The Imitation Game:

How Encouraging Renegotiation Makes Good Borrowers Bad *

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Abstract

Do borrowers default in order to obtain favorable loan modifications? We examine whether CMBS loan borrowers default following principal reductions (Discounted Payoffs, aka DPOs) by their special servicer. We exploit a 2009 tax law change that increases the incentive of financially healthy borrowers to mimic distressed borrowers because it allows borrowers to obtain loan modifications prior to becoming delinquent. We show that the law change increases the likelihood that loans are transferred to special servicing following a DPO on another loan. Additionally, loans transferred following a DPO are more likely to realize full payoffs ex-post. Overall, our results are consistent with financially healthy borrowers attempting to extract concessions from servicers by imitating distressed borrowers, which suggests substantial asymmetric information between borrowers and lenders.

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1 Introduction

The infrequency of principle modification in residential mortgages after sharp declines in real estate prices is puzzling. Adelino et al. (2013) find that the vast majority of seriously delinquent residential mortgages received no concessionary modification whatsoever with principal reduction being exceptionally rare. Ghent (2011) finds that principal reduction was similarly rare during the Great Depression. While such modifications are preferable to a foreclosure for a particular loan, they may increase the risk of borrowers on other loans defaulting in an attempt to extract similar modifications, even when the property is yielding enough cash flow to continue making loan payments. For borrowers to be able to opportunistically default to the disadvantage of lenders, there must be substantial asymmetric information between borrowers and lenders such that financially healthy borrowers can imitate unhealthy ones. Lenders must not be able to observe borrowers' true default costs or their ability to pay.

In this paper, we show evidence of substantial asymmetric information between borrowers and lenders even in commercial real estate (CRE) loans. In contrast to residential loans, where a borrower's ability to pay is difficult for the servicer to observe and to define conceptually, the cash flows on a commercial property are generally observable to both the servicer and the econometrician. We focus on the impact of principal writedowns on defaults in commercial mortgage-backed securities (CMBS) borrowers. Principal writedowns (also known as discounted payoffs, or DPOs hereafter) are a type of loan modification in which the special servicer accepts repayment of an amount less than the current unpaid principal balance on the loan. We ask whether a DPO induces other borrowers to default opportunistically in anticipation of receiving the same type of principal writedown.

To motivate the idea that borrowers may opportunistically default in order to extract concessions, such as a DPO, from the servicer, consider the following excerpt from the prospectus for the deal BANK 2018-BNK15 in which the issuer discloses to investors the behavior of certain borrowers in the pool with respect to past loans:

> With respect to the Harvard Park Mortgage Loan (3.1%), three properties owned by the related sponsors have been subject to discounted payoffs since 2011. In November 2011, Basin Street Properties, which is owned by the related sponsors, placed its

> Petaluma Garage Retail property into a strategic default, and negotiated a discounted payoff of $4,500,000 on the $7,275,000 loan. In September 2014, Basin Street Properties negotiated a discounted payoff of $1,500,000 on a $6,160,000 mezzanine loan and repurchased at auction a $16,000,000 loan secured by its park Center Tower property. In June 2015, Basin Street Properties negotiated a discounted payoff of $15,000,000 on the $23,274,042 outstanding loan on its Cal Center property.

According to the prospectus, the borrower Basin Street Properties placed a loan into "strategic default" and was able to negotiate a substantial DPO.[1]

Our identification of the impact of DPOs on borrower behavior exploits a 2009 REMIC tax rule change that the IRS implemented in response to the CRE market distress caused by the 2008-2009 financial crisis. This rule change allows borrowers to obtain modifications far in advance of ever becoming delinquent or experiencing a default event.[2] The rule change reduces the cost for financially healthy borrowers to mimic distressed borrowers because it allows financially healthy borrowers the opportunity to obtain favorable concessions from the special servicer without ever experiencing distress.

We estimate the impact of a DPO on the likelihood a loan is transferred into special servicing both prior to and following this tax rule change. Following the rule change, DPOs are positively and significantly related to transfer likelihood. This suggests borrowers are more likely to engage with their special servicer immediately after they observe the servicer grant a DPO on a different loan. This result is robust to using various windows of time between the DPO and the transfer, and it is also robust to different definitions of DPO that depend on the size of the payoff relative to the size of the unpaid principal balance. Our regressions include either special servicer and MSA-by-month fixed effects or, alternatively, special servicer-by-MSA and month fixed effects. Therefore, our results cannot be explained by unobserved characteristics of the special servicer, local economic conditions, and/or MSA-specific servicing strategies.

[1] More recent anecdotal examples of opportunism in CRE loans have occurred during the COVID-19 pandemic. For example, retailer The Gap is involved in ongoing litigation with some landlords and lenders over failure to pay rent for its stores. Gap contends that state government-mandated shutdowns void lease agreements, whereas landlords and properties owners such as Simon Property Group contend Gap has the ability to pay and is using the pandemic to cease rent payments or terminate lease agreements. See `https://www.bloomberg.com/news/articles/2020-08-05/simon-countersues-gap-over-107-million-in-lease-payments` and `https://www.nytimes.com/2020/06/05/business/economy/coronavirus-commercial-real-estate.html`.

[2] Transfers and modifications prior to default were still allowed prior to the rule change, but in practice loans were only transferred 1-3 months prior to default.

To provide evidence that DPOs increase the likelihood of transfer for *financially healthy* borrowers, we identify loans that fully pay off subsequent to transfer. Full payoffs ex-post should be positively correlated with financial health ex-ante. Consistent with our main results, we show that DPOs increase the probability of transfers with subsequent full payoffs following the rule change.

Overall, our results show that an exogenous reduction in the cost of renegotiation makes DPOs more likely to result in future transfers of other loans. This suggests that borrowers opportunistically obtain transfers after they observe their servicer grant a favorable concession for another borrower.

Our paper is the first to provide evidence of the impact of principal writedowns on borrower behavior. Mayer, Morrison, Piskorski, and Gupta (2014) and Agarwal, Amromin, Ben-David, Chomsisengphet, Piskorski, and Seru (2017) examine whether strategic default occurs in *residential* mortgages in response to modifications and find mixed evidence. Other studies, including Hwang et al. (2016), Adelino et al. (2013), Maturana (2017), and Korgaonkar (2019), focus on the impact of modifications on redefault rates of residential mortgages. In the context of this existing literature, our results are important because they inform modification design in both the commercial and residential real estate markets. If CRE borrowers respond strategically to DPOs, then the expected payoff must be high because borrowers understand that servicers can assess their ability to pay, yet they still choose to seek renegotiation. This would suggest that principal forgiveness would be very likely to induce opportunistic behavior in residential markets given servicers have significantly less ability to assess residential borrowers' ability to pay.

