised by regulators and pending lawsuits).

#### 5.2.2 Assessing self-dealing at the property transactions level

This sub-section directly measures the number of property transactions that connect special servicers with their affiliates. The data identifies whether special servicers directed transactions of liquidated CRE mortgages to affiliated buyers, lenders and brokers. The objective of this exercise is to quantify the extent of self-dealing transactions and whether they can explain the patterns above. This exercise abstracts away from efficiency considerations. For example, self-dealing transactions can improve efficiency and benefit bondholders in a setting where there are no bidders for liquidated assets, except affiliates of special servicers. As discussed in section 3, I only focus on the sub-sample of liquidations by C-III.

There are eighteen property transactions, valued at $300 million between March 2011 and 2012 that are affiliated with C-III. Table 5 lists these properties. Panel A lists the properties that were bought by C-III. Column 1 indicates the property, column 2 lists the transaction price, column 3 calculates the counterfactual price using the 11 p.p. change in loss rate estimated in column 3 of

Table 4. This assumes the counterfactual price will deliver a loss rate that is 11 p.p. lower than the actual loss rate.[13] Column 4 calculates the benefit to C-III which is the savings from paying a lower transaction price instead of the (higher) counterfactual price. Column 5 calculates the equity multiple (the total benefit divided by the total equity for properties that were bought by C-III).

Of these eighteen transactions that are affiliated with C-III, Panel A lists the fourteen properties (valued at $171 million) that were bought by C-III.[14] The total benefit is $38 million. In addition, Panel B lists 3 transactions (with total loan amounts of $98.4 million and a total transaction value of $125 million) where C-III was the lender. Assuming a 1% lender fee (based on conversations with industry participants) would deliver total lender fees of $984,000. Finally, Panel C lists 3 properties where C-III was the broker (transaction value of $32.55 million). Assuming a 2% broker fee would deliver total fee revenues of $426,000.

Overall, the estimated total benefits are $39 million with an average equity multiple of 1.6. This is 39% of the equity cost to purchase C-III ($100 million) and 38% of the estimated total special servicing revenue for C-III during the same period ($102 million).[15] This calculation ignores other sources of fees from special servicing (such as workout fees and liquidation fees).

These transactions have been disclosed by C-III. They are also subject to monitoring by rating agencies. According to a report by a rating agency, Morningstar: "C-III, in our view, has effective control practices for managing conflicts of interest relative to using third party affiliates ... in the cases in which it exercised a purchase option or used an affiliate entity to liquidate an asset, we believe that C-IIIs involvement and purchase of the assets using affiliates may have actually benefited the trust by minimizing losses. Furthermore, C-III noted that it proactively supplies each rating agency with a listing of all transactions involving an affiliate exercising a fair value loan

[13] To solve for the counterfactual price, $P'$, as a function of the actual transaction price, $P^*$, and the loss rate, $L$, I first solve for the initial price ($P_0$) as a function of $P^*$ and $L$, using $L = \frac{P^*-P_0}{P_0} \Rightarrow P_0 = \frac{P^*}{(1-L)}$. The counterfactual price is the price that delivers the counterfactual loss rate ($L+0.11$), where $L < 0$. Therefore, I set $P'$ such that $\frac{P'-P_0}{P_0} = L+0.11$, which implies that $P' = (1-L+0.11) * P_0 = (\frac{1-L+0.11}{1-L})P^*$. When the actual loss rate is not available, I use the average post event loss rate for C-III (51%).

[14] Six of these properties are part of a portfolio sale.

[15] C-III was purchased in March 2010 for a total cost of $280 million, with new equity of $100 million and assumed debt of $180 million. During that time, Centerline was the named special servicer for $110 billion of CMBS debt (Heschmeyer, 2010). To calculate the special servicing revenue during March 2010-2012, I used the estimate of 25 basis points of the specially serviced portfolio (based on a few examples of pooling and servicing agreements) and the amount of loans in special servicing during this time period. According to Fox and Miller (2013), the total unpaid principal balances of loans that C-III was actively special servicing was $14.2 billion (2010), $18.57 billion (2011) and $11.6 billion (2012). Based on the 25 basis points estimate, the total revenue from special servicing during March 2010 through end of 2012 is $102 million.

purchase option or REO purchase as well as a listing of all transactions in which the affiliated brokerage company was involved." (Chamberlain and Merriam, 2011)

The preceding analysis has several caveats. First, I do not have loss rates for the property, but only loss rates for securitized loans. Presumably, loss rates for the property would be greater since the equity and some subordinated debt could be wiped out during the liquidation process. A higher loss rate would increase the counterfactual price and benefit. Second, the loss rate I assumed for properties with missing loss rates (51%) could be too high. Assuming a loss rate of 25% would translate into total benefits of $30 million.[16]

# 6 Alternative interpretations

The preceding analysis shows that special servicers that changed owners liquidated more and had higher loss rates after the change in ownership. These patterns are consistent with investors' concerns that the change in ownership could have hurt bondholders. However, measures of direct self-dealing cannot fully explain these patterns. Rather, adverse selection associated with self-dealing conflicts is consistent with the higher loss rates. This section examines alternative interpretations.

*Unmeasured connections and tunneling benefits*

There could be other tunneling benefits that are not measured above, such as other affiliates used during the liquidation process (not just lenders and brokers). There could also be sales to affiliates that are not directly related to the special servicer.[17] A broder definition of affiliates could increase the estimate of tunneling benefits.

