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

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Abstract

Self-dealing is potentially important but difficult to measure. I study special servicers in commercial mortgage-backed securities (CMBS), who sell distressed assets on behalf of bondholders. Around 2010, ownership changes for four servicers raised tunneling concerns that they may direct benefits to new owners' affiliates (buyers and service providers). Loss rates for loans liquidated after the ownership changes are 8 percentage points greater than before ($2.3 billion in losses), relative to other (placebo) servicers. Together with a case study that directly measures self-dealing relationships, the findings point to the importance of tunneling through fees to service providers (steering) instead of purchases.

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1 Introduction

Self-dealing has been alleged to harm investors but it is hard to measure (Shleifer and Vishny, 1997). The recent wave of foreclosures of securitized assets has put a spotlight on intermediaries that manage securitized assets on behalf of bondholders. There is anecdotal evidence that some intermediaries appear to tunnel private benefits to their affiliates at the expense of distant bondholders (Lee, 2014). However, it is hard to quantify the extent of self-dealing for securitized assets because it is hard to track them after securitization. Moreover, self-dealing incentives are endogenous by nature and often correlated with omitted variables.

The commercial mortgage-backed securities (CMBS) market provides a useful context to address the empirical challenges in the self-dealing literature. It is the second most important source of credit in the commercial real estate sector with total assets of $623 billion (Federal Reserve, 2016). Each CMBS trust comprises a pool of mortgages that are collateralized by non-residential properties. Crucially, it is relatively easier to track the chain of ownership of CMBS assets because real estate transactions are recorded publicly.

I study self-dealing concerns involving four *special servicers* in the CMBS market, which had servicing rights to more than $500 billion of CMBS debt in 2010. These debt firms manage distressed mortgages on behalf of bondholders with the goal of maximizing the net present value of assets. When a loan is non-performing, the special servicer decides whether and how to liquidate it. Loan liquidations typically involve selling the collateral (non-residential properties). As sellers, special servicers have to search for buyers and intermediaries to facilitate the liquidation.

Around 2010, ownership changes for four special servicers linked sellers with potential buyers and service providers, presenting potential self-dealing conflicts. The links heightened concerns that special servicers may be incentivized to sell assets at a discount to the new owners or to steer business opportunities to affiliates (brokers and lenders) to earn fees. In addition, the volume of distressed CMBS assets, which remained relatively low before 2010 started to increase sharply. Market participants grew concerned that these two factors (the rise in potential sales by servicers and the potential links to affiliates) would sharply increase the potential for these servicers to self-deal with affiliates. Yoon (2012) reports that special servicers appear to be "burdened by conflicts of interest caused in part by new ownership" and allegedly "cutting bad deals".

Motivated by concerns over the ownership changes, I begin by estimating the impact of these events on outcomes for liquidated loans. I compare the changes in loan loss rates (realized losses

divided by loan balance before losses) for the four (treated) special servicers before and after ownership changes relative to other (placebo) servicers. For the placebo group, there is no sharp change because these firms did not change owners.

My panel data analysis includes 9272 loans liquidated from 2003 to 2012, controls for special servicer fixed effects, month of liquidation fixed effects, and pre-determined loan attributes. The key regressor is the interaction between an indicator for loans liquidated by treated servicers and an indicator for liquidations after ownership changes. The identification assumption is that unobserved determinants of loan loss rates do not change differentially for treated versus placebo servicers, conditional on the fixed effects and loan attributes.

I find that loans liquidated after treated special servicers changed owners have loss rates that are 8 percentage points higher than before, relative to placebo servicers. This translates into aggregate losses of $2.3 billion for loans liquidated by treated servicers under new ownership (2010 to 2012). This is a sizable magnitude considering losses from CMBS liquidations from 2008 to 2013 totaled $28 billion (O'Callahan, 2013).

I present robustness checks to address threats to identification. Since the events happened around 2010, a key confounder is unobserved market conditions. Here, the placebo servicers serve as counterfactuals to the extent treated and placebo servicers face common market conditions. Also, market conditions improved after 2010, which biases against finding higher loss rates. Another threat is a difference in the time profile of liquidations due to the liquidity crisis that triggered the ownership changes.[1] I show that the quality of loans liquidated after 2010 follows parallel trends for treated and placebo servicers.

Turning to mechanisms, I explore the three self-dealing conflicts raised by market participants: (i) *buying* (new owners buying assets sold by special servicers), (ii) *steering* (servicers steering business opportunities to affiliated service providers and earning fees), and (iii) *price discrimination* (affiliated service providers charging bondholders higher fees to sell CMBS assets). The price discrimination channel suggests bondholders would pay greater liquidation expenses. However, I find that liquidation expenses are not higher after ownership changes for treated servicers, relative

[1] Like many debt firms, the balance sheets of the previous owners of the servicers worsened dramatically when credit spreads widened during the recent crisis, which triggered the need for capital infusion by new owners. It is possible that special servicers were capacity constrained during the crisis, building a stockpile of distressed debt. After new ownership relaxed these constraints, special servicers could have liquidated the worst loans first. Therefore, one concern is that the higher loss rates could stem from a short run difference in the quality of liquidated loans which will dissipate once the stockpile of debt has been resolved.

to placebo servicers, which is inconsistent with the price discrimination channel.

Next, I estimate that liquidations after ownership changes have an average sale price that is 15% lower than before, relative to placebo servicers. The magnitude of this price discount is large enough to explain the $2.3 billion in aggregate losses reported above. Interestingly, I estimate that monthly liquidation volumes increase by 229% for treated servicers relative to placebo servicers. The price discount and increase in liquidation volume are consistent with both the buying and steering channels.

To assess the relative importance of the two channels, I complement the core regression analysis with a case study for one treated servicer. I construct a novel dataset that tracks buyers for a sub-sample of 1000 CMBS properties liquidated by this servicer. Most real estate transactions are recorded publicly but the recorded owners are often limited liability companies. Since commercial properties are high value assets, data firms have invested resources to collect information about the true owners. Hand-matching the CMBS data to the property transactions data allows me to track what happens to securitized assets liquidated by this servicer in the sub-sample.

The case study indicates that self-dealing purchases are limited but affiliated service providers appear important. Contrary to market concerns over purchases, I only find 14 transactions that were purchased by affiliates of the special servicer. However, a significant share of sales by this servicer involves affiliated service providers. These affiliated transactions are a central source of commission revenue, constituting half of the total transaction volume for the affiliated brokers. This is consistent with the new owner's vertically integrated business model "to build special servicing and ancillary businesses" leveraging the scale of the special servicer (Cohen, 2010).

The limited purchases and relative importance of affiliated service providers lend more support to the steering channel relative to the buying channel. These patterns parallel concerns that relate the underpricing of IPO's to commission generation by investment banks (Reuter, 2006; Nimalendran, Ritter, and Zhang, 2007). The steering channel can be important in real estate, where many intermediaries are needed to facilitate transactions. Each CMBS liquidation may represent a bundle of fee streams for affiliated service providers.

I provide a back-of-the-envelop calculation to illustrate the potential gains from fee streams that are consistent with the magnitudes from the regression analysis above. In addition, there are also dynamic spillover benefits to the new owners in the form of future business opportunities. The large scale of the servicers' liquidations complement the business affiliates of the new owners, minimizing search frictions while building relationship capital.

These results shed light on the classic tension between the efficiency benefits from vertical integration and the costs due to self-dealing conflicts in financial institutions. On balance, I find sizable losses to CMBS bondholders that are consistent with concerns over tunneling conflicts but mixed evidence on scale efficiencies. I discuss three ways vertical integration can improve outcomes for bondholders, but do not find strong evidence of efficiency benefits. Bond-level analysis suggests the additional losses are concentrated amongst junior bonds but senior bondholders associated with treated servicers do not have lower loss rates relative to placebo servicers.

One caveat is the imperfect coverage for affiliated service providers makes it harder to assess the full extent of these affiliations. This is a common problem in the self-dealing context as it tends to happen in places where self-dealing is hard to measure. I discuss on-going efforts to improve transparency and provide some lessons for disclosure policies. Another caveat is that there may be other efficiency benefits that I do not observe.

This paper contributes to the literature on self-dealing and tunneling (Shleifer and Vishny, 1997). One approach assesses the extent of tunneling indirectly by investigating the relationship between aggregate outcomes and self-dealing potential.[2] Another approach uses transactions-level data to provide direct evidence of self-dealing in international contexts.[3]

My analyses build upon both approaches to make progress on the endogeneity and measurement challenges in the self-dealing literature. Motivated by market concerns, my core analysis conceptualizes ownership changes as "shocks to firm affiliations" to provide quasi-experimental variation in self-dealing potential. I study self-dealing in securitized debt markets in the United States and examine effects on both aggregate losses to bondholders as well as disaggregated losses at the loan level. This allows me to investigate the three types of self-dealing mechanisms and control for potential confounders at a finer level. Moreover, the case study provides the first transactions-level measure of self-dealing for securitized assets in the United States.

These findings in CMBS have important implications for the RMBS market as well. There is

[2] Bae, Kang, and Kim (2002) shows that the effects of acquisitions by Korean business groups on stock prices can hurt minority shareholders but controlling shareholders benefit through their affiliates. Lemmon and Lins (2003) compare the stock returns for firms with ownership structures that have varying degrees of self-dealing potential during the East Asian crisis. Djankov et al. (2008) studies the relationship between legal protection of minority rights and stock market outcomes for 72 countries.

