Rate Lock in Commercial Real Estate *

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Abstract

We document the existence and impact of fixed rate mortgage lock-in in commercial real estate loans. Using data on securitized commercial mortgages (CMBS), we find that the average property is roughly 6% less likely to sell over a ten year period when the current market interest rate rises 100bp above the fixed rate on the mortgage. This reduction in sales probability is commensurate with an increase in sales price. In particular, our results suggest a roughly 9% increase in sales price associated with a 100bp gap between current market rates and the mortgage rate, for the average property.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect the opinions of the Federal Reserve Board or anyone in the Federal Reserve System.

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1. INTRODUCTION

The high interest rate environment of 2022-2024 generated an interest rate "lock-in" effect that reduced incentives for fixed-rate mortgage borrowers to relocate. Motivated by the existing literature that studies the impact of this rate lock-in in residential real estate (e.g., Ferreira, Gyourko, and Tracy (2010), Fonseca and Liu (Forthcoming), Aladangady, Krimmel, and Scharlemann (2024), Batzer, Coste, Doerner, and Seiler (2024), and Liebersohn and Rothstein (2024)), in this paper we seek to (1) establish the existence of rate lock-in in commercial real estate (CRE) and (2) study the impact of rate lock-in on prices. Studying fixed rate mortgage lock-in in CRE is important because it can inform optimal CRE mortgage design and improve our understanding of post-COVID price dynamics.

We study the impact of lock-in using the commercial mortgage backed securities (CMBS) market. CMBS loans are a particularly advantageous setting because most CMBS loans are fixed rate and approximately 10 years to maturity at issue. This is important because the lock-in effect should be the most salient for longer-term fixed rate debt. In contrast, as shown by, e.g., Glancy, Kurtzman, and Loewenstein (2022) and Glancy, Krainer, Kurtzman, and Nichols (2021), most bank loans are floating rate and shorter term, which would make bank loans a less ideal setting in which to study our questions.

Our key variable of interest, which we call Δ^{-}, is based on the difference between the origination interest rate on loan i and the current average rate on loans of the same property type as i (the "market rate"). Because the rate lock effect should only be salient when the current market rate *exceeds* the rate on loan i, we set Δ^{-} equal to the difference between the rate on loan i and the market rate when the rate on loan i is less than or equal to the market rate, whereas we set it equal to 0 when the rate on loan i is above the market rate. Thus, Δ^{-} captures the fundamental asymmetry in how fixed-rate borrowers should respond to changes in mortgage rates: when rates rise, borrowers become locked into their low rate, and the degree of lock in is increasing in the gap between their rate and the current market rate. However, when rates fall, borrowers are not subject to lock in.

In our first set of empirical tests, we estimate the likelihood of a CRE property sale as

a function of Δ^- and other observables. Our results suggest that, for the average property, a 1 percentage point more negative interest rate differential is associated with a roughly 6% lower probability of transaction over a ten year period (which is the average term of a CMBS mortgage in our sample). Our second set of tests suggests a price impact commensurate with a reduction in sale likelihood. Specifically, a 1 percentage point more negative rate differential is associated with a roughly 9% increase in sales price.

2. INSTITUTIONAL DETAIL

The U.S. CRE market is dominated by a few large lender types, including banks, CMBS, and insurance companies, that significantly vary in the loan terms they offer. Glancy, Krainer, Kurtzman, and Nichols (2021) provide a comprehensive analysis of the differences in terms of average interest rate, LTV, size, property type, and term. In this paper we focus on CMBS loans. Like most residential mortgages, most CMBS loans are fixed rate, which leads to the potential for the lock-in effect that is the focus of this paper. Despite this and a few other similarities, the standard CMBS loan contains many features that are distinct from the residential mortgages that are the focus of the existing literature. First, most CMBS loans are less than or equal to ten years to maturity.[1] Additionally, they are often either non- or partially-amortizing, which necessitates either a property sale or refinancing at the end of the holding period in order to pay the balloon balance. CMBS loans are also often assumable, which allows a new owner to assume the existing mortgage on the property when it is sold.

Unlike residential mortgages which, post-GFC, are generally prepayable without penalty, all CMBS loans feature prepayment lock-out periods that are followed by defeasance or yield maintenance provisions that penalize prepayment.[2] Thus, CMBS loans may not prepay as quickly as residential mortgages after rates drop. Despite this, CMBS borrowers still face strong refinance incentives when rates drop significantly.