[16] I obtained the 25% benchmark from the following rating agency report: "C-III stated that between January 2010 and June 2011, it purchased four REO assets from the trusts through its affiliate and paid at least market value for those assets as established by an independent third party... The company noted that the overall realized loss to the trust on the multifamily REO purchase in 2010 was 24.8%, compared to C-IIIs overall realized loss of 72.0% on all REO dispositions." (Morningstar, 2011)

[17] An example was reported in Yoon (2012). In October 2011, two properties serviced by C-III suffered losses of 86% and 89% from a discounted payoff from the borrower that was approved by C-III. Soon after, C-III announced a strategic investment in the brokerage company, of which the borrower was the Chairman. This constitutes a relationship between the servicer and the borrower (the buyer of the discounted payoff), but is not measured in the property-level analysis because there was no formal affiliation between the servicer and the borrower.

This paper focuses only on liquidations. There are other methods of resolution for non-performing loans that could direct benefits to affiliates, but I focused on liquidations as most of the concerns were related to liquidations of distressed CRE mortgages to affiliated buyers. Furthermore, the recording of sales of liquidated CMBS properties allows me to directly link sellers with buyers.

*Different availability of time amongst management*

Another way treated special servicers could be different from placebo special servicers is that treated special servicers were sold because they themselves were in distress. This could mean that before their sale, these special servicers were pre-occupied with their own problems, but, after their sale, the capital infusion from the new owners allowed them to hire more staff and spend more time servicing their portfolio. This change in the availability of time amongst management could result in more liquidation, but should not result in larger losses for bondholders.

*Changes in management practices and beliefs*

In addition, changes in management practices could also explain changes in liquidation patterns and loss rates. The new management may have different returns expectations or beliefs about future market trends which would lead them to structure liquidations differently.

Even though the special servicers changed owners, the contract between bondholders and special servicers stayed the same. The responsibility of the special servicer is to maximize the net present value for bondholders, regardless of who their owners are. The sizable losses as a result of the change in ownership remains notable and consistent with bondholders' concerns about the change in ownership.

*Timing of liquidation and the number of post-event months*

As discussed above, this analysis focuses on liquidations but there could be effects on loans that are non-performing but have yet to be liquidated. Here, the timing of liquidation may matter. A related concern is that the higher average loss rates after the changes in ownership arises not because of adverse selection and self-dealing concerns that change sharply around the event date but because treated special servicers liquidate the worst loans first and the better loans later and I only have at most three years after the first ownership change (December 2009). Perhaps, over a longer horizon, the post versus pre average loss rates would be similar.

However, this is unlikely to be the main driver of the difference in loss rate. First, three years is quite long compared to the reported REO hold time of 12 months for 2012 (Heschmeyer, 2014).

Second, it is unlikely that the entire 11 p.p. difference in average loss rate will disappear if I observe a longer time period in which treated special servicers start to liquidate the higher quality loans. This is because the longer they wait to liquidate these loans, the greater the carrying cost they accumulate which increases the post-event loss rates further instead of decreasing it. Therefore, it is unlikely that average post-event loss rates will be much smaller if I had more post-event months.

*Other placebo dates*

I repeat the placebo analysis using the C-III or Berkadia event dates (March 2010, December 2009) instead of July 2010 and the results are similar.

# 7 Conclusion

This paper uses a natural experiment that involved a sharp change in agency conflicts in the CMBS market. I study four events that resulted in the change in ownership of CMBS special servicers who are in charge of liquidating distressed CMBS assets on behalf of bondholders. These events were highly controversial in the industry and led to concerns of tunneling and self-dealing because investors raised the possibility that special servicers could sell distressed CMBS properties at lower prices to their new owners (direct self-dealing effect) or sell adversely selected properties to unaffiliated buyers (indirect adverse selection effect), at the expense of bondholders.

I find that special servicers that changed owners liquidate 116% more ($53 million more per month per special servicer) after their sale compared to the months before. Average loss rates are 11 percentage points greater (as a share of loan balance before loss), translating into additional aggregate losses of $3.2 billion during this period. I do not find the same pattern for the placebo group.

To further quantify to what extent tunneling can explain these patterns, I supplement the main regression analysis with a case study that directly identifies sellers, buyers, lenders and brokers for a sub-sample of transactions. My analysis shows that tunneling (as measured in this paper) can only explain part of the patterns above, lending further support to the adverse selection and trust concerns raised above. I discuss alternative interpretations, including unmeasured tunneling benefits and changes in management practice.

These findings have broader implications beyond the CMBS market. First, actual and perceptions of conflict of interest could have real economic consequences through a reduction in trust

(Guiso et al., 2008). I provide suggestive evidence that these ownership transfers of special servicers have reduced trust in the CMBS market, accompanied with real effects on CMBS activity. Treated special servicers have lost their market shares while a major special servicer in the placebo group has gained market share.

These findings provide policy lessons beyond CMBS. My results illustrate how risk retention rules intended to address adverse selection before securitization could have unintended consequences on adverse selection *after* securitization. The rule could reduce competition amongst securitizers because the risk retention requirement may be too costly for small securitizers. My results highlight adverse selection and self-dealing concerns amongst intermediaries who manage ABS assets on behalf of bondholders. These concerns will likely be exacerbated as the market becomes more concentrated because the perception and likelihood of self-dealing increases when there are only a few players in the market. Therefore, policies that mandate significant risk retention in the ABS market could have unintended consequences by further limiting competition.

In future work, it would be interesting to study other mechanisms that could explain changes in liquidation patterns. It would also be interesting to analyze how perceptions of conflicts of interest could lead to a lack of trust in securitized markets and whether disclosures of conflicts can mitigate this problem.

# References


**Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, and Douglas D. Evanoff**, "The Role of Securitization in Mortgage Renegotiation," *Journal of Financial Economics*, 2011, *102*, 559–578.

**Akerlof, George A.**, "The Market for "Lemons": Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics*, 1970, *84* (3), 488–500.

**Ambrose, Brent W., Anthony B. Sanders, and Abdullah Yavas**, "Special Servicers and Adverse Selection in Informed Intermediation: Theory and Evidence," *Working Paper*, 2001.