[3] Previous studies include analyses for markets in China (Jiang, Lee, and Yue, 2010), Hong Kong (Cheung, Rau, and Stouraitis, 2006), Korea (Baek, Kang, and Lee, 2006), and Bulgaria (Atanasov, 2005). Kroszner and Strahan (2001), La Porta, de Silanes, and Zamarripa (2003), and Engelberg, Gao, and Parsons (2012) examine lending behavior for connected lenders but focus on non-securitized debt.

relatively less work on agency conflicts after securitization (Keys et al., 2013), especially studies on what happens to assets that exit the MBS trust.[4] This paper examines self-dealing/tunneling conflicts of servicers as a result of ownership changes. Regulators have raised concerns over similar ownership changes for RMBS servicers (FHFA, 2014). In fact, self-dealing conflicts involving RMBS servicers and their affiliates are part of on-going investigations and lawsuits alleging servicers directed businesses to benefit affiliates (Goodman, 2010; Lee, 2014).[5] These conflicts can affect trust in securitized markets, potentially impacting investment activity (Zingales, 2015). I provide suggestive evidence of this in the CMBS context.

The rest of the paper proceeds as follows. Section 2 describes the CMBS context, Section 3 describes the data, Section 4 presents the core analysis of the effect of ownership changes on loan loss rates. Section 5 discusses self-dealing and alternative considerations and Section 6 concludes.

2 Background

2.1 Special servicers and ownership changes

A CMBS trust comprises a pool of mortgages collateralized by income-producing commercial properties, such as apartments, hotels, warehouses, and retail properties. Each CMBS trust has a master servicer which services loans that are current or expected to be recoverable. Loans that are delinquent beyond applicable grace periods (typically 60 days) are transferred to the *special servicer*, which usually takes over the operation of the commercial property from the borrower.[6] It then decides whether to keep the distressed mortgage in the trust (by modifying the terms of the

[4] Agarwal et al. (2011) and Piskorski, Seru, and Vig (2010) study the effects of securitization on how RMBS servicers resolve distressed residential mortgages by comparing securitized loans against bank-held loans. Agarwal et al. (2015) and Maturana (2014) study the incentives of servicers to workout distressed residential mortgages. Within the CMBS literature, An, Deng, and Gabriel (2009) and Ghent and Valkanov (2015) investigate whether securitized loans are adversely selected, Stanton and Wallace (2012) studies CMBS subordination levels and ratings. Gan and Mayer (2006), Titman and Tsyplakov (2010), Ashcraft, Gooriah, and Kermani (2015), and Ambrose, Sanders, and Yavas (2015) study other aspects of agency problems in CMBS.

[5] For example, the Superintendent of the New York Department of Financial Services 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..." (Lee, 2014)

[6] In contrast to residential MBS, in the event that borrowers default on their debt, special servicers are needed in CMBS for their expertise in operating commercial properties.

mortgage) or not (usually by liquidating the asset).[7]

The servicing standard specified in pooling and servicing agreements generally requires special servicers to maximize the net present value of assets on behalf of CMBS bondholders. However, special servicers have relatively wide latitude to use their judgement. They are appointed by the controlling class holder (usually the most junior tranche in the CMBS trust, known as the B-piece). B-piece buyers often appoint themselves as special servicers.[8] Special servicers usually earn 25 basis points on loans in special servicing, 1% of the resolved loan balance for loan resolutions (modifications or liquidations), and other fees, as stated in the pooling and servicing agreement.

Most special servicers are part of commercial real estate debt firms, with expertise in underwriting commercial real estate debt and operating commercial properties. Like many debt investors, they faced a liquidity crisis when their balance sheets worsened because spreads widened in late 2008. While the high yield debt investments suffered, their special servicing businesses grew in importance in light of the rise in delinquent loans after the crisis. Loans in special servicing increased from $5 billion dollars in 2007 (0.5% of CMBS loans) to $90 billion dollars in 2012 (12%).

I study the ownership changes for Berkadia (December 2009), C-III (March 2010), LNR (July 2010), and CW Capital (September 2010). These are among the 4 largest special servicers in CMBS, servicing around 65% of the loans (by loan amount). When the new owners explain their acquisition strategies, they often invoke the potential scale efficiencies because these 4 special servicers have servicing rights to more than $500 billion of CMBS debt. The large scale of the servicers is beneficial because it takes time to establish a network of customers, especially in real estate where there are significant search frictions.

The new owners also emphasize complementarities between the servicing operations and affiliates which provide a bundle of real estate services. Each CMBS liquidation is a real estate transaction with many entities facilitating the transaction. These entities include brokers, online auction platforms, titling agencies, and lenders. Using in-house intermediaries can speed up the liquidation process and having a large network of customers can also facilitate the search and matching of buyers and sellers. This can benefit bondholders (by improving liquidation outcomes) and also the new owners (the servicing business can help build relationship capital and develop future business opportunities).

[7] Technically, the special servicer can decide to sell the mortgage (a note sale) or to foreclose the property. In both instances, the loan will exit the CMBS trust.

[8] See Gan and Mayer (2006) and Ashcraft, Gooriah, and Kermani (2015) for studies related to this issue. I return to this issue at the end of the paper.

Figure 1 shows annual liquidation volumes remained below $2 billion through 2009 but started to increase after that. Before the ownership changes, there was not much distressed debt (not much sales) by both treated and placebo servicers. The rise in potential sales, combined with the potential links to new affiliates, contributed to a sharp increase in concerns over potential self-dealing conflicts.

For the placebo servicers, there is no sharp change in the self-dealing potential during this period because they did not change owners. Moreover, one of the placebo servicers (Midland) is part of PNC bank and has no proprietary investments. There are 30 placebo servicers with Midland being the largest and other moderately-sized servicers. Insofar as the placebo servicers or the previous owners (in the pre-period) have the potential to engage in self-dealing as well, this would operate against finding an effect.

These ownership changes are controversial and raised concerns among market participants. For example, Standard and Poor issued a statement 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" (Steward et al., 2012).[9]

2.2 Three types of self-dealing mechanisms

The concerns amongst market participants center around three types of self-dealing/tunneling mechanisms that can arise in CMBS liquidations: (i) buying, (ii) steering, and (iii) price discrimination. Self-dealing/tunneling involves transactions that connect the special servicer (acting as a seller on behalf of bondholders) and any affiliate of the new owner, including a buyer or an affiliated service provider. This notion of self-dealing/tunneling encompasses the three self-dealing mechanisms whereby special servicers can potentially tunnel cashflows to their new owners at the expense of bondholders.

First, when the ownership changes happened,the primary concern of the market was the ability of special servicers to purchase a liquidated asset by exercising a *fair value option*. This option allows the special servicer to purchase distressed assets in the CMBS trust at a fair value, as specified in the pooling and servicing agreement. The ownership changes heightened the concerns over self-dealing via purchases because the new owners also had distressed debt investment funds and were active buyers of commercial real estate assets. For example, a shareholder of Vornado (a

[9]See also Berger (2012), Lancaster et al. (2012), and Wheeler (2012) for related commentary on potential agency conflicts.

new owner of LNR) stated that "I believe their goal here is to get first shot - potentially with no competitors - to buy mortgages which are being serviced by LNR ... Flow and exclusive first crack is the appeal." (Troianovski and Wei, 2010)

The second mechanism, steering, relates to the concern that special servicers may be incentivized to *liquidate more* and steer business opportunities to affiliated service providers. For example, LNR had a partial ownership of an online auction platform (Auction.com) and there were concerns that LNR may be incentivized to direct business opportunities to Auction.com by liquidating more assets. Similarly, other treated servicers also have a combination of affiliated lenders, brokerages, or titling agencies that provide various services to facilitate real estate transactions.

The third mechanism, price discrimination, is related to the possibility that affiliated service providers might charge distant bondholders *higher fees* for their services when selling CMBS assets. For example, an RMBS servicer used an affiliated online auction platform (Hubzu) to auction off foreclosed homes. Hubzu allegedly charged these affiliated auctions a fee of 4.5% (paid by bondholders) but charged fees as low as 1.5% for non-affiliated auctions it competes for in the open market (Lee, 2014). Incidentally, the same statement by Standard and Poor on ownership changes mentioned above also points to these three self-dealing mechanisms: "market participants...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."

3 Data

3.1 CMBS loans

I purchased access to CMBS loans data from November 2010 through November 2012 from Realpoint (since owned by Morningstar). This dataset includes the universe of all securitized loans. I observe loan attributes at-origination (such as loan-to-value (LTV), the securitized loan amount, and the special servicer) and information about the collateral (such as the property type, age, and the street address of the property). The appendix provides more details of the sample construction.

Crucially, the Realpoint database includes a *realized loss report* that comprises a history of all securitized loans with realized losses to the CMBS trust, reporting the date the losses were incurred, the liquidation proceeds, the liquidation expenses, as well as the balance before losses. There are 11,332 loans with realized losses, between September 1997 and November 2012. The

primary estimation sample uses 9272 loans liquidated between 2003 and 2012. Before 2003, there are fewer than 500 liquidations per year.[10]

One shortcoming of this dataset is the lack of pre-treatment data for some attributes. Realpoint only reports the most recent value for time-varying loan attributes (such as current LTV, current balance, and delinquency) and only updates the values each month for loans that have a positive loan balance that month. Since I purchased the data only in November 2010 and all four ownership changes occurred before that, I do not have pre-treatment data for these attributes. Table 1 reports the summary statistics for the full sample of 120,495 securitized loans and the 9,272 liquidated loans in the primary estimation sample.