[1] Recent evidence from An, Cordell, and Smith (2023) suggest that, post-GFC, the CMBS market is shifting away from 10-year, fixed rate loans and into shorter-term floating rate loans. We restrict our sample to fixed rate CMBS only, and as shown in Table 2, the loans in our sample are primarily 10-year loans.

[2] Defeasance is the most common type of prepayment clause used in CMBS. With defeasance, if a borrower prepays, they are required to supply a portfolio of risk-free securities (typically U.S. Treasuries) to the investor that can replicate the payments of the loan through its maturity date.

3. DATA AND EMPIRICAL METHODOLOGY

Our primary dataset is based on transaction-level data from MSCI Real Capital Analytics (RCA), which is comprehensive for transactions above $2.5 million in value in the U.S. We begin with the information on all sales and refinancings that are associated with CMBS loans since 2003. Because RCA provides point-in-time data at the time of a transaction, rather than a time series for each property such that we have a panel, we construct a panel after cleaning the data.

Cleaning the RCA data proceeds in several steps. First, we drop transactions that have missing values for any of the following: interest rate, interest rate type (necessary for identifying fixed rate loans), origination date, maturity date, loan amount, debt service coverage ratio (DSCR), transaction value, property type, property geography, and lender type. We also drop transaction associated with loans with interest rates outside the 99.9th or 0.1th percentiles in order to get rid of erroneous loan rates. We only keep loans that are fixed rate and we also drop hotel loans given there are very few in our sample.

After cleaning the transaction-level data, we create create a loan panel at the monthly frequency by carrying forward observations between the most recent transaction and the date of the next transaction. For observations without a second transaction, we carry forward the information to the the maturity date of the loan. We drop any observations that occur before loan origination or after loan maturity. For loans with a transaction date greater than the last date in RCA, we only keep through the last date in RCA. The loan panel thus spans from 2001 through May 2024.

After constructing the loan-month panel, we undertake additional cleaning. First, we require that loans have at least 12 months of data. Second, we drop properties without RCA property quality (Q)-scores,[3] age, or size, as these variables are necessary for the empirical analysis. Third, we drop distressed sales.[4]

[3] Q-score is a measure created by RCA to measure the relative quality of the property as compared with other properties in a locality. See Glancy, Kurtzman, and Loewenstein (2024) for further details on this measure.

[4] We use the *DistressedStatus* variable at the time of repeat sale with "LenderREO", "Potentially Troubled", and "Troubled" as the exact fields, respectively.

3.1. *Empirical Methodology*

Construction of our key independent variable of interest is based on Fonseca and Liu (Forthcoming). We first construct the difference between the interest rate on a CMBS loan[5] at origination and the prevailing market interest rate for similar CMBS loans in a given month:

$$\Delta_{i,p,t} = r_{i,p,orig} - R_{p,t}, \tag{1}$$

where $r_{i,p,orig}$ is the interest rate associated with loan i on property type p originated in month $orig$ and $R_{p,t}$ is the average interest rate for fixed-rate CMBS loans of property type p originated in month t.

A key aspect of our empirical design is that the mortgage rate differential captured by $\Delta_{i,p,t}$ should only impact sales when it is negative. This is because when $\Delta_{i,p,t} \geq 0$ the property owner can sell the existing property and buy a new property using a mortgage with a rate lower than the rate they have on the existing property. In this environment we do not expect the lock-in effect to be strong after controlling for other determinants of sale. In contrast, when $\Delta_{i,p,t} < 0$, if the property owner sells and puts their equity into a new property, they will be forced to borrow at a mortgage rate that is higher than the rate they have on the existing property. In this environment we do expect a lock-in effect to after controlling for other determinants of sale.

We capture this asymmetry by defining our key independent variable of interest, $\Delta^{-}_{i,p,t}$, in the following way:

$$\Delta^{-}_{i,p,t} = \begin{cases} 0 & \text{if } \Delta_{i,p,t} \geq 0, \\ \Delta_{i,p,t} & \text{if } \Delta_{i,p,t} < 0. \end{cases}$$

This variable incorporates the idea that the lock-in effect should not "bite" unless the current market rate is higher then the fixed rate on the property associated with loan i.