**An, Xudong, Yongheng Deng, and Stuart A. Gabriel**, "Asymmetric Information, Adverse Selection, and the Pricing of CMBS," *Journal of Financial Economics*, 2009, *100*, 304–325.

**Ashcraft, Adam B., Kunal Gooriah, and Amir Kermani**, "Does Skin-in-the-Game Affect Security Performance? Evidence from the Conduit CMBS Market," *Working Paper*, 2014.

**Atanasov, Vladimir**, "How Much Value can Blockholders Tunnel? Evidence from the Bulgarian Mass Privatization Auctions," *Journal of Financial Economics*, 2005, *76*, 191–234.

**Baek, Jae-Seung, Jun-Koo Kang, and Inmoo Lee**, "Business Groups and Tunneling: Evidence from Private Securities Offerings by Korean Chaebols," *The Journal of Financial*, 2006, *61*, 2415–2449.

**Battalio, Robert, Andrew Fllul, and Robert Jennings**, "Reputation Effects in Trading on the New York Stock Exchange," *The Journal of Finance*, 2007, *62* (3), 1243–1271.

**Benmelech, Efraim, Jennifer Dlugosz, and Victoria Ivashina**, "Securitization without Adverse Selection: The Case of CLOs," *Journal of Financial Economics*, 2012, *106*, 91–113.

**Berger, Stacey M.**, "The New World Order for Special Servicers: Is the Cure Worse Than the Disease?," *CRE Finance World*, 2012, *14* (2), 15–18.

**Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan**, "How Much Should We Trust Differences-in-Diferences Estimates?," *Quarterly Journal of Economics*, 2004, *119*, 249–275.

**Cameron, A Colin, Jonah B Gelbach, and Douglas L Miller**, "Bootstrap-Based Improvements for Inference with Clustered Errors," *The Review of Economics and Statistics*, 2008, *90* (3), 414–427.

**Chamberlain, Mary and Michael S. Merriam**, "Operational Risk Assessment C-III Asset Management LLC October 2011," Technical Report, Morningstar 2011.

**Cheung, Yan-Leung, P. Paghavendra Rau, and Aris Stouraitis**, "Tunneling, Propping, and Expropriation: Evidence from Connected Party Transactions in Hong Kong," *Journal of Financial Economics*, 2006, *82*, 343–386.

**Cohen, Jeffery P.**, "Island Capital Group LLC Annouces Acquisition," *Business Wire*, 08 March 2010. 2010.

**Djankov, Simeon, Rafael La Porta, Florencio Lopez de Silanes, and Andrei Shleifer**, "The Law and Economics of Self-dealing," *Journal of Financial Economics*, 2008, *88* (3), 430–465.

**Donald, Stephen G. and Kevin Lang**, "Inference With Difference-in-Differences and Other Panel Data," *Review of Economics and Statistics*, 2007, *89* (2), 221–233.

**Downing, Chris, Dwight Jaffee, and Nancy Wallace**, "Is the Market for Mortgage-Backed Securities a Market for Lemons?," *The Review of Financial Studies*, 2009, *22* (7), 2457–2494.

**Drucker, Steven and Manju Puri**, "On Loan Sales, Loan Contracting, and Lending Relationships," *The Review of Financial Studies*, 2009, *22* (7).

**Engelberg, Joseph, Pengjie Gao, and Christopher A. Parsons**, "Friends with Money," *Journal of Financial Ecnomics*, 2012, *103*, 169–188.

**Fox, Adam and Howard Miller**, "C-III Asset Management, LLC Servicer Report," Technical Report, Fitch Ratings 2013.

**FRB**, "Financial Accounts of the United States: Flow of Funds, Balance Sheets, and Intergrated Macroeconomic Accounts," *Federal Reserve Statistical Release*, 11 December 2014. 2014.

**Gan, Yingjin Hila and Christopher Mayer**, "Agency Conflicts, Asset Substitution, and Securitization," 2006. NBER Working Paper No.12359.

**Geithner, Timothy F.**, "Macroeconomic Effects of Risk Retention Requirements," 2011. Completed pursuant to Section 946 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

**Ghent, Andra and Rossen Valkanov**, "Comparing Securitized and Balance Sheet Loans: Size Matters," *Working Paper*, 2014.

**Gorton, Gary and Andrew Metrick**, "Securitization," *Handbook of the Economics of Finance*, 2013, *2*, 1–70.

**Gorton, Gary B. and George G. Pennacchi**, "Banks and Loan Sales: Marketing Nonmarketable Assets," *Journal of Monetary Economics*, 1995, *35*, 389–411.

**Guiso, Luigi, Paola Sapienza, and Luigi Zingales**, "Trusting the Stock Market," *The Journal of Finance*, 2008, *63* (6), 2557–2600.

**Heschmeyer, Mark**, "Farkas' Island Capital Leads Centerline Restructuring," *CoStar News*, 10 March 2010. 2010.

_ , "Length of Time to Dispose of CMBS REO Properties Increasing," 2014. Online, accessed at 4-24-2015.

**Ivashina, Victoria**, "Asymmetric Information Effects on Loan Spreads," *Journal of Financial Economics*, 2009, *92* (2), 300–319.

**Jiang, Guohua, Charles M.C. Lee, and Heng Yue**, "Tunneling through Intercorporate Loans: The China Experience," *Journal of Financial Economics*, 2010, *98*, 1–20.

**Keys, Benjamin J., Tanmoy Mukherjee, Amit Seru, and Vikrant Vig**, "Did Securitization Lead to Lax Screening Evidence from Subprime Loans," *The Quarterly Journal of Economics*, 2010, *125* (1), 307–362.

_ **, Tomasz Piskorski, Amit Seru, and Vikrant Vig**, "Mortgage Financing in the Housing Boom and Bust," in Edward L. Glaeser and Todd Sinai, eds., *Housing and the Financial Crisis*, University of Chicago Press, 2013, pp. 143–204.