3.2 Measuring self-dealing relationships

As discussed in Section 2.2, market participants are most concerned about purchases by the new owners of special servicers. They are also concerned about the use of affiliated service providers. The core regression analysis uses comprehensive CMBS data covering loans liquidated by all servicers. This subsection describes measures of self-dealing relationships for one treated servicer in my case study.

I restrict my analysis to liquidations by C-III (which changed owners in March 2010). I choose this special servicer because regressions by special servicer indicate that the patterns are most robust for this special servicer. The sample for the case study includes 1,074 properties that were liquidated from 2010 to 2012 by C-III.[11]

Purchases

To trace the chain of ownership, I handmatch data on CMBS loan liquidations with property transactions data. 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

[10] My main specification includes special servicer fixed effects and month of liquidation fixed effects. Having more liquidations in a year is useful because liquidation outcomes are noisy and in the earlier years, there is not much variation left after controlling for special servicer and month of liquidation fixed effects.

[11] While I only directly measure relationships for one servicer, the number of transactions is comparable to other papers in the literature. Baek, Kang, and Lee (2006) studies 262 private placements of equity-linked securities in Korea between 1989 and 2000. Cheung, Rau, and Stouraitis (2006) investigates pricing for connected transactions in 375 filings in Hong Kong between 1998 to 2000. Jiang, Lee, and Yue (2010) examines 1,134 firm-years in their data with information on affiliated transactions.

as the identity of the buyer. These databases focus on transactions above $2.5 million but also report some CMBS transactions below this cutoff when available.

I limit the case study to one treated servicer only since the process of merging CMBS loans with property transactions for non-residential properties is time consuming. Each property address for the 1,074 properties had to be entered individually into these databases to search for the true owner for each asset. This process was time consuming because commercial properties have names and addresses that are not standardized.

Most transactions are structured so that buyers are limited liability companies (LLC). However, data firms have invested resources to collect information about the true identity of buyers, their addresses, and contact information. Commercial properties are high value assets and investors are willing to pay for information about the true property owners for prospective investment or leasing opportunities. The data firms make significant attempts to identify the true owner, by contacting brokers, property operators, and other sources. The exact methods are proprietary. Each record is confirmed through multiple independent reports from reliable sources. For example, the buyer for an apartment complex, Cherry Grove, is recorded publicly as RFI Cherry Grove LLC. But, 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. For transactions that were identified as being bought by C-III, I also obtained deeds of sales to confirm that the buyer is affiliated with C-III.

Affiliated service providers

In addition to information about buyers, Real Capital Analytics also reports the brokers and lenders for property transactions, whenever this information is available. Compared to the data on buyers, the coverage for service providers is less consistent, especially for lenders (sellers' brokers are an important source of information for Real Capital Analytics). I searched for all transactions from 2010 to 2015 that use an affiliate of C-III as the lender or the broker. The data coverage tends to be more comprehensive for later years. I also support my analysis with industry reports. Known affiliated brokers of C-III include NAI and C-III Realty. The affiliated lender is C-III Commercial Mortgage.

4 Effect of ownership changes

4.1 Effect on loan loss rates

Section 2 describes market concerns that after the ownership changes, the self-dealing conflicts may increase loan losses. I use a panel data specification that compares the changes in loan loss rates for treated special servicers after they were sold, relative to changes in loan loss rates for other (placebo) special servicers. Specifically, I estimate

$$LossRate_{lit} = \alpha + \beta OwnershipChange_i \times Post_{it} + \gamma X_{li} + \tau_t + \delta_i + \varepsilon_{lit} \quad (1)$$

where $LossRate_{lit}$ is the loss rate (realized losses divided by loan balance before losses) for loan l liquidated by special servicer i in month t (centered around event dates), $OwnershipChange_i$ is 1 if servicer i is Berkadia, C-III, CW Capital, or LNR, and $Post_{it}$ is 1 loan l is liquidated after the event date for special servicer i. For treated servicers, the event date corresponds to the first day of the month they changed owners. For placebo servicers, $Post_{it}$ is 1 if month t is after LNR's event date. The results are similar using other placebo dates (Table 3). Additionally, X_{li} represents pre-determined controls for loan l, τ_t is month of liquidation fixed effects, δ_i is special servicer fixed effects, and ε_{lit} is an idiosyncratic error term.

The parameter of interest is β which tests whether loss rates change differentially after treated servicers were sold compared to placebo servicers. The identification assumption is that unobserved determinants of $LossRate_{lit}$ do not change differentially around the event dates for treated versus placebo servicers, conditional on the controls. Standard errors are double clustered by special servicer and month of liquidation.

Column 1 of Table 2 presents the main specification which indicates that loss rates for loans liquidated after treated servicers changed owners are 8 percentage points (p.p.) higher than before, relative to placebo servicers that did not change owners. The magnitude of the effect is sizable, representing 16% of the mean loss rate in the pre-period (50%) and translating into aggregate losses of $2.3 billion for loans liquidated by treated servicers in the post period (2010 to 2012).[12] As a benchmark, between 2008 and 2013, special servicers liquidated approximately $65 billion in loans with total losses of $28 billion (O'Callahan, 2013). In another context, Lemmon and

[12]To calculate the total losses implied by the 8 p.p. effect on loss rates, I multiply it by the total loan balance before losses for all loans liquidated by treated servicers after the ownership changes ($29 billion, liquidated between 2010 and 2012).

Lins (2003) show that during the East Asian financial crisis, stock returns of firms with high self-dealing potential (as proxied by the wedge between control rights and cash flow rights) are 10 to 20 percentage points lower than those of other firms.

The main specification includes controls that mitigate three sources of omitted variable bias. First, month of liquidation fixed effects circumvents potential confounding due to changes in general economic conditions. This is important as the ownership changes happened around 2010, raising the threat that the differences after ownership changes reflect sharp changes in economic conditions only. To the extent that assets liquidated by placebo servicers face similar economic conditions, they can serve as useful counterfactuals.

Additionally, the 106 month of liquidation fixed effects control non-parametrically for high frequency monthly changes. Moreover, Table A3 in the appendix shows that the effects are similar with coarser time controls (quarter of liquidation or year of liquidation fixed effects as well as monthly quadratic time trends plus a post indicator). The relative stability of the estimates mitigates concerns about confounding due to time trends (Altonji, Elder, and Taber, 2005).

Furthermore, it is worth noting that any bias due to changes in economic conditions is likely to be *against* the result of higher loss rates because prices were recovering after 2010 (dashed line in Figure 1). Indeed, the analysis for placebo servicers indicates *lower* and insignificant loss rates after 2010 compared to before.

The second potential confounder is the difference across treated versus placebo special servicers, which I control for using special servicer fixed effects. If anything, a comparison of loss rates for treated versus placebo servicers in the pre-period suggests the bias due to differences between treated and placebo servicers works *against* the finding above. Before ownership changes, the loss rates were *lower* for treated servicers relative to placebo servicers.

Third, loans serviced by treated versus placebo servicers could be different. I control for predetermined loan attributes reported in Table 1, including the initial debt service coverage ratio (DSCR) and initial loan-to-value (two loan quality measures commonly used to underwrite commercial mortgages),[13] initial loan balance, indicators for loans with balloon payments, with fixed interest rates, indicators for property types (hotels, industrial properties, apartments, offices, retail), year of securitization, the number of properties, property age, and an indicator for loans with

[13]The debt service coverage ratio is the net operating income of a property divided by the debt payment. Ratios above 1 correspond to (safer) loans that have enough operating income to cover debt payments. The initial loan-to-value is the securitized loan amount divided by the value of the property.

missing loan attributes. Column 2 repeats column 1 but further winsorizes loss rates at the top 1% to show that the results are not driven by outliers.

Finally, the last two columns address the concern that β could be biased by other changes over time. Column 3 adds interactions between loan attributes and the post indicator, to allow for the effects of loan attributes on loss rates to be different before and after the ownership changes. Column 4 adds special servicer-specific quadratic time trends and a post indicator (but drops month fixed effects).[14] This alleviates the concern that the loan quality is worsening over time differently across special servicers. Reassuringly, the results remain similar and the effects are not statistically different across the columns.

Table A2 in the appendix presents heterogeneous analyses using different sub-samples, demonstrating that the higher loss rates are not driven by particular loan types. The results indicate stronger effects for fixed rate loans, office, and retail loans. Notably, the results are not significantly higher for balloon loans (an indicator for high risk loans).

4.2 Identification checks

4.2.1 Robustness analysis

Table 3 further probes the robustness of the results on loss rates. The first row repeats the main specification in Table 2 (column 1) but includes liquidations in all years (1997 to 2012) instead of liquidations between 2003 and 2012. The next row includes liquidations between 2004 and 2012. The effect is slightly larger including all years because liquidations in the late 1990's (before the downturn) have low loss rates. Additionally, Table A3 presents evidence that the estimates are relatively stable with coarse versus fine time controls, such as quarter or year of liquidation fixed effects or monthly time trends (Altonji, Elder, and Taber, 2005).