We then estimate:

$$\text{Sale}_{i,p,t} = \beta \Delta^{-}_{i,p,t-1} + \eta_1 X_i + \eta_2 Z_{i,t-1} + \zeta_{i,t} + \varepsilon_i \tag{2}$$

[5] Although the RCA data is at the property-level, we construct our panel dataset using the loan associated with each particular property. Therefore, our key variable of interest is at the loan level, rather than the property level.

where $\text{Sale}_{i,p,t}$ is an indicator equal to 1 when the property associated with loan i is sold in month t, and 0 otherwise.

Controls that do not vary with the time (X_i) include the log of the previous transaction price of the property in 2017 dollars, the LTV at origination, an indicator for whether LTV is greater than 80%, the DSCR at the time of first transaction for the property, the Q-score of the property, the square footage of the property, and whether the property is located in a central business district (CBD). Time-varying controls ($Z_{i,t-1}$, which are lagged one month) are property age and age-squared and the remaining term on the loan. In some specifications, we interact the remaining term on the loan with $\Delta^{-}_{i,p,t}$. Fixed effects ($\zeta_{i,t}$) include property type×month, owner type[6], CBSA, and whether the loan is associated with a refinancing. Standard errors are clustered at the CBSA×property type level.

To estimate the impact the relative rate has on sale price, we reestimate a version of equation 2 in which the dependent variable is the log transaction price. For this regression, we collapse the panel to a dataset of repeat transactions in which each property is observed at least twice. In this dataset, the timing of observables is such that t is the month of sale, $t-1$ is the month before the sale, and $t=0$ is the date of loan origination or previous transaction, whichever is later. Our price equation has the following form:

$$\text{LnPrice}_{i,p,t} = \beta\Delta^{-}_{i,p,t-1} + \eta_1 Z_{i,t-1} + \eta_1 Z_{i,t=0} + \zeta_{i,t} + \varepsilon_i \tag{3}$$

Here, controls at the time of origination ($t=0$) are LTV, an indicator for whether origination LTV is greater than 80%, DSCR, and the origination term to maturity. The controls as of month $t-1$ (many of which are fixed through the term of the loan) are property size, age, age-squared, Q-score, and whether the property is located in a CBD. Fixed effects ($\zeta_{i,t}$) include property type×month, owner type, CBSA, and whether the loan is associated with a refinancing. Standard errors are clustered at the CBSA×property type level.

[6]We group owner types in a manner similar to the groupings in Ghent (2021).

4. RESULTS

Table 1 summarizes our data at the loan-month level, and Table 2 summarizes at the loan level. Panel A of Table 2 summarizes all loans in our sample. Because the focus of our study is on transaction likelihood and prices, we also break our sample into two parts, which are summarized in Panels B and C. In Panel B we summarize loans associated with properties that are sold before or at maturity. For these loans, we observe at least one sale in the sample period. In contrast, in Panel C we summarize loans associated with properties that are not sold before or at maturity in our sample. For these loans, therefore, the dependent variable is always 0 in the regressions of sales probability and always missing in the regressions of prices.

Table 3 tabulates property type counts for all transactions in our sample. We exclude agency CMBS deals, and because of the large portion of the multifamily market that is comprised of agency loans, the count of multifamily loans is very low relative to the other major property types. Table 4 tabulates owner types.

Figure 1 plots the number of loans outstanding in our loan panel each month. The counts begins to decline in the aftermath of the GFC and level off around 2016 when the CMBS "wall of maturities" began to refinance. Figure 2 plots the number of property sales for the loans in our sample. There are noticeable declines in sales volume following the GFC, during COVID, and during the 2022-2024 period of rising interest rates. Figure 3 plots sales counts by remaining term to maturity at the time of sale. Because the standard CMBS loan term is 10 years, we group loans into ten 1-year remaining term buckets and plot the sales counts by bucket. Sales frequency is highest in the 1 year remaining bucket, consistent with property owners being more likely to sell when they need funds to repay the maturing balloon balance.[7] Sales frequency is relatively stable in the 2-year to 9-year buckets, and then drops again for loans with more than 9 years remaining to maturity.