**Kroszner, Randall S. and Philip E. Strahan**, "Bankers on Boards: Monitoring, Conflicts of Interest, and Lender Liability," *The Journal of Financial Economics*, 2001, *62*, 415–452.

**Lancaster, Brian P., David Brickman, Victor Calanog E.J. Burke, Nelson Hioe, Michael Moran, Thomas F. Nealon III, Steve Kraljic, Jack Taylor, and Doug Tiesi**, "Roundtable: Outlook 2012," *CRE Finance World*, 2012, *14* (1), 6–22.

**Lee, David S. and Thomas Lemieux**, "Regression Discontinuity Designs in Economics," *Journal of Economic Literature*, 2010, *48* (2), 281–355.

**Lee, Pamela**, "Nonbank Specialty Servicers: What's the Big Deal?," *Housing Finance Policy Center Commentary*, 2014, *August*.

**Levitt, Steve and Chad Syverson**, "Market Distortions when Agents are Better Informed: The Value of Information in Real Estate Transactions," *Review of Economics and Statistics*, 2008, *90*, 599–611.

**Maturana, Gonzalo**, "When are Modifications of Securitized Loans Beneficial to Investors?," 2014. Working paper.

**Morningstar**, "Operational Risk Assessment C-III Asset Management LLC October 2011," Available: http://ratingagency.morningstar.com 2011.

__ , "Monthly CMBS Delinquency Report January 2013," Available: http://ratingagency.morningstar.com 2013.

**Myers, Stewart C. and Nicholas S. Majluf**, "Corporate Financing and Investment Decisions when Firms have Information that Investors Do not Have," *Journal of Financial Economics*, 1984, *13* (2), 187–221.

**O'Callahan, John**, "We've Hit the Halfway Point for Vintage CMBS," 2013. Online, accessed at 4-24-2015.

**Piskorski, Tomasz, Amit Seru, and Vikrant Vig**, "Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis," *Journal of Financial Economics*, 2010, *97* (3), 369–397.

**Porta, Rafael La, Florencio Lopez de Silanes, and Guillermo Zamarripa**, "Related Lending," *The Quarterly Journal of Economics*, 2003, *118* (1), 231–268.

**PREA**, "Compendium of Statistics," *Pension Real Estate Association*, 10 February 2015. 2015.

**Ritter, Jay R.**, "Investment Banking and Securities Issuance," in Milton Harris George M. Constantinides and Rene M. Stulz, eds., *Handbook of Economics of Finance*, 1 ed., Elsevier, 2003, chapter 5.

**Rutherford, Ronald C., Thomas M. Springer, and Abdullah Yavas**, "Conflicts between Principals and Agents: Evidence from Residential Brokerage," *Journal of Financial Economics*, 2005, *76*, 627–665.

**Shleifer, Andrei and Rober Vishny**, "Fire Sales in Finance and Macroeconomics," *Journal of Economic Perspectives*, 2011, *25* (1), 29–48.

__ **and Robert W. Vishny**, "Liquidation Values and Debt Capacity: A Market Equilibrium Approach," *The Journal of Finance*, 1992, *47* (4), 1343–1366.

__ **and** __ , "A Survey of Corporate Governance," *The Journal of Finance*, 1997, *52* (2), 737–783.

**Stanton, Richard and Nancy Wallace**, "CMBS Subordination, Ratings Inflation, and Regulatory Capital Arbitrage," *Working Paper*, 2012.

**Steward, Timothy, Mark Goldberg, Thomas Merck, Andrew Foster, Monica Perelmuter, Gary Carrington, and Barbara Hoeltz**, "Standard & Poor's Comments on Potential Conflicts of Interest Within

Commercial Special Servicing Market," Global Credit Portal, Standard & Poor's Financial Services 2012.

**Titman, Sheridan and Sergey Tsyplakov**, "Originator Performance, CMBS Structures, and the Risk of Commercial Mortgages," *Review of Financial Studies*, 2010, *23* (9), 3558–3594.

**Webb, Matthew D.**, "Reworking Wild Bootstrap Based Inference for Clustered Errors," *Queen's Economics Department Working Paper*, 2014, *No. 1315.*