Additionally, our results speak broadly to the unintended consequences of regulation designed to encourage loan renegotiation. This is particularly important in light of recent real estate market turmoil and the response of regulators. In April 2020, in response to anticipated distress due to the COVID-19 pandemic, the IRS granted additional safe harbor provisions that allow CRE loan forbearance and modifications to occur without jeopardizing REMIC tax status.[3] These provisions parallel the rule change we exploit in our empirical analysis. Although these types of policies, which are designed to encourage *proactive* renegotiation, may allow efficient resolution of certain distressed loans, they may also encourage borrowers who otherwise would perform to use the additional renegogiation flexibility to extract concessions from servicers.

[3]See `https://www.irs.gov/irb/2020-26_IRB` for more information on IRS Revenue Procedure 2020-26.

The remainder of the paper proceeds as follows. Section 2 describes the rule change, Section 3 describes the data and methodology, Section 4 presents the results, and Section 5 concludes.

2 Institutional Overview and Mechanism

When securitized commercial mortgages become distressed, they are transferred to a special servicer. The special servicer is responsible for working the loan out and/or initiating foreclosure. The servicer has many workout options available, including modifications such as term or interest rate changes, or DPOs. Although the borrower and special servicer can engage in discussions about modifications prior to a transfer or default (see Internal Revenue Service (2009) Section 3.11), the actual workout process can only begin after the loan has been transferred by the master servicer into special servicing. Once transferred, the borrower can engage directly with the special servicer and begin modifications or other renegotiations. Thus, the transfer event is the most significant event with respect to renegotiating the terms of the loan.

Transfers and subsequent loan renegotiation can have important consequences for the securitization vehicle used to pool mortgage loans and sell MBS bonds to investors. Real estate mortgage investment conduits (REMICs) are used in both residential and commercial MBS to pool loans and sell bonds to investors. REMICs themselves are exempt from federal taxes, and only the income earned by investors in the MBS is subject to federal tax. The tax-exempt status of the REMIC rests in part on whether it adheres to rules governing the types of mortgages it can hold. So long as the REMIC holds "qualifying mortgages" it remains tax-exempt, but it may lose this status if a non-trivial portion of the mortgage pool loses qualifying status. One reason a loan my lose its qualifying status is if it is modified, because significant modifications may be treated as an exchange of the original loan for a new (modified) loan. Because REMICs are prohibited from purchasing new mortgages or exchanging mortgages currently in the pool for others, a modification that constitutes an exchange or new purchase would threaten the REMIC tax exemption.

2.1 Revenue Procedure 2009-45

The barriers to loan modification that the REMIC tax rules created became a significant issue in 2007 as financial crisis-related mortgage distress increased. In response and in order to allow

for more efficient distressed loan resolution, the IRS, beginning in December 2007, issued a series of Revenue Procedures that provided safe harbor provisions for *residential* MBS REMICS. These Procedures stated that significant loan modifications would not trigger an IRS challenge of the tax-exempt status of REMICS, provided the loans met certain criteria.[4]

For securitized commercial real estate loans, these barriers were removed in September of 2009. Prior to September 2009, modifications did *not* nullify a loan's qualifying status, and hence did not threaten the REMIC tax status, so long as the modification was made either (1) after the loan had actually defaulted or (2) when default was "reasonably foreseeable." The "reasonably foreseeable" criterion was usually interpreted narrowly such that only defaults expected within, e.g., 2-3 months qualified.[5] Thus, prior to the rule change, a loan could only be transferred into special servicing and subsequently modified if it had experienced a default event or if a default was imminent. (Note that although transfer into special servicing itself would not threaten the tax status of the REMIC, transfer is a necessary condition for loan modification. Hence, transfers were in effect limited to cases in which the subsequent modifications would have been acceptable under the REMIC tax rules.)

The definition of a default depends on the loan documents and CMBS deal's Pooling and Servicing Agreement (PSA), but a standard definition is 60+ days delinquent, which means the loan has missed more than two monthly payments. Therefore, prior to the rule change a transfer and modification could take place after the loan became 60+ days delinquent, or if there was a reasonably foreseeable likelihood of it doing so within a few months.

In September 2009, in response to increasing levels of distress in the CMBS market, the IRS issued Revenue Procedure 2009-45 (Internal Revenue Service (2009).) Among other things, this rule significantly *relaxed* the criterion that required either an actual or reasonably foreseeable default in order for a loan to be modified without negative tax consequences. Section 5 of the Procedure states that "This revenue procedure applies to a modification...if...:"

> Based on all the facts and circumstances, the holder or servicer reasonably believes that there is a significant risk of default of the pre-modification loan upon maturity of the

[4]These Revenue Procedures include Rev. Proc. 2007-72, Rev. Proc. 2008-28, and Rev. Proc. 2008-47. See Beeman (2009) for a discussion.

[5]See, e.g., `https://www.seyfarth.com/news-insights/irs-announces-new-remic-rules.html` or `https://www.ballardspahr.com/alertspublications/legalalerts/2009-10-16_newirsguidanceoncommercial` for legal industry commentary on the reasonably foreseeable standard.

> loan or at an earlier date. This reasonable belief must be based on a diligent contemporaneous determination of that risk, which may take into account credible written factual representations made by the issuer of the loan if the holder or servicer neither knows nor has reason to know that such representations are false. In a determination of the significance of the risk of a default, one relevant factor is how far in the future the possible default may be. There is no maximum period, however, after which default is per se not foreseeable. For example, in appropriate circumstances, a holder or servicer may reasonably believe that there is a significant risk of default even though the foreseen default is more than one year in the future. Similarly, although past performance is another relevant factor for assessing default risk, in appropriate circumstances, a holder or servicer may reasonably believe that there is a significant risk of default even if the loan is performing.

In particular the procedure allows a transfer and modification so long as the servicer believes there is risk of default at some point in the future, but it does not specify a definite time frame. Additionally, the procedure provides for the determination of default based on borrower representations.