Row 3 repeats the main specification, restricting the sample to loans matched using propensity scores.[15] Row 4 aggregates the loan level data to the special servicer-month level to address concerns of over-rejection (Bertrand, Duflo, and Mullainathan, 2004; Donald and Lang, 2007; Cameron, Gelbach, and Miller, 2008). The specification is analogous to that of the main loan-level

[14] For placebo special servicers, I estimate a separate trend for Midland and a common trend for the other placebo servicers.

[15] I first predict the probability of treatment using a logit model with the treatment indicator as the dependent variable, loan controls and month of liquidation fixed effects. I then drop the 25% of loans in the control group with the lowest predicted probability of treatment.

estimation. I include month fixed effects, special servicer fixed effects and report robust standard errors in the parentheses.[16] Finally, the last three rows repeat the main specification but use the event dates for Berkadia, C-III, and CW Capital as placebo dates respectively.

Reassuringly, the results are broadly similar across the specifications. The effects of the ownership changes on loan loss rates are not statistically different from the main effect of 0.08.

4.2.2 Differences in loan quality

Table 4 shows that the higher loan loss rates do not appear to be driven by treated servicers servicing worse loans. The first row reports results from an OLS regression with an indicator for fixed rate loans as the dependent variable and the ownership change indicator as the regressor. The subsequent 12 rows repeat this analysis for other at-origination loan attributes. The sample comprises all loans that were securitized before 2008. Both the dependent variables and the sample are determined before the ownership changes. Standard errors are clustered by special servicer and month of securitization.

While the composition of loans are different along some dimensions, treated servicers do not appear to service loans that have systematically worse quality. Notably, the differences in initial LTV and initial debt service coverage ratios (DSCR) are small. Loans serviced by the treatment group have LTV's that are higher by 3% (compared to a mean of 67%) and DSCR's that are lower by 0.02 (compared to a mean of 1.49). One concern is that treated servicers are 41% more likely to have loans with balloon payments (relative to a mean of 74%), which could indicate worse loan performance. However, the results are robust to controlling for the balloon loan indicator and heterogeneous analysis in Table A2 in the appendix shows that the results are not significantly stronger for balloon loans (column 2). Finally, loans serviced by treated special servicers have larger loan balances, are more likely to have fixed interest rates, more likely to be a hotel, office, or retail loan, and are newer. Taken together, these differences in (fixed) at-origination loan attributes do not systematically point to treated special servicers having loans of significantly worse quality.

Next, I present evidence that loan quality also does not worsen differentially *over time* for treated versus placebo servicers. The last two rows of Table 4 show that the differences do not appear to be large, on average. This is a loan-month level analysis where I first regress *current LTV* for loan l reported in month t on the ownership change dummy and report month fixed effects.

[16] For the placebo servicers, I estimate a fixed effect for Midland and a common fixed effect for the other placebo servicers.

Standard errors are double clustered at the special servicer-by-report month level. The sample includes loans that are current in month t. I do not control for current LTV and current DSCR when estimating equation (1) as these attributes are not pre-determined and I do not have pre-treatment data for current LTV and current DSCR. This analysis uses data on current loan attributes that was collected monthly after November 2010. Figure 2 shows that current LTV's and DSCR's appear to be parallel between treated and placebo special servicers.

Finally, Figure 3 reinforces the findings above that loan quality does not worsen more over time for treated servicers. This figure plots the share of loans in month t (in dollars) that first become 60-day delinquent in month t. This represents a relatively exogenous measure of loan quality as special servicers have less control over these loans because most loans are only transferred to special servicers after they become delinquent for more than 60 days.

4.2.3 Liquidity crisis and capacity constraints

Next, I address the concern that the higher loan loss rates are driven by the liquidity crisis experienced by treated servicers that triggered their ownership changes. The concern is treated servicers were capacity constrained before the ownership changes as they were too occupied with their own problems and built a stockpile of distressed loans that should have been liquidated. Therefore, the higher loss rates could reflect a temporary difference in the quality of liquidated loans that dissipates after treated servicers have resolved the stockpile of distressed debt.

First, it is worth noting that the servicing operations of the treated servicers were relatively well-functioning even while the high yield debt investments weakened the balance sheets for the firms. In addition, both treated and placebo servicers did not anticipate the sudden spike in the volume of distressed CMBS debt. For example, a rating agency report by Fitch in 2009 (just before the ownership changes) stated that "Fitch continues to believe current staffing levels are at capacity for most special servicers" (Petosa, Weems, and Carlson, 2010). To the extent that placebo servicers also experienced crisis-like moments, comparing differences between treated and placebo servicers partially addresses this issue. Nevertheless, the concern remains that treated servicers were relatively more capacity constrained.

The capacity constraint channel will likely result in different time profiles of liquidation for treated versus placebo servicers. If treated servicers liquidate the worst loans first, this would result in a divergence in trend right after the ownership change, followed by a convergence towards placebo servicers. However, Figure 4 shows relatively similar trends in both LTV and DSCR

reported in the month of liquidation. This is not consistent with the notion that the higher loan loss rates are driven by compositional differences in liquidated loans.

A related concern is the post period may be too short. If treated servicers liquidate the worst loans first and the better loans later, perhaps, over a longer horizon, the post versus pre average loss rates will be similar for treated versus placebo servicers. Actually, a post period of 3 years is relatively long compared to the reported real estate owned (REO) hold time of 12 months for 2012 (Heschmeyer, 2014).

Moreover, I confirm that the patterns remain using auxiliary data with a longer post period. I collected data from Bloomberg on CMBS loans liquidated between 2000 and 2015 (6 years for the post period), complementing the primary data which ends in 2012. Bloomberg does not report balance before losses (the denominator of loan loss rates) but it does report losses in dollars. With the longer post period, I continue to find larger losses for treated servicers after the ownership changes, relative to placebo servicers. Table A4 in the appendix presents the results and provides more details of this analysis.

5 Is it self-dealing?

So far, the finding of higher loan loss rates after ownership changes is consistent with market concerns. As discussed in Section 2.2, there are three types of self-dealing mechanisms: (i) buying, (ii) steering, and (iii) price discrimination. While these channels may not be mutually exclusive, this section presents a collection of findings that lend more support to the steering channel compared to the buying and price discrimination channels.

5.1 Why are loan loss rates higher?

Loan losses can be greater either because assets are liquidated at lower prices or fees incurred to sell the assets are higher. Column 1 explores the sale price channel using a hedonic regression with log sale price as the dependent variable, special servicer fixed effects, quadratic time trends (and a post indicator), MSA fixed effects, and pre-determined controls. Column 2 repeats the same specification using log of liquidation expenses as the dependent variable.

Table 5 shows that the higher loss rates reflect lower sales prices for the liquidated assets. The estimate suggests the average price is 15% lower for assets liquidated by treated servicers

after ownership changes relative to placebo servicers. I calculate that the price discount needed to rationalize the $2.3 billion in aggregate losses implied by the main effect (Table 2, column 1) is around 10%, which is similar to the price discount estimated here.[17] Table A6 in the appendix repeats the same analysis for net sales proceeds and finds a similar effect.

Column 2 shows there is no significant effect on liquidation expenses, which is inconsistent with the price discrimination channel. If treated servicers are charging bondholders higher fees to sell the assets, this should lead to greater liquidation expenses after the ownership changes relative to placebo servicers.

Interestingly, column 3 shows that treated servicers are liquidating more after ownership changes. The dependent variable measures the dollar volume of liquidation by special servicer i in month t using $ln(\sum_l BalanceBeforeLoss_{lit})$, where I sum over the balance before losses for all loans liquidated by special servicer i in month t. This aggregates the data to the special servicer-month level and controls for month fixed effects and special servicer fixed effects. The estimate represents an increase in the liquidation volume by 119 log points (229%), or an increase of $105 million per special servicer per month, using the pre-event average of $46 million.

This increase in liquidation volume is not consistent with the notion that the price discounts for CMBS liquidations by treated servicers reflect a reduced willingness to pay by unaffiliated buyers (they expect treated servicers to select the best assets for affiliated buyers and leave the lemons for them). A pure adverse selection effect is less consistent with the rise in liquidation volume after the ownership changes.

5.2 Case study: Self-dealing transactions for one servicer

So far, the regression estimates of higher loan loss rates, lower prices, and greater liquidation volume are inconsistent with the price discrimination channel and consistent with both the buying and the steering channels. The buying channel is naturally associated with lower prices (as affiliated buyers prefer lower prices) but it can also be associated with a greater liquidation volume if special servicers are incentivized to liquidate and steer investment opportunities to affiliated buyers.

The steering channel is also consistent with an increase in liquidation volume and lower prices. For example, when a buyer approaches the special servicer to bid for a distressed asset, the servicer could inform the buyer privately that it would accept a lower price if the buyer uses its in-house

[17] The total sales proceeds from liquidations by treated servicers in the post period is $21 billion. Assuming the counterfactual sales proceeds total $23.3 billion ($2.3 billion more), the price discount is 10% (2.3/23.3).

service providers. This tunneling example directs private revenue streams to the servicer's affiliates to the detriment of bondholders (who suffer from the lower sale price).