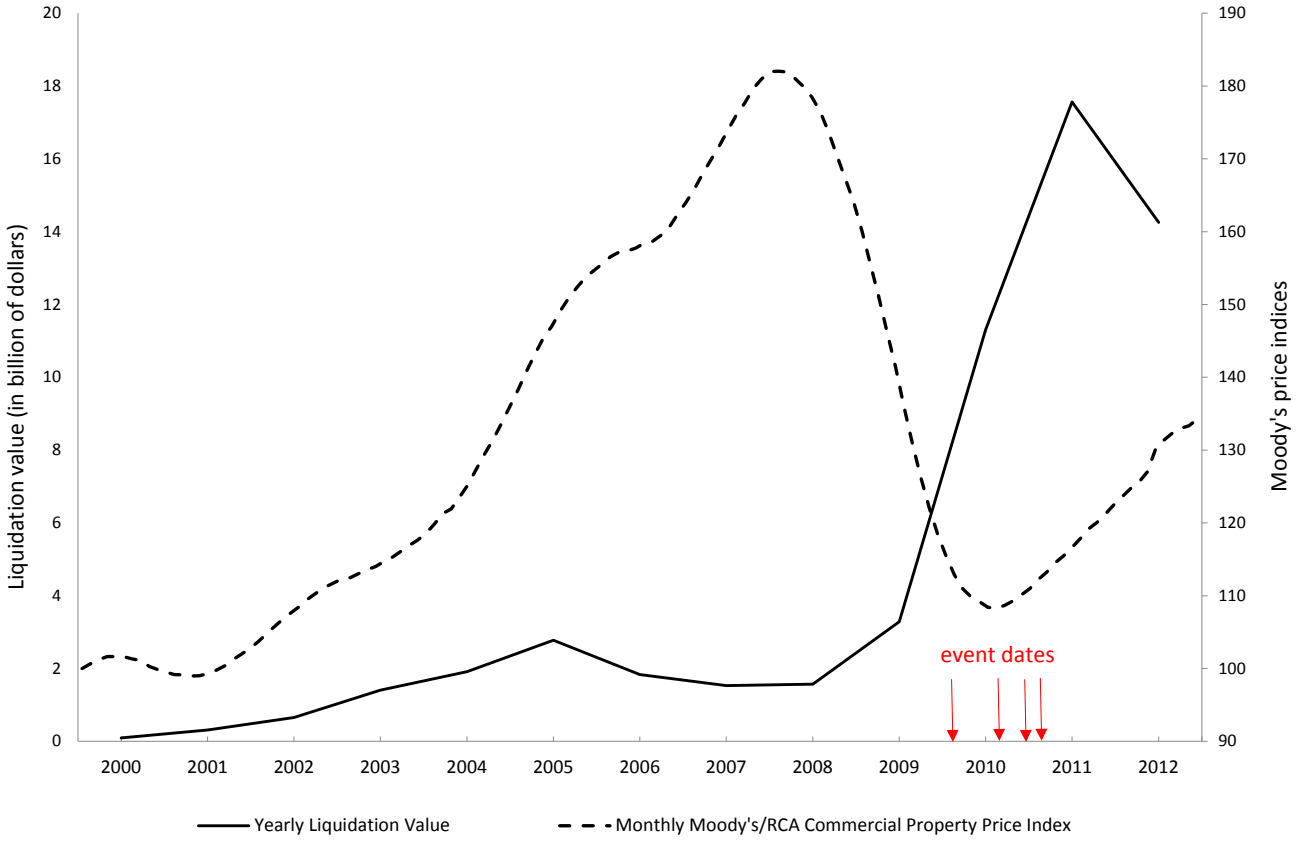
**Wheeler, Darrell**, "CMBS Special Servicer Behavior-As Subordinate Bond Positions Evolve From Investments to Fee Generators or Fair Market Value Options," *CRE Finance World*, 2012, *14* (1), 29–34.

**Yoon, Al**, "Investors Bemoan Lean Results from Workouts," *The Wall Street Journal*, 29 May 2012. 2012.

**Zingales, Luigi**, "Does Finance Benefit Society?," 2015. Prepared for the 2015 AFA Presidential Address. NBER Working Paper No. 20894.