Figure 4 plots the interest rate differential $\Delta_{i,p,t}$ over time. We present the series both unweighted and weighted by property value. The differential declines and is persistently negative at two points in the sample: during the aftermath of the GFC, and during the 2022-2024 rate

[7] CMBS loans within 3 months of maturity can usually be paid off without defeasance or yield maintenance penalties.

increases. The latter period is notable due to the magnitude of the negative differential.

4.1. Main results

Table 5 reports the results of estimating equation 2. The dependent variable is equal to 1 if the property associated with loan i is sold in month t and 0 otherwise, and we multiply the dependent variable by 100 to ease in interpretation of the results. All columns include property type$\times$month fixed effects, owner type fixed effects, CBSA fixed effects, and an indicator for whether the loan was initially associated with a refinancing. Column 1 reports our most parsimonious specification. The sign on Δ^- is positive and significant, which indicates that as the interest rate differential becomes more negative, the likelihood of sale decreases. The coefficient can be interpreted as follows. When the rate differential is negative, a 100bp reduction in the rate differential is associated with a 0.064% lower probability of a sale. Because the dataset is at a monthly rate, this specification implies a roughly 77bp lower probability of a sale over the year, or -7.7% over the life of the loan.

Columns 2 through 5 incorporate the remaining term to maturity as a control variable. As Figure 3 shows, properties with loans closer to maturity are more likely to sell, therefore incorporating the the remaining term is important. In columns 2 and 3, we control for the remaining term as a continuous variable, whereas in columns 4 and 5, we control for the remaining term in a way that allows us to incorporate nonlinearity. Specifically, in columns 4 and 5 we include indicators for less than 1 year remaining and greater than five years remaining, such that the excluded category is loans with between 1 and 5 years remaining. In column 4 we include these controls on their own, whereas in column 5 we interact them with the main variable of interest. The interaction terms allow us to capture the possibility that the lock-in effect is stronger for loans further from maturity. The coefficient on Δ^- remains positive and significant. In the most saturated specification in column 5, the coefficient indicates a 0.0526% lower monthly probability of a sale for a 100bp reduction in the rate differential, which implies a roughly -6.2% reduction over the life of the loan.

In addition to investigating sales probability, in Table 6 we report the results of estimating equation 3, in which the log of sales price is the dependent variable. The sign on Δ^- is negative

and significant, which indicates that as the interest rate differential becomes more negative and hence exposes the owner to more rate lock-in, the sales price increases. The coefficient on our baseline specification in column 1 indicates that a 100bp reduction in the rate differential is associated with a 9.68% higher sales price.

4.2. Robustness

To establish robustness of our sales and prices regressions, we recalculate our main independent variable of interest using Trepp CMBS data. Because Trepp does not contain transaction prices, we are unable to use it for our primary analysis. However, like RCA, Trepp contains comprehensive information on interest rates for CMBS loans. We use Trepp to construct the market rate by month and property type $R_{p,t}$ and then recalculate the interest rate differential for our RCA loan sample using the Trepp market rate. We then recalculate Δ^{-} and reestimate equations 2 and 3 and report the results in Tables 7 and 8. The results are qualitatively similar to those in our main analysis.

5. CONCLUSION

We document the existence and impact of fixed rate mortgage lock-in in CMBS loans. For a 100bp increase in market interest rates relative to the fixed mortgage rate on the average property, our results suggest a significantly lower sales probability and higher price conditional on sale. Additionally, our results are consistent with a recent and growing literature that documents the effects of rate lock-in in residential real estate.

References

ALADANGADY, A., J. KRIMMEL, AND T. SCHARLEMANN (2024): "Locked In: Rate Hikes, Housing Markets, and Mobility," Working Paper.

AN, X., L. CORDELL, AND N. SMITH (2023): "CMBS Market Evolution and Emerging Risks," Working Paper.

BATZER, R., J. COSTE, W. DOERNER, AND M. SEILER (2024): "The Lock-In Effect of Rising Mortgage Rates," Working Paper.

FERREIRA, F., J. GYOURKO, AND J. TRACY (2010): "Housing busts and household mobility," Journal of Urban Economics, 68, 34–45.

FONSECA, J. AND L. LIU (Forthcoming): "Mortgage Lock-In, Mobility, and Labor Reallocation," Journal of Finance.