This subsection presents evidence from a case study for one treated special servicer (C-III). In March 2010, Island Capital purchased Centerline (the predecessor of C-III) and the servicing rights for $110 billion of CMBS debt, with an equity cost of $100 million and assumed debt of $180 million. Andrew Farkas, Chairman and CEO of Island Capital, described a vertically integrated business strategy for this acquisition: "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). This raised agency conflict concerns in the market (Wei, 2010).

Limited purchases

To track the chain of ownership to see whether C-III is selling assets to affiliates, I merge the sample of CMBS liquidations by C-III with property transactions data. I then identify whether the true buyer is an affiliate of C-III, as discussed in Section 3.2.

Contrary to market concerns about self-dealing through purchases, I only find 14 property transactions, valued at $171 million, that were bought by C-III. This could be due to the threat of litigation (some special servicers are involved in lawsuits pertaining to the use of the fair value option to purchase CMBS assets) and the high profile nature of this self-dealing conflict. For example, a few transactions (linking special servicers and the new owners) were presented as the "poster children of questionable behavior" (Yoon, 2012). Also, when a high profile property in New York (666 Fifth Avenue) was sold to Vornado (the new owner of LNR), this transaction received much media attention. As the lawyer representing the sellers explained, "Vornado got "anything but" an advantage from its stake in the special servicer...Everybody knew what was going on." (Levitt, 2011).

Even though many investors thought the servicers would engage in self-dealing by buying assets, these reports and the threat of litigation may increase the costs to engage in self-dealing through purchases. This is consistent with research on the importance of institutions that protect investors (Djankov et al., 2008).

Affiliated service providers

In contrast to the limited purchases identified above, affiliated service providers appear to be important. While the coverage for data on affiliated service providers is weaker than the coverage for buyers, I provide several sources of information that point to the importance of these providers.

First, Chamberlain and Merriam (2015) reports that the share of Real Estate Owned (REO) sales using an affiliated broker was 30% in 2011 and as high as 90% in 2014. Second, the Real Capital Analytics data I collected shows that C-III engages an affiliate in 40% of transactions where it is a special servicer. In other contexts, Baek, Kang, and Lee (2006) studies 262 private securities offerings in Korea where 77 (29%) have intragroup conflicts. Jiang, Lee, and Yue (2010) finds that around 30% to 40% of transaction volume can be traced to affiliates.

Third, data from Real Capital Analytics indicate that close to half of the total transaction volume of C-III's affiliated brokers results from liquidations where C-III is the special servicer. In other words, liquidations from C-III's servicing arm is a central source of commission revenue for C-III's affiliated brokers.

How much can the new owners gain through tunneling?

To illustrate the potential importance of the steering channel, I provide a back-of-the-envelop calculation that shows that C-III can stand to gain up to 70% of the losses to bondholders. Of the $2.3 billion in losses for all 4 treated servicers implied by the regression estimates (Table 2), $462 million is associated with C-III. During the post period, sales proceeds from CMBS liquidations by C-III total $3.6 billion.

I consider the potential gains to C-III through the benefits to its affiliated lender, brokers, and titling agency in facilitating the $3.6 billion in liquidations. The expected profits from lending amount to $89 million.[18] The potential gains from brokerage and titling services amount to $234 million. This assumes a commission rate for brokerage services of 6% and 0.5% for titling.[19]

Together, the total potential gains are $323 million (70% of $462 million), multiplied by the share of transactions that engage affiliated service providers. Assuming shares of 30% or 90% (using the lowest and highest estimates above) would imply that C-III can gain 21% to 63% of the $462 million losses to bondholders. These magnitudes are consistent with the larger losses reported in the regression analysis. In addition, there are also dynamic spillover benefits in the form of future business opportunities. In this sense, the purchase of C-III can be viewed as an

[18] To estimate this, I assume an LTV of 80% and a loan yield of 8% (based on the general lending parameters on C-III's website). I further assume a 3% charge-off rate and a profit margin of 40%. I estimate the charge-off rate and the profit margin from recent annual reports of publicly traded mortgage REITs. I estimate the profit margin from reported average loan yields and reported average cost of funds or from the income statements. Put together, the expected profits are calculated as (1-0.03)*($3.6 billion*80%*8%*40%).

[19] I estimate these parameters from market reports and conversations with practitioners. I do not have data on profit margins for these services.

investment in relationship capital.

5.3 Potential benefits from vertical integration

Of course, vertical integration has potential efficiency benefits as well. I consider three benefits below.

Higher liquidation price

The fair value option, which allows special servicers to bid for distressed assets, can lead to higher sales prices, especially in situations where there are few or no bidders. Special servicers may bid higher prices for distressed assets relative to other investors if they have private information about the underlying quality of the asset. However, the price discount and greater loan loss rates reported above are inconsistent with this benefit.

Faster liquidations

Next, using in-house intermediaries can lead to faster liquidations. Table A6 in the appendix shows that treated servicers have faster liquidations (1.7 months) relative to placebo servicers, conditional on loan controls, time trends, and MSA fixed effects. Together, the 15% lower sale price reported in Table 5 and the faster time to liquidation implies a monthly discount rate of 9%, suggesting the price discounts appear too steep. This analysis relies on a comparison between treated and placebo servicers in the post period only as I do not have pre-period data for time to liquidation (calculated as the number of months between delinquency and liquidation).

I provide another calculation to benchmark how much faster the liquidations have to be after the ownership changes to rationalize the 15% price discount. Using an annual discount rate of 25% (this is at the higher end of the target returns for opportunistic real estate investment funds, especially given the low-yield environment), I calculate that liquidations have to be 8 months faster.[20]

A difference of 8 months is quite large, considering the average REO holdtime is 12 months (Heschmeyer, 2014). Also, rating agency reports do not indicate significantly faster liquidations after the ownership changes. Steward and Wertman (2013) report that the average time it took

[20] An annual discount rate of 25% implies a monthly discount rate of 1.9%. Therefore, the improvement in speed has to be 8 months faster (the ratio of 15% and 1.9%).

C-III to foreclose loans ranged from 8 to 11 months before the ownership changes (2008-2010) but it increased to 16 to 18 months after the ownership changes (2011 to 2012). Chamberlain and Merriam (2015) also reports that average resolution times were not consistently faster for sales using affiliated brokers relative to non-affiliated sales. Overall, I do not find strong evidence of significantly faster liquidations after the ownership changes.

B-piece conflict and benefits to senior bondholders

A third benefit of having vertically integrated affiliates pertains to benefits for senior bondholders because the self-dealing conflicts have the potential to offset another conflict in the CMBS structure which tends to hurt senior bondholders. In CMBS, the owner of the first loss tranche (B-piece) acts as the controlling class holder and often appoints itself as the special servicer. This concentration of control rights in (thin) first loss tranches incentivizes special servicers against liquidating loans to prevent the B-pieces from being wiped out. This protects their control rights, potentially at the expense of senior bondholders. In light of the B-piece conflict which *reduces* liquidation, the steering channel which incentivizes more liquidation, can have an off-setting effect.

My analysis of bond-level losses suggest that the additional losses are concentrated amongst junior bonds but senior bond holders do not have lower loss rates for treated servicers compared to placebo servicers. I downloaded bond-level loss rates (realized losses divided by original balance) from Bloomberg in April 2016.

Treated bonds have an average loss rate of 26% compared to 18% for placebo bonds. The losses are concentrated amongst junior bonds (original rating below A). For senior bonds (original rating of A or better), the loss rates are similar (3.7% for treated and 3.5% for placebo). Likewise for AAA-rated bonds (0.3% for treated and 0.2% for placebo).

It is possible that absent the ownership changes, senior bondholders may suffer even greater losses. However, this bond-level analysis is suggestive that the self-dealing mechanism is not enough to lead to lower loss rates for senior bondholders. The appendix provides more details about the bond-level data.

5.4 Discussion

Overall, the chain of evidence above is less consistent with the buying and price discrimination channels, but consistent with the new owners' intentions to establish a vertically integrated com-

mercial real estate firm affiliated with the special servicer. The results lend support to concerns that the special servicers may be incentivized to liquidate more on the margin to steer business opportunities to their affiliates. On balance, I find sizable losses to bondholders after the ownership changes, consistent with concerns over self-dealing/tunneling conflicts. However, I find mixed evidence of efficiency benefits.

Impact on trust and broader investment activity

While the self-dealing mechanisms discussed above can be viewed as transfers from bondholders to the new owners and buyers of the liquidated CMBS asset, there are broader efficiency losses that can arise from reduced trust. Figure 5 plots the issuance volume (in billions of dollars) and market shares for special servicers, by year of issuance. Two striking patterns emerge. First, annual CMBS issuance volumes have dropped markedly after the crisis even while other commercial debt instruments have grown in importance.

Second, treated servicers have lost market share. The market share for Midland has increased. Discussions with market participants suggest that Midland has the reputation of being a neutral special servicer because it has no proprietary investment activity. While these are suggestive patterns only, they are consistent with the interpretation that investors' concerns with agency conflicts amongst treated special servicers could endanger trust in the market and lead to real effects on investment activity.[21] These agency conflict concerns are important because a majority of assets in the MBS market are actively managed by intermediaries. Many of these intermediaries have ties to major financial institutions and may face similar agency conflicts.