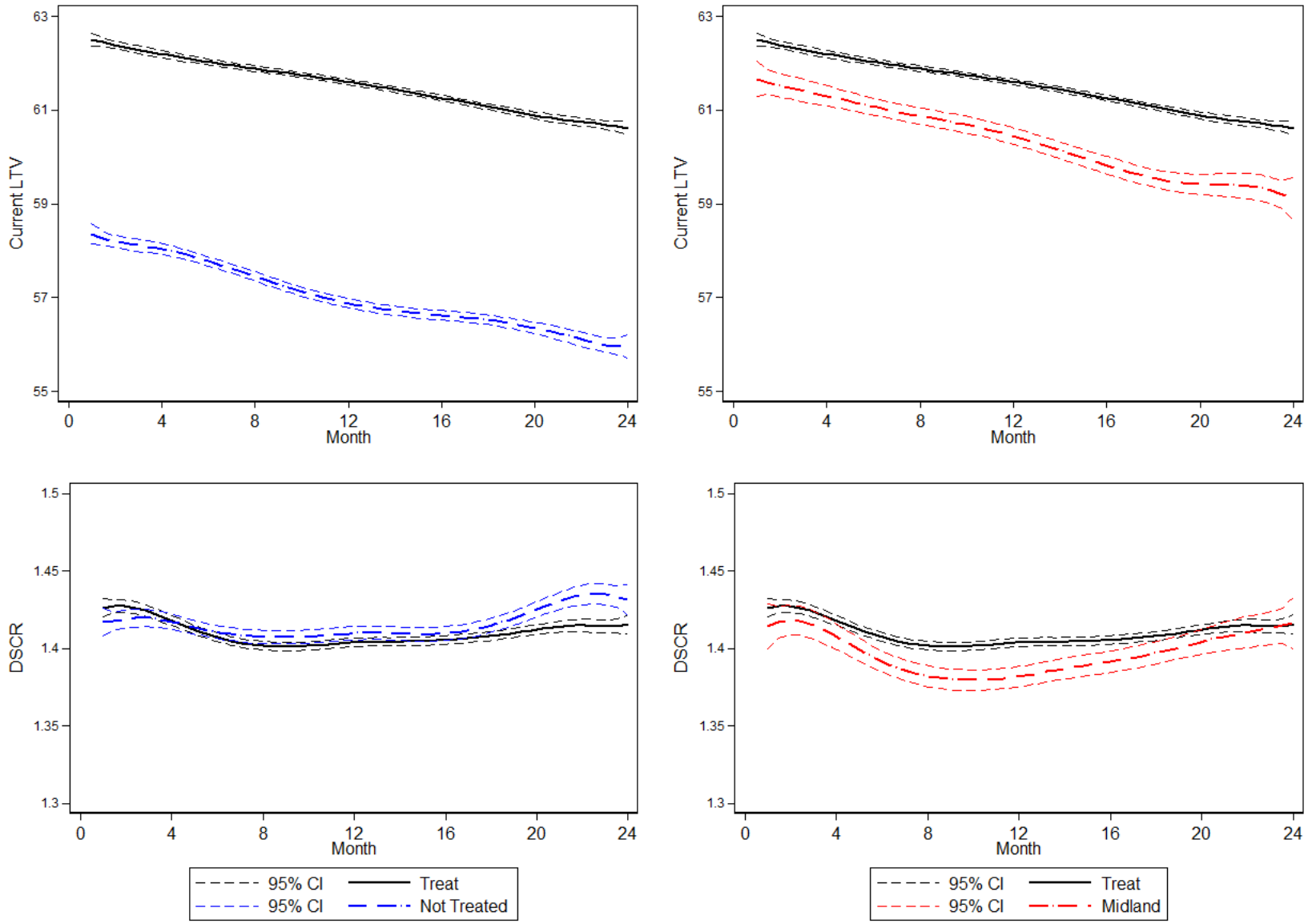
# Figures

**Figure 1:** Trends in Liquidation and Commercial Real Estate Prices



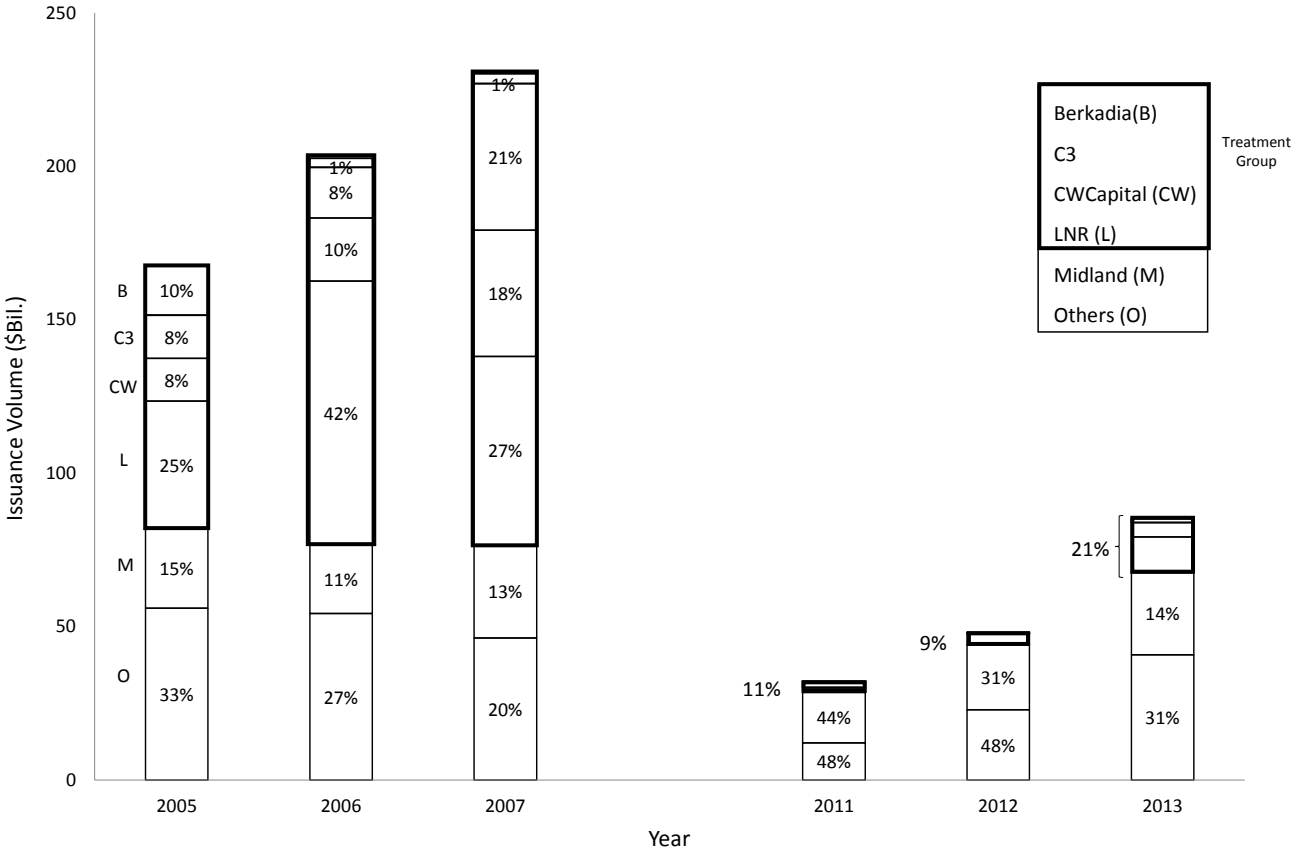

*Notes*: The solid line plots the total value of liquidated assets each year in my data. The dashed line plots the monthly Moody's/RCA Commercial Property Price Index. The four arrows indicate the four event dates when special servicers changed owners.
*Source*: Moody's Price Indices–2013 Real Capital Analytics, Moody's RCA/CPPI. Liquidation Value–author's own calculations.

**Figure 2:** Post Trends for Monthly LTV and DSCR by Treatment and Control Groups




*Notes*: Trends in current loan-to-value (LTV) and current debt service coverage ratio (DSCR) each month, by special servicers in the treatment and control groups, with associated 95 percent confidence intervals. Each of the eight time series trend lines was estimated using a fourth order local polynomial regression at the loan-month level. The data vendor reports *current LTV* and *current DSCR* every month $t$ for all loans that are current in month $t$. I downloaded this data each month from December 2010 (month 0) to November 2012 to construct a panel of current loans. The left panel compares trends for treated special servicer (black, solid line) versus non-treated special servicers (blue, dashed line) for current LTV (top) and current DSCR (bottom). The right panel repeats the analysis but compares treated special servicers versus Midland (red, dashed line).