2.2 How does early renegotiation lead to imitation?

From a borrower's perspective, the key institutional change introduced by the Procedure is a reduction in the cost of renegotiation with the special servicer. Although borrowers could engage with the special servicer absent a default prior to the rule change, transfer and renegotiation could only take place once the loan had defaulted or was very close to default. Following the rule change, a borrower can engage with *and* begin renegotiating well in advance of a default. Thus, the rule change expands the ability of borrowers to proactively seek concessions regardless of the status of the loan. In particular it allows borrowers to request a transfer and modification even if they have no expectation of distress, so long as they can convince the special servicer there is a significant risk of default in the future.

This gives rise to the potential for financially healthy borrowers to imitate distressed borrowers if they believe they will obtain a favorable renegotiation outcome. One key concession borrowers can seek is a discounted payoff. Unlike a modification such as a temporary interest rate reduction

or a term extension, a DPO provides a principal reduction and allows the borrower to retain the property. Thus, DPOs are a potentially high-payoff concession that borrowers may be incentivized to pursue.

3 Data and Empirical Overview

We use data on CMBS loans originated between January 2000 and September 2013 from Trepp. We exclude agency deals and we supplement this data with Bloomberg data on delinquency commentary. In our empirical tests we focus on loan performance during the September 2005-September 2013 period.

3.1 Variable construction: measuring DPOs and transfers

We construct our DPO variables by combining Trepp's workout and prepayment code fields. For each loan that is in special servicing Trepp provides a workout code. The workout code can change during the duration of special servicing based on the strategy the special servicer is pursuing. For example, a servicer may initially pursue a modification strategy but then switch to a foreclosure strategy after six months. Additionally, Trepp lists prepayment codes for loans that either voluntarily prepay or are liquidated after a default.

We first identify all loans that have a prepayment code that indicates a DPO. We then add to that set any loans without a prepayment code of DPO but for which the last workout code available at the time of liquidiation indicates a DPO. We choose not to rely strictly on the workout code because we find it to be an inaccurate indicator of DPOs in particular. When we check the loans which Trepp codes as being in DPO against the actual delinquency commentary in Bloomberg we find a significant number of discrepancies. For example, we find a significant number of loans that Trepp codes as DPO but which the delinquency commentary indicates another workout strategy such as foreclosure or modification or note sale. Similarly, we find a number of loans that Trepp codes as not being in DPO but which the delinquency commentary indicates there is a DPO being pursued.[6]

[6]Although we have not checked every serviced loan in Trepp we have found that a number of these discrepancies occur when the loan is being "dual-tracked" in two different workout procedures. In these instances the delinquency commentary will indicate that a loan is being dual-tracked in, e.g., a foreclosure and a DPO. This indicates that the servicer is considering both options, but it is not clear whether either option is actually favored by the servicer.

To identify transfers to the special servicer we use Trepp's field for transfer dates. We identify the month in which the loan is transferred into special servicing and include both imminent default and actual default transfers in the analysis.

3.2 Measuring the impact of DPOs on transfer probability

We wish to estimate the impact of a DPO *on a different loan* by the *same* special servicer on the probability that a given loan is subsequently transferred. Our main dependent variable is an indicator $transfer_{i,s,t}$ equal to 1 if loan i serviced by special servicer s is transferred in month t. For loans that experience a transfer, this variable is set to 0 in months prior to transfer and missing in months following the transfer. For loans that never experience a transfer, this variable is always set to 0. Hence, the dependent variable only takes a value of 1 in months in which a loan is transferred. Our main independent variable is an indicator that is equal to 1 if special servicer s grants a DPO during a window of time prior to t and 0 otherwise.

Our empirical strategy exploits the reduction in the cost of transfer into special servicing following the change in the REMIC tax rule. This change went into effect on September 15, 2009.[7] We define the pre-regulation period as September 2005-September 2009 and the post-regulation period as October 2009-September 2013, giving us a balanced number of months in both periods. The variable *post* equals 1 in the post-regulation period and 0 otherwise.

We estimate:

$$transfer_{i,s,t} = \beta_0 + \beta_1 DPO_{s,t-k,t-k-j} + \beta_2 Post + \beta_3 PostxDPO + \beta_x Cont_{i,s,t} + \epsilon_{i,j,t} \qquad (1)$$

The independent variable $DPO_{s,t-k,t-k-j}$ is equal to 1 if special servicer s granted a DPO on a loan different than i in a time window k to $k-j$ months prior to t, and 0 otherwise.[8]

[7] The IRS made the change in tax law retroactive to January 1, 2008, in order to avoid jeopardizing the tax treatment of REMICs in which loans were modified prior to default in 2008 and the beginning of 2009. This retroactive application will not impact our results because we focus on the transfer event itself and not the tax treatment of REMICs.

[8] For our main analysis we put an additional restriction on the DPO variable and the loan on the left-hand side in that we exclude all loans that receive DPOs from the set of transfers. This means that the set of loans for which transfer is equal to 1 never receive a DPO in subsequent workouts. Similarly, the loans we use to define the main independent variable do not also appear as loans with transfer equal to 1. We allow the *deal* in which loan i resides to experience a DPO on a different loan during the time window over which the DPO variable is measured. In other words, if loan i resides in deal d, then deal d can experience a DPO for a different loan during the period from $t-k$ to $t-k-j$. This implies that a borrower can either observe a DPO from the special servicer from another deal or

We define our independent variable at a lag since borrowers may not respond immediately to DPOs they observe. It takes time for a given borrower to learn about DPOs their special servicer negotiates with other borrowers, and it also takes time for a borrower to determine whether there is a significant likelihood of receiving a similar favorable workout if they are transferred. Additionally, once a borrower decides to seek a transfer into special servicing, it may take time for the master servicer to actually agree to this.

We further define our main independent variable as a time *window* in order to account for the fact that borrowers may base their decision on special servicing outcomes they observe over a period of time, rather than in a single month. We estimate equation 1 using various DPO windows: $[t-6, t-12]$, $[t-7, t-10]$, $[t-6, t-9]$, $[t-5, t-8]$, $[t-4, t-7]$, and $[t-3, t-6]$.

As an example of the timing in equation 1, take the DPO and transfer that is visually represented in Figure 1. This loan is transferred in January 2008 such that $transfer_{i,s,t}$ is equal to 1 in January 2008. If we use the $[t-3, t-6]$ DPO window, then the variable $DPO_{s,t-3,t-6}$ is equal to 1 if special servicer s transferred a different loan between July and October 2007, and 0 otherwise. In robustness checks we also consider single-month lags of our DPO variable instead of time windows.