Unmeasured connections and lessons for disclosure policies

In principle, more disclosure of affiliated transactions can improve transparency and enhance trust in CMBS markets. The Investor Reporting Package (IRP) developed by the Commercial Real Estate Finance Council provides a standardized reporting template used widely by servicers, trustees, and data providers in CMBS. At present, there are templates to disclose the involvement

[21] 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).

of affiliates and the fees charged. However, this information is only provided at the discretion of the special servicer. Moreover, lending relationships are not tracked comprehensively.

To restore trust in the CMBS market, one proposal is to encourage the public disclosure of all affiliated transactions. In similar efforts, the Securities Exchange Commission (SEC) is encouraging the disclosure of non arms'-length fees by private equity firms (SEC, 2015).

6 Conclusion

The ownership changes and new business models for four CMBS special servicers provide a unique lens to study the tension between the benefits of vertical integration and the costs of self-dealing conflicts. Compared to placebo servicers, treated servicers liquidate loans with higher loss rates, lower sales prices, and they also liquidate more after they changed owners. These findings are consistent with self-dealing concerns raised by market participants. I do not find many purchases by new owners but affiliated service providers are important. There is mixed evidence on whether the use of affiliates speed up liquidation.

These findings have broader implications beyond the CMBS market. Policy makers and researchers have focused on agency conflicts *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 securitized markets. While the rule targets adverse selection before securitization, one unintended consequence is that it could enhance agency conflicts *after* securitization. The high costs of the risk retention requirements could limit competition from small issuers and servicers (Geithner, 2011). As the number of servicers 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, further exacerbating self-dealing concerns.

In future work, it would be interesting to study other aspects of agency conflicts in securitized markets and how they may interact with the risk retention policy and with tunneling conflicts. Another direction for research is to investigate how the disclosure of information affects outcomes. Finally, how important are tunneling conflicts in the RMBS context? Servicers in the residential sector also experienced ownership changes. How large are the efficiencies from vertical integration in the residential sector?

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Tables

Table 1: Summary statistics

	All loans			Liquidated loans		
Variable Name:	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
1(Fixed rate loan)	120495	0.90	0.30	9272	0.87	0.34
1(Balloon loan)	120495	0.74	0.44	9272	0.69	0.46
1(Property is hotel)	120495	0.04	0.20	9272	0.06	0.24
1(Industrial property)	120495	0.07	0.25	9272	0.05	0.22
1(Property is apartment)	120495	0.28	0.45	9272	0.26	0.44
1(Property is office)	120495	0.13	0.34	9272	0.14	0.35
1(Retail property)	120495	0.24	0.43	9272	0.20	0.40
Year of secruitization	120495	2002	3.56	9272	2003	3.50
Initial loan balance (in million dollars)	115896	7.78	15.31	8658	6.69	12.30
Number of properties per loan	120495	1.24	4.75	9272	1.21	3.83
Property age	87616	26.55	21.74	6571	26.33	20.23
Initial loan-to-value	110015	66.72	13.76	8543	70.97	9.75
Initial debt service coverage ratio	83636	1.49	0.54	6569	1.37	0.25

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

Notes: Summary statistics for at-origination loan attributes for the full sample of 120,495 securitized loans (left 3 columns) and the primary estimation sample of 9,272 liquidated loans (last 3 columns).

Table 2: Effect of ownership changes on loan loss rates

Specification:	**Main specification**	**Winsorize loss rates**	**Post × controls**	**Servicer trends**
	(1)	(2)	(3)	(4)
Post × Ownership change	0.08***	0.08***	0.08***	0.12**
	(0.03)	(0.03)	(0.03)	(0.05)
N	9272	9272	9272	9272
R^2	0.14	0.16	0.15	0.11
Month FE	Y	Y	Y	N
Special servicer FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
Post × Controls	N	N	Y	Y
Special servicer time trends	N	N	N	Y

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

Notes: This table reports results from OLS regressions using liquidated loans. The dependent variable is the loss rate for loan l liquidated by special servicer i in month t, centered around event dates. The loss rate is the loan losses divided by the loan balance before losses. The key regressor is the interaction between an indicator that is 1 if special servicer i changed owners and a post indicator that is 1 if month t is after the event date for special servicer i. The event date is the month of ownership change for treated servicers. The event date for placebo servicers is LNR's event date. The estimation sample consists of 9,272 loans liquidated between 2003 and 2012. Column 1 reports the main specification with 106 month fixed effects, 33 special servicer fixed effects and 13 loan attributes (reported in Table 1), plus a dummy for loans with missing values for any loan attributes. Column 2 further winsorizes loan loss rate at the top 1 percent. Column 3 repeats column 1 but adds interactions between the post indicator and each loan control. Column 4 adds 6 special servicer-specific quadratic time trends (and drops month fixed effects), including trends for each of the 4 treated servicers, Midland and a common trend for other placebo servicers. Standard errors are double clustered by special servicer and month of liquidation.

Table 3: Robustness checks for effect of ownership changes on loss rates

	Coefficient	**Standard Error**
Specification:	(1)	(2)
1. Sample: All years	0.10***	(0.03)
2. Sample: 2004-2012	0.06**	(0.03)
3. Sample: Propensity score	0.09**	(0.04)
4. Sample: Aggregated data	0.09**	(0.04)
5. Placebo date: Berkadia date	0.10*	(0.05)
6. Placebo date: C-III date	0.11**	(0.05)
7. Placebo date: CW Capital date	0.06**	(0.03)

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

Notes: The first row repeats the main specification in column 1 of Table 2 but includes all years (not just 2003-2012). The second row includes a shorter event window (2004-2012). The third row repeats the main specification, restricting the sample to loans matched using propensity scores. The fourth row aggregates the loan level data to the special servicer-month level, 106 month fixed effects, 6 special servicer fixed effects (including a common fixed effect for placebo servicers besides Midland), and robust standard errors. The last three rows repeat the main loan-level specification but use the event dates for Berkadia, C-III, and CW Capital as placebo dates respectively.

Table 4: Loan attributes for treated versus placebo servicers

Dependent Variable:	**Mean**	**SD**	**N**	**Coefficient**	**Std. Err.**
1(Fixed rate loan)	0.90	0.30	120495	0.15***	(0.03)
1(Balloon loan)	0.74	0.44	120495	0.41***	(0.14)
1(Property is hotel)	0.04	0.20	120495	0.03**	(0.01)
1(Industrial property)	0.07	0.25	120495	0.01	(0.02)
1(Property is apartment)	0.28	0.45	120495	0.02	(0.04)
1(Property is office)	0.13	0.34	120495	0.07**	(0.03)
1(Retail property)	0.24	0.43	120495	0.15**	(0.06)
Year of secruitization	2002	3.56	120495	0.32	(0.72)
Initial loan balance (in million dollars)	7.78	15.31	115896	3.36**	(1.58)
Number of properties per loan	1.24	4.75	120495	0.04	(0.10)
Property age	26.55	21.74	87616	-1.19**	(0.54)
Initial loan-to-value	66.72	13.76	110015	3.17**	(1.46)
Initial debt service coverage ratio	1.49	0.54	83636	-0.02	(0.02)
Current LTV	59.80	16.46	1349597	4.61**	(2.34)
Current DSCR	1.41	0.62	1249870	-0.002	(0.03)

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

Notes: Each row reports results from an OLS regression with a loan attribute as the dependent variable and the ownership change indicator as the key regressor. The first 13 rows report differences in loan attributes at-origination. The sample includes all loans securitized before 2008. Standard errors are double clustered by special servicer and month of securitization. The last 2 rows report results for current loan-to-value ratios for loan l in month t and current debt service coverage ratios. The sample includes all loans that have a positive loan balance in month t. These last 2 regressions add report month fixed effects and cluster standard errors by special servicer and report months.