**Figure 3:** CMBS Issuance by Year and Market Shares of Special Servicers




*Notes*: Each bar represents the total volumne of CMBS debt issued each year between 2005 and 2007 and between 2011 and 2013. The annual issuance volumes between 2008 and 2010 (ranging from $3 billion to $12 billion) have been suppressed. The numbers in the bar correspond to the market shares for the top five special servicers: (B)erkadia, C-III, (CW)Capital, (L)NR, (M)idland and for (O)ther special servicers. The top-to-bottom order of the special servicers within each bar remains the same with Berkadia at the top and Other special servicers at the bottom. The bold border highlights the volume for treated special servicers. For 2011-2013, the market shares for treated special servicers are too small to report individual market shares. Only aggregate market shares are reported (for all treated special servicers).
*Source*: Commercial Mortgage Alert

# Tables

**Table 1:** Summary Statistics

| Variable Name: | **No. of Loans** | **Mean** | **Std. Deviation** |
|---|---|---|---|
| Issuance DSCR NCF | 83373 | 1.49 | 0.54 |
| Cutoff balance LTV | 109793 | 66.63 | 13.79 |
| Cutoff balance (in million dollars) | 117099 | 7.78 | 15.23 |
| 1(Balloon loan) | 121627 | 0.75 | 0.43 |
| 1(Fixed rate loan) | 121627 | 0.90 | 0.30 |
| 1(Property is hotel) | 121627 | 0.04 | 0.20 |
| 1(Industrial property) | 121627 | 0.07 | 0.25 |
| 1(Property is apartment) | 121627 | 0.29 | 0.46 |
| 1(Property is office) | 121627 | 0.13 | 0.34 |
| 1(Retail property) | 121627 | 0.24 | 0.43 |
| 1(Loan originated between 2005 and 2007) | 107454 | 0.42 | 0.49 |
| Number of properties per loan | 121627 | 1.25 | 5.10 |
| 1(Number of properties>5 per loan) | 121627 | 0.01 | 0.10 |
| Property age | 81864 | 27.25 | 22.26 |

*Notes*: Summary statistics for the full sample of 121,627 loans. Issuance DSCR NCF is the debt service coverage ratio on the issuance date, calculated the ratio of net cash flow (NCF) for the collateral divided by the debt service payment. Cutoff balance LTV is calculated using the loan balance on the cutoff date divided by the appraised value of the collateral.

**Table 2:** Balance Check

| Dependent Variable: | Treat vs. Non-treated | | | Treat vs. Midland | | |
|---|---|---|---|---|---|---|
| | Coeff. | p-value | N | Coeff. | p-value | N |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Issuance DSCR NCF | -0.016 | ( 0.645) | 57998 | -0.023 | ( 0.490) | 45422 |
| Cutoff balance LTV | 1.808 | ( 0.202) | 66815 | 0.844 | ( 0.559) | 46900 |
| Cutoff balance (in million dollars) | 3.158* | ( 0.067) | 68966 | 1.644 | ( 0.162) | 47941 |
| 1(Balloon loan) | 0.318** | ( 0.013) | 72581 | 0.147*** | ( 0.007) | 47942 |
| 1(Fixed rate loan) | 0.175*** | ( 0.002) | 72581 | 0.126*** | ( 0.000) | 47942 |
| 1(Property is hotel) | 0.026** | ( 0.016) | 72581 | 0.016** | ( 0.010) | 47942 |
| 1(Industrial property) | 0.021 | ( 0.140) | 72581 | 0.015 | ( 0.335) | 47942 |
| 1(Property is apartment) | -0.059 | ( 0.215) | 72581 | -0.100*** | ( 0.000) | 47942 |
| 1(Property is office) | 0.072** | ( 0.017) | 72581 | 0.022** | ( 0.048) | 47942 |
| 1(Retail property) | 0.154** | ( 0.016) | 72581 | 0.037** | ( 0.013) | 47942 |
| 1(Loan originated between 2005 and 2007) | 0.001 | ( 0.988) | 72581 | 0.013 | ( 0.831) | 47942 |
| Number of properties per loan | 0.050 | ( 0.633) | 72581 | -0.036 | ( 0.445) | 47942 |
| 1(Number of properties>5 per loan) | 0.003 | ( 0.370) | 72581 | -0.000 | ( 0.821) | 47942 |
| Property age | -1.571 | ( 0.213) | 54626 | -0.582 | ( 0.384) | 42052 |

* p<0.1, ** p<0.05, *** p<0.01

*Notes*: This table reports results from loan-level OLS regressions testing whether special servicers in the treatment and control group serviced similar loans. The sample includes all current loans originated before the event dates. The dependent variables are attributes of loans at-origination. Columns 1 to 3 report the comparison between treated and all other special servicers. Column 1 reports the coefficient on the treatment dummy, column 2 reports the p-value and column 3 reports the sample size. Columns 4 to 6 repeat the same analysis but restricts the comparison to treated special servicers versus Midland.

**Table 3:** Results on Amount Liquidated

| | **Treat** | | | **Non-treated** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Post | 1.866 | 1.228 | 1.156 | 0.599 | 0.223 | 0.081 |
| | ( 0.227)*** | ( 0.242)*** | ( 0.215)*** | ( 0.199)*** | ( 0.246) | ( 0.206) |
| | [ 0.054] | [ 0.053] | [ 0.054] | [ 0.079] | [ 0.347] | [ 0.727] |
| N | 528 | 258 | 258 | 927 | 562 | 498 |
| Num. of clusters | 4 | 4 | 4 | 31 | 28 | 21 |
| $R^2$ | 0.529 | 0.498 | 0.612 | 0.080 | 0.080 | 0.425 |
| Sample period windows | All | 36 months | 36 months | All | 36 months | 36 months |
| Controls | No | No | Yes | No | No | Yes |

Significance levels: * (p<0.1), ** (p<0.05), *** (p<0.01).