Controls in equation 1 include loan origination characteristics (LTV, coupon, occupancy rate, and debt service coverage ratio (DSCR)) and characteristics at the time of transfer (age, ratio of current unpaid balance to origination balance, LTV, occupancy rate, and DSCR). We include origination month, deal type, and property type fixed effects in all specifications. Additionally, we include either special servicer and MSA-by-month fixed effects, or special servicer-by-MSA and month fixed effects. The servicer and MSA-by-month fixed effects are particularly important as they allow us to account for characteristics of the servicer and local economic conditions that are correlated with the propensity to grant DPOs and the likelihood of a transfer. Alternatively, using servicer-by-MSA and month fixed effects allows us to include the *Post* variable in the regression and also accounts for MSA-specific strategies that servicers employ. We restrict our sample to loans serviced by special servicers who negotiated at least one DPO prior to the REMIC rule change and who do at least one DPO following the rule change.

from within the deal in which their loan resides. Our results do not change if we exclude DPOs from within the same deal.

3.3 Heterogeneity in DPOs

Our baseline empirical tests establish the impact of DPOs on the likelihood a loan is transferred, but there may be variation in the characteristics of DPOs that is important for the results. We conduct additional analysis that exploits heterogeneity in DPOs. Specifically we consider the possibility that the size of the principal reduction relative to the remaining unpaid principal balance (UPB) may matter for future strategic behavior on the part of other borrowers. If a special servicer negotiates a particularly large principal writedown, other borrowers may have a greater incentive to default than if the principal reduction is small relative to the remaining balance. To assess whether this is the case, we compute the size of the liquidation balance relative to the remaining UPB at the time of DPO. A larger liquidation balance relative to remaining UPB indicates a smaller DPO, whereas a smaller liquidation balance indicates the amount of principal written down was large relative to the UPB.

We observe the size of the liquidation balance for a subset of DPOs. In those cases, we use the liquidation balance relative to the UPB to define three alternative measures of DPO. The first is a variable equal to 1 if the liquidation balance is between 0% and 80% of the remaining UPB, the second is equal to 1 if the liquidation balance is between 10% and 100%, and the third is equal to 1 if the liquidation balance is between 10% and 80%. These three alternatives allow us to account for the potential that data errors produce very large DPOs (ratio less than 10%) or relatively small DPOs (ratio greater than 80%) and also allow us to determine whether larger DPOs (those with a ratio less than 80%) have a different impact than smaller DPOs.

3.4 Separating good borrowers from imitators

Because a loan may be transferred into special servicing when a borrower has experienced a legitimate negative cash flow shock or loss of a major tenant, not all transfers will be due to good borrowers imitating bad ones. Special servicers will not know ex-ante which borrowers are imitating. Furthermore, because we control for loan characteristics at the time of transfer in our empirical tests, we are unable to distinguish borrower types ex-ante econometrically. We therefore attempt to identify borrowers who were imitating ex-ante by focusing on how loans transferred into servicing perform. We expect different outcomes for loans that were transferred due to legitimate cash

flow problems vs loans transferred due to borrower imitation. In particular, a loan that ultimately realizes a full payoff ex-post is more likely to have been a high-quality loan ex-ante as compared to, e.g., a loan that is foreclosed on and liquidated for much less than the remaining unpaid principal balance.

To assess whether DPOs induce transfers that ultimately result in full payoffs, we condition our transfer variable on the size of the payoff relative to the remaining unpaid balance at the time the loan is resolved. To do this we use several Trepp fields. First, we use the prepayment and workout strategy codes to identify loans for which there is either a "Full Payoff" or "Full Payoff at Maturity." Second, we add to this set of loans any loan for which the size of the payoff relative to the remaining UPB is at least 95%. To do this, we use the Trepp field *curunschedprin* to define the amount of the payoff at the time the loan is resolved, and the field *disposedamount* to define the balance at the time of resolution payoff. We then define a variable *unschedsize* equal to the size of the payoff relative to the disposed amount. Finally, we consider a loan to have received a full payoff when *unschedsize* is greater than or equal to 95%.

After identifying loans that receive full payoffs, whether at or prior to maturity, we define a variable $transfer\_fullpay$ equal to 1 if the loan is transferred *and* subsequently fully pays off, and 0 otherwise. We then use this variable on the left-hand side of equation 1.

4 Results and discussion

Table 1 defines our variables, and Table 2 summarizes the data at the loan-month level for the September 2005 to September 2013 period. Note that our sample contains loans *originated* between January 2000 and September 2013, but we only analyze *performance* during the September 2005 to September 2013 window.

The total number of DPOs during the sample period is quite small at 1,730 (*dpo_indicator*), but the number of loan-months for which there was a DPO by the special servicer is high. Regardless of which window we consider, the average is roughly 80%. Table A.1 shows that averages are also high for the three alternative definitions of DPO that are based on different size cutoffs, with averages around 60%. Like the number of DPOs, the number of transfers, 11,307, is also small relative to the full sample of loan-month observations.

Figure 2 illustrates time trends in both DPOs and transfers during our sample period. Transfers to the special servicer increase significantly in 2008 at the onset of the financial crisis, and there are more than two times as many transfers in 2009 as there are in 2008, which is consistent with the REMIC regulation increasing the ease of transfer. DPOs are low until 2009, and there is a significant increase in DPOs beginning in 2010 and going through 2011 as loans that went into distress during the peak of the financial crisis conclude their workouts.

4.1 The impact of DPOs on transfers

Table 3 shows results for estimating equation 1 using a linear probability model.[9] We show the results for four windows: $[t-7, t-10]$, $[t-6, t-9]$, $[t-5, t-8]$, and $[t-4, t-7]$. (Additional time windows, as well as single-month lags of the DPO variable, are shown in Table 5). Columns 1-4 include MSA-by-month and special servicer fixed effects, whereas columns 5-8 include special servicer-by-MSA and month fixed effects, plus an indicator for the *Post* period. All columns include origination loan characteristics (LTV, coupon, occupancy rate, DSCR), current loan characteristics (age, ratio of current unpaid balance to origination balance, LTV, occupancy rate, and DSCR), and origination month, property type, and deal type fixed effects.