GHENT, A. C. (2021): "What's wrong with Pittsburgh? Delegated investors and liquidity concentration," Journal of Financial Economics, 139, 337–358.

GLANCY, D., J. KRAINER, R. J. KURTZMAN, AND J. NICHOLS (2021): "Intermediary Segmentation in the Commercial Real Estate Market," Journal of Money, Credit and Banking.

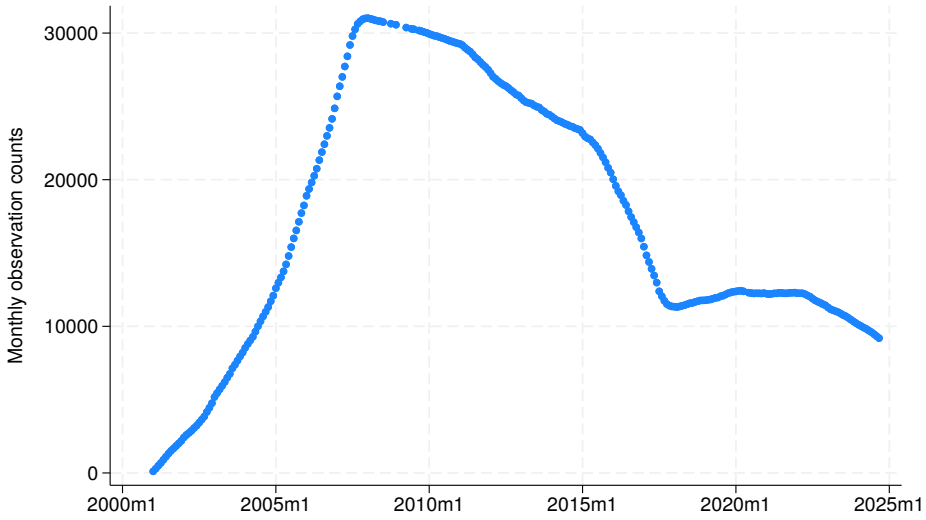
GLANCY, D., R. KURTZMAN, AND L. LOEWENSTEIN (2024): "CRE redevelopment options and the use of mortgage financing," Real Estate Economics.

GLANCY, D., R. J. KURTZMAN, AND L. LOEWENSTEIN (2022): "Loan Modification and the Commercial Real Estate Market," Working paper.

LIEBERSOHN, J. AND J. ROTHSTEIN (2024): "Household Mobility and Mortgage Rate Lock," Working Paper.