Table 5: Mechanisms related to higher loan loss rates

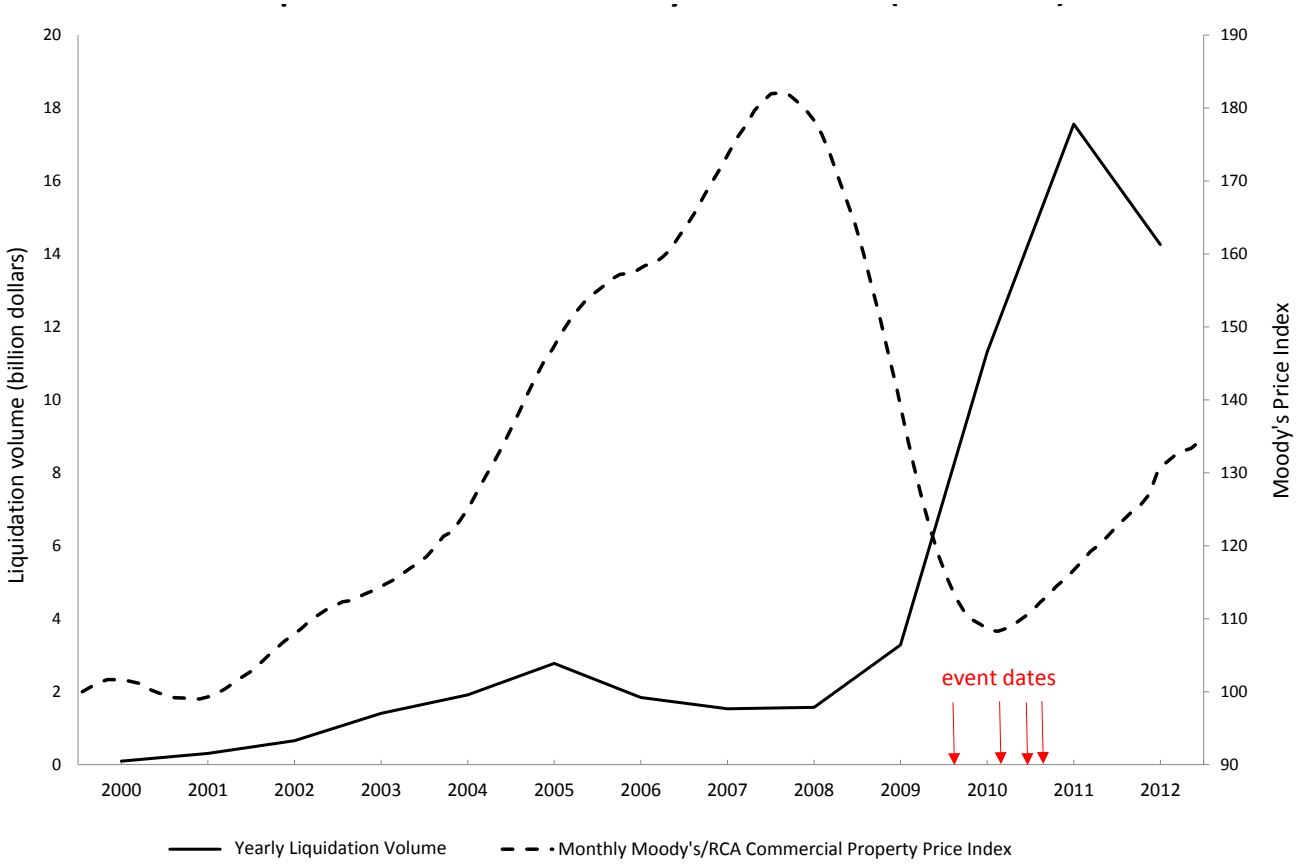
Dependent variable:	**Ln(Sale price)**	**Ln(Expense)**	**Ln(Volume)**
	(1)	(2)	(3)
Post × Ownership change	-0.15*	-0.08	1.19***
	(0.08)	(0.10)	(0.14)
N	5993	5935	1132
R^2	0.65	0.38	0.54
Month FE	N	N	Y
Special servicer FE	Y	Y	Y
Controls	Y	Y	N
MSA FE	Y	Y	N
Trends	Y	Y	N

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

Notes: Column 1 reports results from a hedonic regression where the dependent variable is log (Sale price) for the liquidated loan, the key regressor is the interaction between the ownership change and the post indicator, controlling for special servicer fixed effects, loan controls, MSA fixed effects, quadratic time trends (centered around event dates) and a post indicator. The sample includes liquidated loans in the estimation sample of Table 2 that have non-missing values for sales prices. Column 2 repeats the same regression with log of liquidation expenses as the dependent variable. Column 3 aggregates the loan level data to the special servicer-month level. The dependent variable is log of the total amount liquidated by special servicer i in month t, where the total amount liquidated sums over the balance before losses for all loans liquidated by special servicer i in month t. This specification includes special servicer fixed effects and month fixed effects and reports robust standard errors.

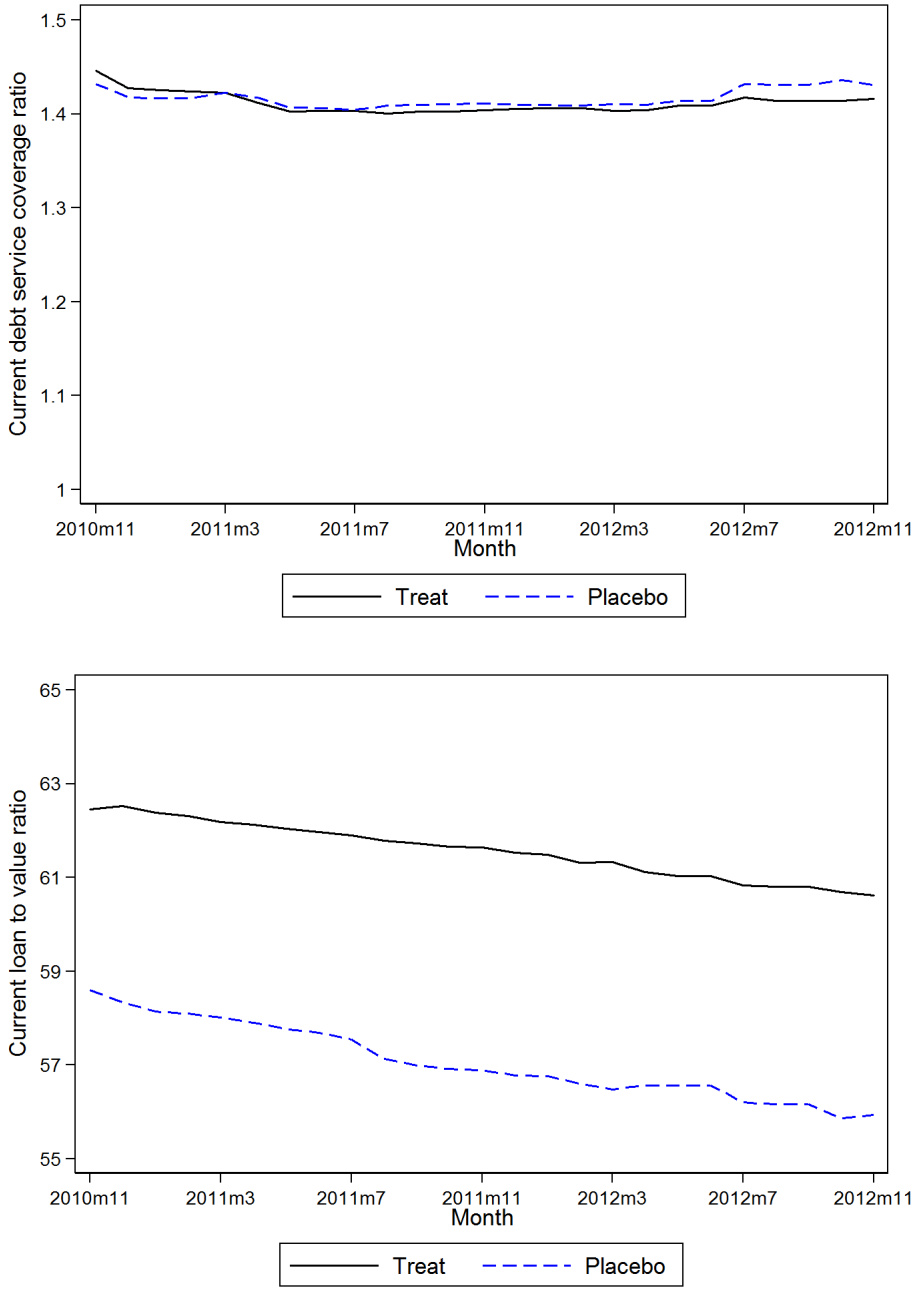
Figures

Figure 1: Trends in liquidation volume and commercial property prices



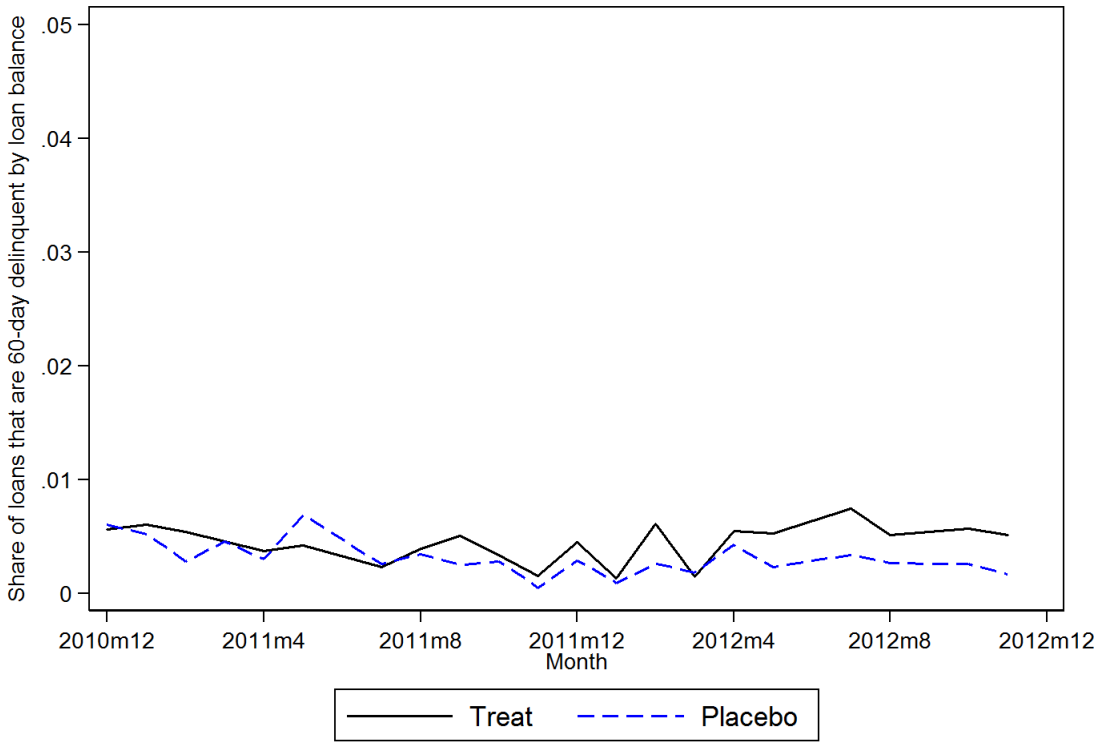
Notes: The solid line plots the annual total value of all liquidations (billion dollars) in my data. The dashed line plots the monthly Moody's/RCA Commercial Property Price Index. The four arrows indicate the four event dates when special servicers changed owners.