Across specifications the interaction terms $PostxDPO$ indicate the impact of DPOs is positive and significant following the REMIC rule change. This implies that a DPO by the special servicer increases the likelihood of a loan being transferred *conditional* on a reduction in the cost of engaging with the special servicer. The MSA-by-month fixed effects in columns 1-4 account for unobserved changes in local economic conditions that may be correlated with DPO and transfer activity. Similarly, the MSA-by-servicer fixed effects in columns 5-8 account for unobserved correlation between MSA-specific strategies employed by the special servicer and transfers and DPOs. Although we cannot include *Post* in columns 1-4 due to collinearity with the fixed effects, the *Post* variable is positive and significant in columns 5-8, consistent with an increase in transfers following the peak of the financial crisis.

The results in Table 3 are consistent with borrowers attempting to extract concessions from special servicers using the transfer process. Borrowers observe a DPO by their special servicer

[9] We use a LPM, as opposed to a nonlinear model such as probit, due to the fact that we include hundreds of fixed effects in our estimations and wish to avoid issues with incidental parameters.

and subsequently are transferred into servicing, and this occurs after an increase in the ability of borrowers to engage with servicers well in advance of any missed payments or other default events. Because we utilize MSA-by-month and, alternatively, special servicer-by-MSA, fixed effects, this cannot be explained by correlations between DPOs and local economic conditions or MSA-specific servicing strategies.

To provide additional evidence that DPOs induce financially-healthy borrowers to be transferred, Table 4 reports results of estimating our main equation with the variable $transfer\_fullpay$ on the left-hand side. This variable is equal to 1 if the transferred loan realizes a full payoff ex-post, and 0 otherwise. The interaction term is positive and mostly significant across DPO windows, indicating that DPOs increase the likelihood that loans realize full payoffs conditional on transfer. Because ex-ante high quality loans are more likely to pay off fully ex-post, this suggests that DPOs give good borrowers the incentive to obtain a transfer.

4.2 Robustness

Table 5 shows results for alternative time windows and single-month lags of the DPO variables. The results are qualitatively unchanged when we use either the $[t-3, t-6]$ or $[t-6, t-12]$ window. Additionally, all of the single-month lags except $t-5$ are significant.

Tables 6A-6C allow for heterogeneity in the size of the discounted payoff relative to the remaining UPB at the time of the DPO. We use DPOs between 0% and 80% of the UPB in Table 6A, between 10% and 100% in Table 6B, and between 10% and 80% in Table 6C. Regardless of how DPOs are defined based on the size, the interaction term is positive and significant across time windows.

Finally we allow for heterogeneity in the pre-rule-change time period. Figure 2 shows that transfers began to increase significantly in 2008 and were relatively level during 2009, whereas DPOs did not begin to increase significantly until 2009. Because the rule change did not occur until September 2009, our pre- period encompasses both the pre-financial crisis period, in which there is relatively modest transfer activity, and the period during the beginning and peak of the crisis, in which the amount of transfer activity is significant.

In order to capture potentially interesting variation during the peak crisis period, we define a second time period variable called $Interim$ which is equal to 1 between January 2008 and September 2009 and 0 otherwise. This variable therefore captures the peak crisis time period. We then interact

Interim with our DPO variables.

Table 7 reports the results. Columns 1-4 use special servicer and MSA-by-month fixed effects, and columns 5-8 use special servicer-by-MSA and month fixed effects. The interaction between *Post* and the DPO variables remains positive and significant, and consistent with an increase in transfers beginning in 2008, the *Post* and *Interim* variables are positive in columns 5-8. The interaction between *Interim* and the DPO variables is consistently negative across specifications, whereas the main DPO variables lose significance in several specifications. This suggests that the negative coefficient on the main DPO variables in Table 3 is primarily driven by the January 2008-September 2009 time period.

The negative impact of DPOs during the 2008-2009 time period may be due to borrowers anticipating the rule change. The IRS began relaxing modification rules for residential MBS in December 2007 when it issued Rev. Proc. 2007-72. This was followed by Rev. Proc. 2008-28 in June 2008 and Rev. Proc. 2008-47 in July 2008. The successive relaxation of tax rules for RMBS loans makes it plausible that CMBS borrowers anticipated similar relief. If this is the case, borrowers may have delayed transfer requests they otherwise would have made after observing a DPO in the time period immediately preceding the rule change.

5 Conclusion

We provide evidence of significant asymmetric information between borrowers and lenders in commercial real estate. Favorable loan renegotiation induces other borrowers to "default" opportunistically in an attempt to extract a similarly favorable outcome from the special servicer. Following an exogenous reduction in the cost of renegotiation, discounted payoffs induce a higher likelihood of transfer. Additionally, DPOs increase the likelihood that a loan fully pays off subsequent to transfer, which suggests that ex-ante good borrowers are more likely to obtain transfers following a DPO.

Our results are the first to detail the impact of principal writedowns on borrower behavior, and the first to study the consequences of the 2009 REMIC rule change on borrower incentives. Our findings are particularly important in light of the REMIC safe harbor provisions granted in April 2020 in response to COVID-19-induced commercial real estate distress. Like the rule change we

study, these provisions are designed to increase the ability of borrowers and servicers to engage prior to default. Although such provisions may allow efficient resolution of certain distressed loans, our results suggest that policies that allow for such preemptive renegotiation may also encourage borrowers who otherwise would perform to attempt to extract concessions from servicers.

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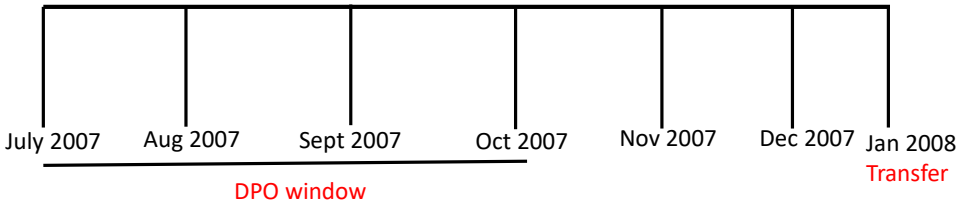

Figure 1: DPO-Transfer example

Notes: This figure illustrates the timing in our empirical specification when we use a DPO window of 3 months to 6 months prior to transfer.