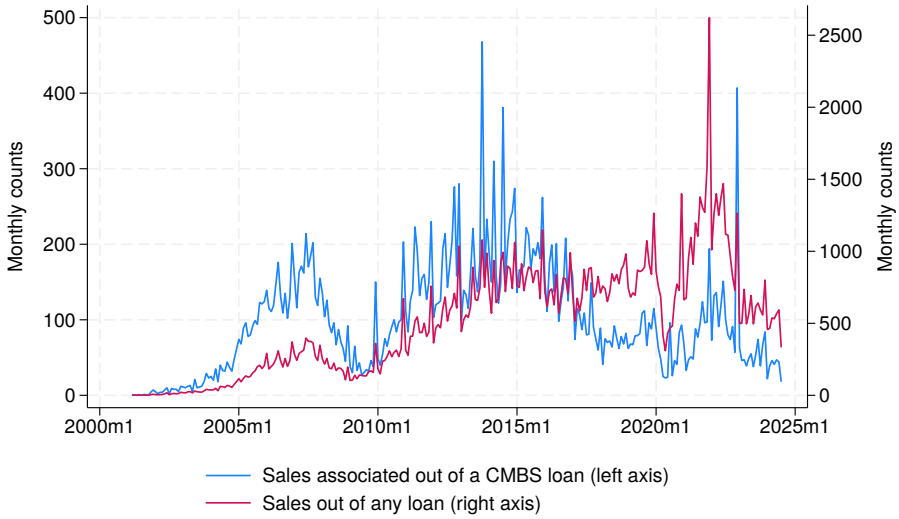
FIGURES

Figure 1: Counts of loan-panel observations over time



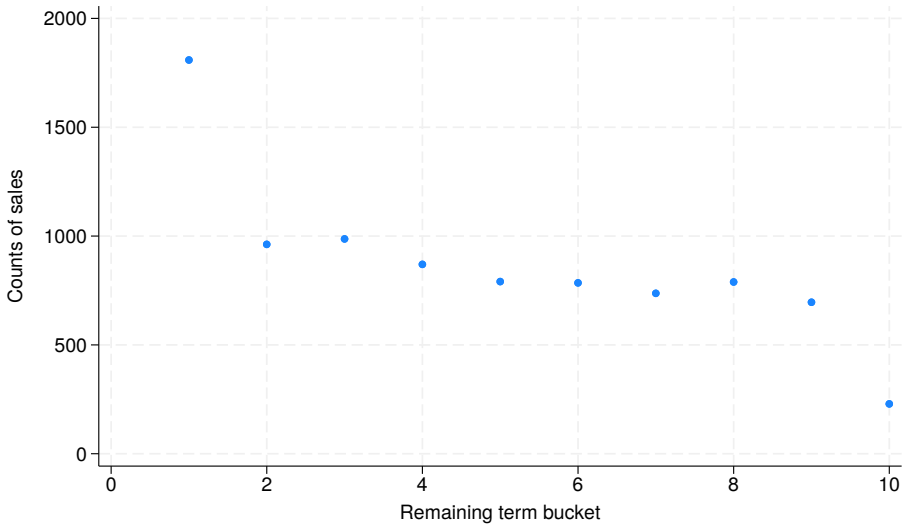
Note: The figure plots counts of observations in our loan panel by month in the sample of data used in our analysis.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 2: Sales over Time in the Overall RCA Sample of Loans



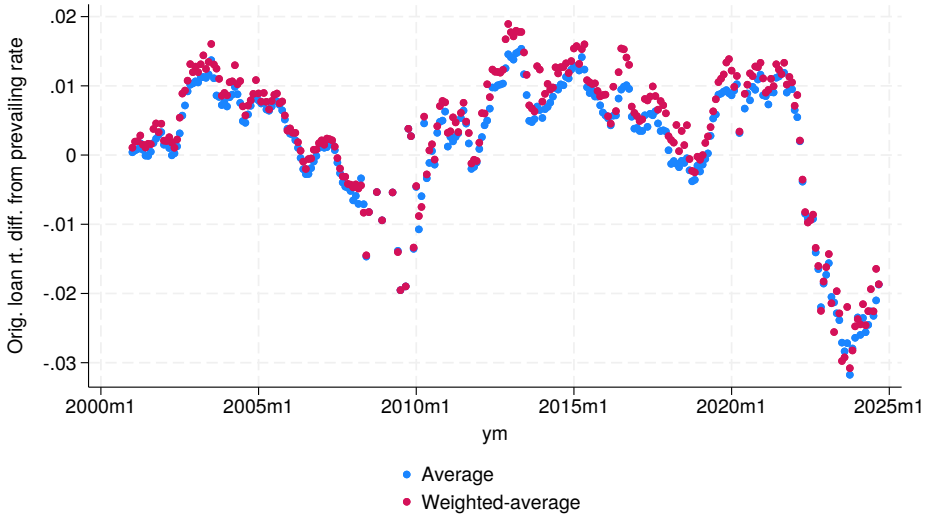
Note: The figure plots counts of the sales out of existing transactions ("repeat sales") for any loan (right axis) and just CMBS loans (left axis).
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 3: Sales by Term Remaining Bucket



Note: The figure plots a scatter of counts of the sales out of existing transactions ("repeat sales") by term remaining year bucket (0-1 years, 1-2 years, ..., 9+ years).
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 4: Average Relative Rate over Time



Note: The figure the average and weighted (by property value) average of the relative rate (defined in (1)) over time.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

TABLES

	Count	Mean	Median	SD	Min	Max
$\mathbb{1}$ for $<$1 yr to mat.	4697974	.086	0	.28	0	1
$\mathbb{1}$ for $<$5 & $>$1 yr to mat.	4697974	.38	0	.49	0	1
$\mathbb{1}$ for 5+ yr to mat.	4697974	.53	1	.5	0	1
Relative rate	4391335	.0026	.0032	.011	-.052	.052
Relative rate if $<$0	4391335	-.0032	0	.0065	-.052	0
Indicator for sale	4697974	.0018	0	.043	0	1
Indicator for refi	4697974	.0017	0	.041	0	1
Indicator for sale or refi	4697974	.0035	0	.059	0	1