Figure 2: Post trends for monthly debt service coverage ratios and monthly loan-to-value



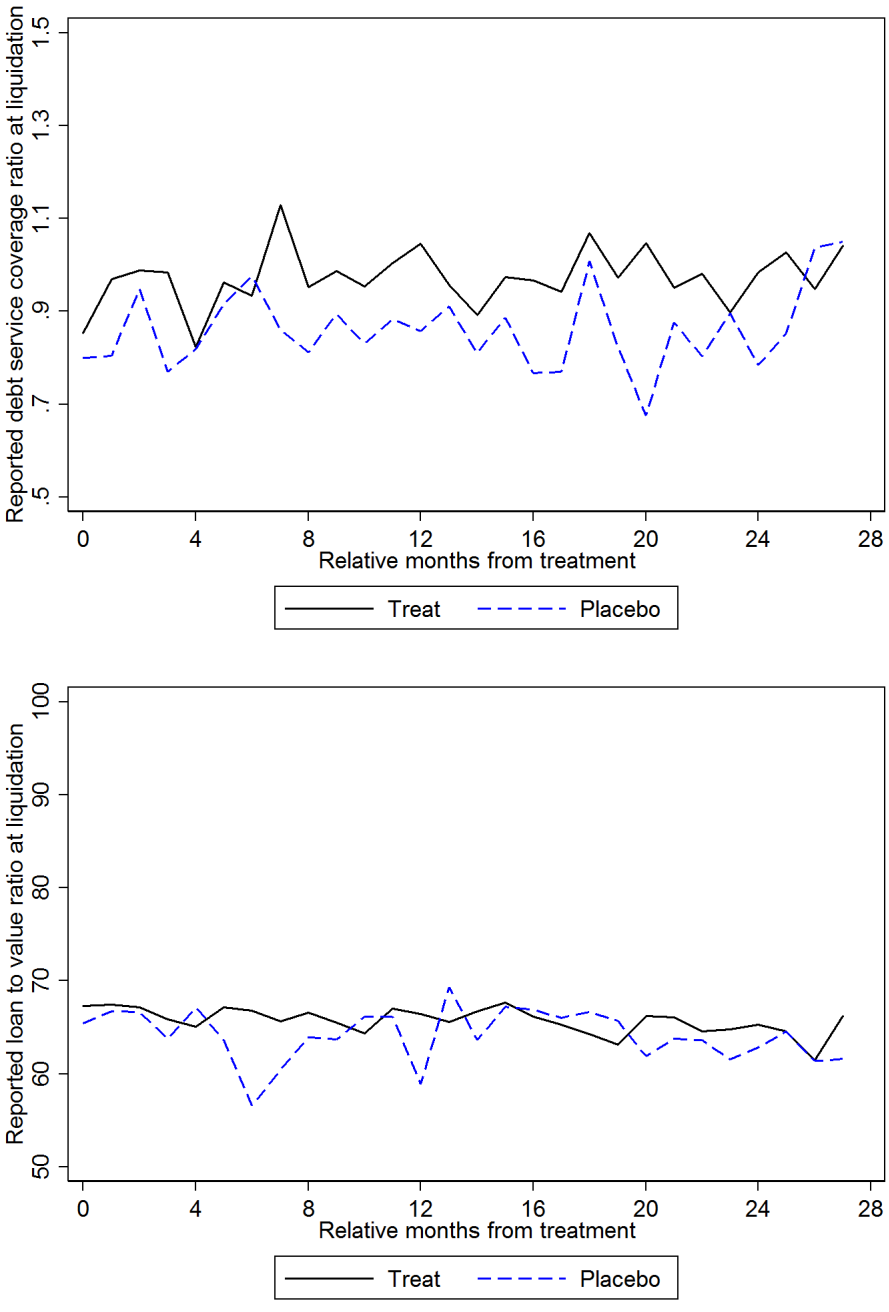
Notes: Monthly average in current loan-to-value (LTV) and current debt service coverage ratio (DSCR), by treated (solid line) and placebo (dashed line) special servicers. DSCR equals net operating income divided by debt service payments. The sample includes all current loans, each month from December 2010 to November 2012.

Figure 3: Share of loans that become 60-day delinquent



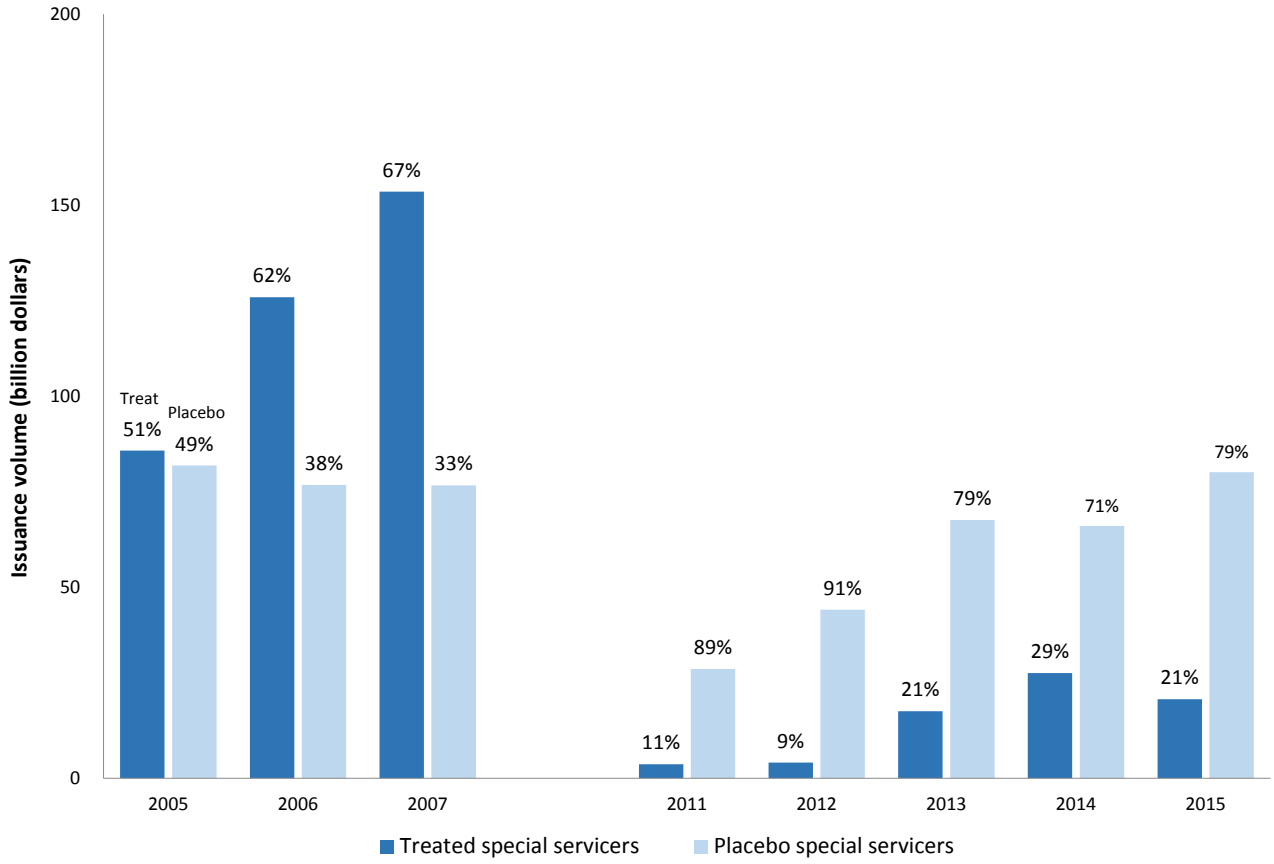
Notes: Share of loans (by dollar amount) that become 60-day delinquent in month t for treated (solid line) versus placebo servicers (dashed line). Each month, I report the share of loans that just become 60-day delinquent in that month. Loans are transferred to special servicers after they become 60-day delinquent.

Figure 4: Debt service coverage ratio and loan-to-value in the month of liquidation



Notes: Monthly averages of loan-to-value and monthly averages of debt service coverage ratios for liquidated loans, by treated (solid line) and placebo (dashed line) servicers.

Figure 5: CMBS issuance by year and market shares of special servicers



Notes: Each bar represents the total volume of CMBS debt issued each year between 2005 and 2007 and between 2011 and 2015 for treated (darker bar) and placebo (lighter bar) special servicers, respectively. The annual issuance volumes between 2008 and 2010 (ranging from $3 billion to $12 billion) have been suppressed. The numbers above the bars correspond to the market shares for the treated and placebo special servicers.