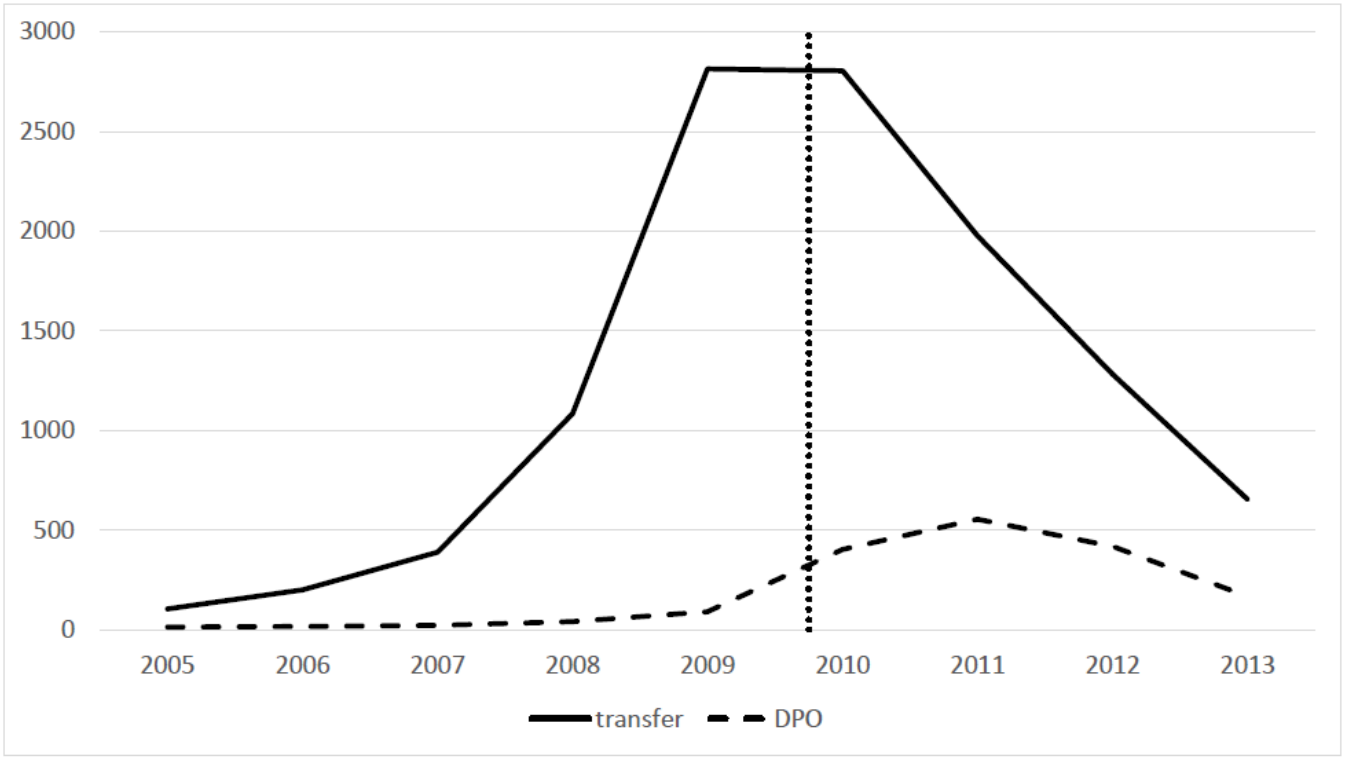

Figure 2: Transfers and DPOs over time

Notes: Data are for nonagency CMBS transfers and DPOs that took place between Sept 2005 and Sept 2013. CMBS deals originated between January 2000 and Sept 2013 are included. The vertical dashed line is September 2009.

Table 1: Variable definitions

Variable	**Definition**
DPO [-t,-t-n]	Indicator equal to 1 if loan special servicer negotiated a discounted payoff between t and t-n months prior
dpo_indicator	Indicator equal to 1 if DPO was negotiated in loan-month, 0 otherwise
transfer	Indicator equal to 1 if loan was transferred into special servicing, missing in all months following transfer, and 0 otherwise
transfer_fullpay	Indicator equal to 1 if loan was transferred into special servicing and received a full payoff, missing in all months following transfer, and 0 otherwise
post	Indicator equal to 1 for months between Oct 2009 and Sept 2013 and 0 for months between Sept 2005 and Sept 2009
Unschedsize	Size of payoff relative to the remaining unpaid principal balance at time of resolution
Orig LTV	Origination loan-to-value ratio
Orig coupon	Origination loan interest rate
Orig occ	Origination occupancy rate
Orig DSCR	Origination debt service coverage ratio
Age	Age of loan in months
Balratio	Unpaid principal balance divided by origination balance
Curr LTV	Current loan-to-value ratio
Curr occ	Current occupancy rate
Curr DSCR	Current debt service coverage ratio

Table 2: Summary statistics

variable	N	mean	p50	sd	min	max
transfer	4,352,981	0.0026	0	0.0509	0	1
transfer_fullpay	4,352,981	0.0008	0	0.0288	0	1
dpo_indicator	4,644,593	0.0004	0	0.0193	0	1
post	4,644,593	0.4903	0	0.4999	0	1
unschedsize	1,326,339	0.6663	0.985	0.3993	0	1
DPO[-3,-6]	4,644,593	0.8328	1	0.3732	0	1
DPO[-4,-7]	4,644,593	0.8281	1	0.3773	0	1
DPO[-5,-8]	4,644,593	0.8243	1	0.3806	0	1
DPO[-6,-9]	4,644,593	0.8196	1	0.3845	0	1
DPO[-7,-10]	4,644,593	0.8158	1	0.3876	0	1
DPO[-6,-12]	4,644,593	0.8939	1	0.3079	0	1
Orig LTV	4,597,045	67.5604	71.7	13.6009	10.6	82.9
Orig coupon	4,588,594	6.0774	5.89	0.8354	3.57	9.09
Orig occ	4,370,079	94.4008	97.5	7.8814	62.7	100
Orig DSCR	3,859,819	1.5599	1.36	0.8215	1.03	7.43
Age	4,644,593	18.4001	18	10.0896	1	54
Balratio	4,626,058	0.9383	0.9549	0.0797	0	1
Curr LTV	4,640,902	70.1235	72	21.2126	9.9	188.08
Curr occ	4,591,363	91.7045	96	11.2304	49.73	100
Curr DSCR	4,619,969	1.4825	1.374	0.5937	0.31	4.5705
Year	4,644,593	2009	2009	2	2005	2013
Origination year	4,644,593	2005	2005	2	2000	2013

Notes: 1) Summary statistics at the loan-month level. Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 2) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail.