*Notes*: The dependent variable is log(total current balance of loans liquidated by a special servicer in a month). Coefficients in columns 1 to 3 are from special servicer-month level regressions that compare the amount liquidated before and after the special servicers were sold during the sample period. Column 1 includes all months, column 2 includes only 36 months before and after the special servicers were sold, and column 3 adds special servicer fixed effects. Columns 4 to 6 repeat the same regressions for the control group, but column 6 uses averages of pre-determined special servicer attributes (Table 2) as controls instead of special servicer fixed effects. The unclustered standard errors are reported in the parentheses. The p-values, reported in brackets, are clustered at the special servicer level using the Wild Webb bootstrapped to address the issue of having fewer than ten clusters.

**Table 4:** Results on Average Loss Rate

| | **Treat** | | | **Non-treated** | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Post | 0.135 | 0.113 | 0.110 | 0.156 | 0.030 | 0.014 |
| | ( 0.040)*** | ( 0.042)*** | ( 0.039)*** | ( 0.053)*** | ( 0.049) | ( 0.046) |
| | [ 0.043] | [ 0.060] | [ 0.105] | [ 0.064] | [ 0.533] | [ 0.766] |
| N | 528 | 258 | 258 | 926 | 562 | 498 |
| Num. of clusters | 4 | 4 | 4 | 31 | 28 | 21 |
| $R^2$ | 0.079 | 0.108 | 0.210 | 0.012 | 0.062 | 0.268 |
| Sample period windows | All | 36 months | 36 months | All | 36 months | 36 months |
| Controls | No | No | Yes | No | No | Yes |

Significance levels: * (p<0.1), ** (p<0.05), *** (p<0.01).

*Notes*: Repeats the same special servicer-month level regressions as Table 3 but the dependent variable is now the average loss rate for all loans liquidated by a special servicer in a month. The loss rate for a loan is the ratio of total realized losses from liquidation divided by the loan balance before losses.

**Table 5:** Estimated Benefits for Transactions Affiliated with C-III

| **Property** | **Price or Loan amount** | **Estimated benefit** | | |
|---|---|---|---|---|
| | | Post - Pre (11 p.p. lower loss rate) | | |
| | | Counterfactual Price | Benefit | Equity Multiple |
| [1] | [2] | [3] | [4] = [3] - [2] | [5] |
| **Panel A: Buyer** | | | | |
| Hampton Inn, Woodbridge, VA | 9,050,000 | 10,211,173 | 1,161,173 | 0.6 |
| Westchase Ranch, Houston, TX | 15,500,000 | 17,270,531 | 1,770,531 | 0.4 |
| *Somerset I & II, Houston, TX | 8,000,000 | 9,795,918 | 1,795,918 | 9.0 |
| Foxboro, Houston, TX | 6,500,000 | 7,242,481 | 742,481 | 0.4 |
| Cherry Grove, Jackson, TN | 18,912,000 | 26,406,417 | 7,494,417 | 1.5 |
| *Seven Gables, Richmond, VA | 35,571,400 | 43,556,816 | 7,985,416 | 0.2 |
| *Rollingwood, Richmond, VA | 9,500,000 | 11,632,653 | 2,132,653 | 4.3 |
| *Hilltop, Dallas-Fort Worth, TX | 8,127,935 | 9,952,573 | 1,824,638 | 0.9 |
| *Cambridge, Houston, TX | 5,100,000 | 6,244,898 | 1,144,898 | 0.8 |
| *Audobon Park, Mesquite, TX | 7,551,731 | 9,247,018 | 1,695,287 | 0.9 |
| *Knollwood, St Louis, MO | 16,681,968 | 20,426,900 | 3,744,932 | 1.1 |
| *Camellia, Jackson, TN | 11,300,000 | 13,836,735 | 2,536,735 | 0.8 |
| The Park, Columbia, SC | 7,250,000 | 8,078,152 | 828,152 | 0.3 |
| *Portofino, Pittsburgh, CA | 11,800,000 | 14,448,980 | 2,648,980 | 1.1 |
| **Total (Panel A)** | **170,845,034** | | **37,506,210** | |
| **Panel B: Lender** | | | | |
| Hampton Inn, Woodbridge, VA | 6,500,000 | | 65,000 | |
| Lakeforest Mall, Gaithersburg, MD | 82,000,000 | | 820,000 | |
| Meridian Village, Bellingham, WA | 9,900,000 | | 99,000 | |
| **Total (Panel B)** | **98,400,000** | | **984,000** | |
| **Panel C: Broker** | | | | |
| Hampton Inn, Woodbridge, VA | 9,050,000 | | 181,000 | |
| Tara, Athens, GA | 15,500,000 | | 131,100 | |
| Fairfield Inn, Woodbridge, VA | 8,000,000 | | 114,000 | |
| **Total (Panel C)** | **32,550,000** | | **426,100** | |
| **Total benefits, Average equity multiple** | | | **38,916,310** | **1.6** |

*Notes*: Panel A lists the properties liquidated by C-III and bought by an affiliate of C-III. Column 1 lists the property, column 2 indicates the transaction price, column 3 reports the counterfactual price, column 4 estimates the benefit to C-III and column 5 estimates the equity multiple for this transaction (estimated as total benefit divided by total equity paid by C-III). Panel B lists properties where an affiliate of C-III was the lender. In this case, column 2 reports the loan amount and column 4 represents the estimated fees to the lender. Panel C lists properties where an affiliate of C-III was the broker. Columns 2 and 4 report the transaction price and estimated brokerage fees, respectively.

* Some values for these properties had to be estimated. The transaction prices for Somerset, Cambridge, Audobon Park, Knollwood and Park were estimated, either from Real Capital Analytics or from the deeds of sale. Except, the price for Knollwood was estimated by dividing the loan amount by an estimated LTV (79%). Since Knollwood was part of a portfolio sale, the LTV was estimated as the average LTV for other properties in that portfolio. The loss rates were assumed to be 51% for Somerset, Seven Gables, Rollingwood, Hilltop, Cambridge, Audobon Park, Knollwood, Camellia and Portofino.