Table 3: Impact of DPOs on transfer likelihood

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DPO[-5,-8]	-0.00037***				-0.00038***			
	(0.00011)				(0.00011)			
Post x DPO[-5,-8]	0.0013***				0.0012***			
	(0.00036)				(0.00036)			
DPO[-4,-7]		-0.00041***				-0.00044***		
		(0.00011)				(0.00011)		
Post x DPO[-4,-7]		0.0013***				0.0012***		
		(0.00032)				(0.00032)		
DPO[-6,-9]			-0.00063***				-0.00065***	
			(0.00011)				(0.00011)	
Post x DPO[-6,-9]			0.0016***				0.0015***	
			(0.00035)				(0.00034)	
DPO[-7,-10]				-0.00065***				-0.00068***
				(0.00011)				(0.00011)
Post x DPO[-7,-10]				0.0015***				0.0015***
				(0.00035)				(0.00035)
Post					0.026***	0.027***	0.026***	0.026***
					(0.0022)	(0.0022)	(0.0022)	(0.0022)
Observations	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318
R-squared	0.009	0.009	0.009	0.009	0.005	0.005	0.005	0.005
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	N	N	N	N
PropType FE	Y	Y	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y	Y	Y
Curr Month FE	N	N	N	N	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	N	N	N	N
SS-MSA FE	N	N	N	N	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 4: Full payoff transfers

	(1)	(2)	(3)	(4)	(5)	(6)
DPO[-5,-8]	-0.00012*					
	(0.000061)					
Post x DPO[-5,-8]	0.00040					
	(0.00025)					
DPO[-4,-7]		-0.00016***				
		(0.000061)				
Post x DPO[-4,-7]		0.00033				
		(0.00023)				
DPO[-6,-9]			-0.00026***			
			(0.000063)			
Post x DPO[-6,-9]			0.00043*			
			(0.00024)			
DPO[-7,-10]				-0.00032***		
				(0.000062)		
Post x DPO[-7,-10]				0.00051**		
				(0.00023)		
DPO[-3,-6]					-0.00011*	
					(0.000059)	
Post x DPO[-3,-6]					0.00042*	
					(0.00021)	
DPO[-6,-12]						-0.00047***
						(0.000086)
Post x DPO[-6,-12]						-0.00016
						(0.00045)
Observations	2,655,259	2,655,259	2,655,259	2,655,259	2,655,259	2,655,259
R-squared	0.005	0.005	0.005	0.005	0.005	0.005
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	Y	Y
PropType FE	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The dependent variable is equal to 1 if the loan was transferred and realized a full payoff ex-post, and 0 otherwise. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 5: DPOs and transfers: alternative time windows

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DPO[-6,-12]	-0.0010***						
	(0.00014)						
Post x DPO[-6,-12]	0.00077**						
	(0.00039)						
DPO[-3,-6]		-0.00033***					
		(0.00011)					
Post x DPO[-3,-6]		0.00037					
		(0.00028)					
DPO[-3]			-0.00033***				
			(0.000085)				
Post x DPO[-3]			0.00040**				
			(0.00020)				
DPO[-4]				-0.00014			
				(0.000084)			
Post x DPO[-4]				0.00092***			
				(0.00020)			
DPO[-5]					0.000039		
					(0.000091)		
Post x DPO[-5]					0.00022		
					(0.00020)		
DPO[-6]						-0.000081	
						(0.000090)	
Post x DPO[-6]						0.00089***	
						(0.00020)	
DPO[-7]							-0.00016*
							(0.000090)
Post x DPO[-7]							0.00079***
							(0.00020)
Observations	2,234,263	2,334,079	2,540,697	2,542,195	2,543,670	2,545,391	2,547,277
R-squared	0.010	0.009	0.009	0.009	0.009	0.009	0.009
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	Y	Y	Y
PropType FE	Y	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 6A: DPOs and transfers: variation in size of DPO

(0,80%] of UPB

	(1)	(2)	(3)	(4)	(5)	(6)
DPO[-6,-12]	-0.00077***					
	(0.00016)					
Post x DPO[-6,-12]	0.0010***					
	(0.00032)					
DPO[-5,-8]		-0.00049***				
		(0.00016)				
Post x DPO[-5,-8]		0.0010***				
		(0.00027)				
DPO[-4,-7]			-0.00065***			
			(0.00016)			
Post x DPO[-4,-7]			0.0010***			
			(0.00026)			
DPO[-6,-9]				-0.00061***		
				(0.00016)		
Post x DPO[-6,-9]				0.0012***		
				(0.00026)		
DPO[-7,-10]					-0.00074***	
					(0.00016)	
Post x DPO[-7,-10]					0.0013***	
					(0.00027)	
DPO[-3,-6]						-0.00075***
						(0.00015)
Post x DPO[-3,-6]						0.00073***
						(0.00026)
Observations	2,338,623	2,429,481	2,425,837	2,433,947	2,438,785	2,422,097
R-squared	0.009	0.009	0.009	0.009	0.009	0.009
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	Y	Y
PropType FE	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO measure in this panel is equal to 1 only if the size of the DPO is greater than 0% but less than or equal to 80% of the remaining unpaid principal balance. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 6B: DPOs and transfers: variation in size of DPO

[10%,100%] of UPB

	(1)	(2)	(3)	(4)	(5)	(6)
DPO[-6,-12]	-0.00061***					
	(0.00011)					
Post x DPO[-6,-12]	0.0010***					
	(0.00033)					
DPO[-5,-8]		-0.00037***				
		(0.00012)				
Post x DPO[-5,-8]		0.00098***				
		(0.00027)				
DPO[-4,-7]			-0.00052***			
			(0.00012)			
Post x DPO[-4,-7]			0.00083***			
			(0.00026)			
DPO[-6,-9]				-0.00061***		
				(0.00012)		
Post x DPO[-6,-9]				0.0012***		
				(0.00026)		
DPO[-7,-10]					-0.00053***	
					(0.00012)	
Post x DPO[-7,-10]					0.0011***	
					(0.00026)	
DPO[-3,-6]						-0.00049***
						(0.00012)
Post x DPO[-3,-6]						0.00060**
						(0.00026)
Observations	2,302,485	2,400,355	2,395,866	2,405,755	2,411,440	2,391,542
R-squared	0.010	0.009	0.009	0.009	0.009	0.009
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	Y	Y
PropType FE	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO measure in this panel is equal to 1 only if the size of the DPO is greater than or equal to 10% but less than or equal to 100% of the remaining unpaid principal balance. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 6C: DPOs and transfers: variation in size of DPO

[10%,80%] of UPB

	(1)	(2)	(3)	(4)	(5)	(6)
DPO[-6,-12]	-0.00077***					
	(0.00016)					
Post x DPO[-6,-12]	0.0011***					
	(0.00031)					
DPO[-5,-8]		-0.00048***				
		(0.00016)				
Post x DPO[-5,-8]		0.0010***				
		(0.00027)				
DPO[-4,-7]			-0.00066***			
			(0.00016)			
Post x DPO[-4,-7]			0.00094***			
			(0.00026)			
DPO[-6,-9]				-0.00060***		
				(0.00016)		
Post x DPO[-6,-9]				0.0012***		
				(0.00026)		
DPO[-7,-10]					-0.00073***	
					(0.00016)	
Post x DPO[-7,-10]					0.0012***	
					(0.00026)	
DPO[-3,-6]						-0.00075***
						(0.00015)
Post x DPO[-3,-6]						0.00070***
						(0.00026)
Observations	2,345,834	2,435,569	2,432,041	2,439,889	2,444,622	2,428,408
R-squared	0.009	0.009	0.009	0.009	0.009	0.009
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	Y	Y
PropType FE	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO measure in this panel is equal to 1 only if the size of the DPO is greater than or equal to 10% but less than or equal to 80% of the remaining unpaid principal balance. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

Table 7: DPOs and transfers: heterogeneity in pre-regulation time period

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DPO[-5,-8]	-0.000035				-0.000045			
	(0.000091)				(0.000091)			
Post x DPO[-5,-8]	0.00099***				0.00084**			
	(0.00036)				(0.00036)			
Interim x DPO[-5,-8]	-0.00066***				-0.00066***			
	(0.00018)				(0.00018)			
DPO[-4,-7]		-0.000017				-0.000031		
		(0.000091)				(0.000092)		
Post x DPO[-4,-7]		0.00093***				0.00079**		
		(0.00032)				(0.00032)		
Interim x DPO[-4,-7]		-0.00077***				-0.00079***		
		(0.00018)				(0.00018)		
DPO[-6,-9]			-0.00020**				-0.00020**	
			(0.000092)				(0.000092)	
Post x DPO[-6,-9]			0.0012***				0.0010***	
			(0.00035)				(0.00034)	
Interim x DPO[-6,-9]			-0.00085***				-0.00087***	
			(0.00018)				(0.00018)	
DPO[-7,-10]				-0.00015*				-0.00016*
				(0.000089)				(0.000089)
Post x DPO[-7,-10]				0.0010***				0.00094***
				(0.00035)				(0.00034)
Interim x DPO[-7,-10]				-0.00100***				-0.0010***
				(0.00018)				(0.00018)
Post					0.027***	0.027***	0.027***	0.028***
					(0.0022)	(0.0022)	(0.0022)	(0.0022)
Interim					0.016***	0.016***	0.016***	0.017***
					(0.0011)	(0.0011)	(0.0011)	(0.0011)
Observations	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318	2,585,318
R-squared	0.009	0.009	0.009	0.009	0.005	0.005	0.005	0.005
Loan characteristic ctrls	Y	Y	Y	Y	Y	Y	Y	Y
SS FE	Y	Y	Y	Y	N	N	N	N
PropType FE	Y	Y	Y	Y	Y	Y	Y	Y
DealType FE	Y	Y	Y	Y	Y	Y	Y	Y
Orig Month FE	Y	Y	Y	Y	Y	Y	Y	Y
Curr Month FE	N	N	N	N	Y	Y	Y	Y
MSA-Month FE	Y	Y	Y	Y	N	N	N	N
SS-MSA FE	N	N	N	N	Y	Y	Y	Y
SE Clust by loan	Y	Y	Y	Y	Y	Y	Y	Y

Notes: 1) Results of estimating linear regressions of transfer likelihood on DPO measures and controls. The DPO variables are measured at the special servicer-month level and all other variables are at the loan-month level. We limit the data to special servicers who negotiate at least one DPO prior to and following the REMIC rule change. 2) Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 3) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail. 4). $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors clustered at the loan level.

A Appendix

Table A.1: Summary statistics - alternative DPO measures

	variable	N	mean	p50	sd	min	max
DPO (0,80%]	DPO[-3,-6]	4,644,593	0.6137	1	0.4869	0	1
	DPO[-4,-7]	4,644,593	0.6022	1	0.4894	0	1
	DPO[-5,-8]	4,644,593	0.593	1	0.4913	0	1
	DPO[-6,-9]	4,644,593	0.5833	1	0.493	0	1
	DPO[-7,-10]	4,644,593	0.5742	1	0.4945	0	1
DPO [10%,100%)	DPO[-3,-6]	4,644,593	0.6636	1	0.4725	0	1
	DPO[-4,-7]	4,644,593	0.654	1	0.4757	0	1
	DPO[-5,-8]	4,644,593	0.6467	1	0.478	0	1
	DPO[-6,-9]	4,644,593	0.639	1	0.4803	0	1
	DPO[-7,-10]	4,644,593	0.632	1	0.4823	0	1
DPO [10%,80%]	DPO[-3,-6]	4,644,593	0.6116	1	0.4874	0	1
	DPO[-4,-7]	4,644,593	0.6001	1	0.4899	0	1
	DPO[-5,-8]	4,644,593	0.591	1	0.4917	0	1
	DPO[-6,-9]	4,644,593	0.5812	1	0.4934	0	1
	DPO[-7,-10]	4,644,593	0.5721	1	0.4948	0	1

Notes: 1) Summary statistics at the loan-month level for alternative DPO measures. $DPO(0, 80\%]$ is equal to 1 for DPOs greater than 0% but less than or equal to 80% of the remaining UPB. $DPO[10, 100\%]$ is equal to 1 for DPOs greater than or equal to 10% but less than or equal to 100% of the remaining UPB. $DPO[10\%, 80\%]$ is equal to 1 for DPOs greater than or equal to 10% but less than or equal to 80% of the remaining UPB. Data is from Trepp for CMBS deals originated from January 2000-September 2013, with performance measured from September 2005-September 2013. 2) All variables defined in Table 1. Variables are winsorized at the 1% level in each tail.