Table 1: SUMMARY STATISTICS AT LOAN-MONTH LEVEL. *Note:* This table reports summary statistics at the loan-month level for our estimation sample. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Panel A: Statistics for all loans						
	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	50837	.056	.056	.0093	.027	.087
Term remaining as of 1st obs. (years)	50918	9.7	10	3	1	40
Term remaining at time of transaction	50918	1.7	0	3.1	0	35
Term at origination (years)	50918	9.9	10	2.8	1	40
LTV at origination	50918	.68	.7	.11	.27	.8
DSCR at origination (%)	50918	1.6	1.4	.47	.92	3.7
Property quality score	50918	.53	.53	.26	.01	1
Transaction price in millions of dollars	50812	26	10	95	.39	5400
Loan size at origination (millions $)	50918	15	6.7	47	0	3002
CBD indicator	50918	.1	0	.3	0	1
Building age at time of transaction (years)	50918	32	26	24	-2	283
Building size in square feet (1,000s) at time of transaction	50918	126	70	197	.2	10247

Panel B: Statistics for loans that are sold before or at maturity						
	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	8647	.057	.057	.0083	.03	.087
Term remaining as of 1st obs. (years)	8662	9.7	10	2.8	1.5	30
Term remaining at time of transaction	8662	4.1	3.7	3.4	0	29
Term at origination (years)	8662	9.9	10	2.7	1.9	30
LTV at origination	8662	.7	.72	.095	.27	.8
DSCR at origination (%)	8662	1.5	1.4	.36	.92	3.7
Property quality score	8662	.51	.51	.26	.01	1
Transaction price in millions of dollars	8644	30	11	112	.62	5400
Loan size at origination (millions $)	8662	19	8	63	0	3002
CBD indicator	8662	.1	0	.3	0	1
Building age at time of transaction (years)	8662	28	23	23	-2	225
Building size in square feet (1,000s) at time of transaction	8662	156	88	241	1.8	10247

Panel C: Statistics for loans that are not sold before or at maturity						
	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	42190	.055	.056	.0094	.027	.087
Term remaining as of 1st obs. (years)	42256	9.7	10	3	1	40
Term remaining at time of transaction	42256	1.2	0	2.8	0	35
Term at origination (years)	42256	10	10	2.8	1	40
LTV at origination	42256	.67	.7	.11	.27	.8
DSCR at origination (%)	42256	1.6	1.4	.49	.92	3.7
Property quality score	42256	.53	.53	.26	.01	1
Transaction price in millions of dollars	42168	25	9.6	91	.39	4800
Loan size at origination (millions $)	42256	15	6.4	43	0	1852
CBD indicator	42256	.1	0	.3	0	1
Building age at time of transaction (years)	42256	32	26	25	0	283
Building size in square feet (1,000s) at time of transaction	42256	120	66	187	.2	6925

Table 2: SUMMARY STATISTICS AT LOAN LEVEL. *Note:* DSCR is at time of first transaction, which is typically the loan origination date. We label it as of origination above to avoid confusing it with the variable that are at the time of the second transaction like term remaining, age, and building size. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Property type	Count	Col %
Industrial	5,816	11.4%
Multifamily	5,540	10.9%
Office	13,575	26.7%
Retail	25,963	51.0%
Total	50,894	100.0%

Table 3: PROPERTY TYPE COUNTS ACROSS CMBS TRANSACTIONS. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Buyer type	Count	Col %
All REITs	3,739	7.3%
Bank/Insurer	221	0.4%
Cooperative	232	0.5%
Corporate	933	1.8%
Developer/Owner/Operator	32,981	64.8%
Equity Fund	1,620	3.2%
Government/Sovereign Wealth Fund	32	0.1%
Investment Manager	1,270	2.5%
Other/Unknown	9,720	19.1%
Pension/Education/Endowment	146	0.3%
Total	50,894	100.0%

Table 4: BUYER TYPE COUNTS ACROSS CMBS TRANSACTIONS. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Sales x 100				
	(1)	(2)	(3)	(4)	(5)
Δ^-	6.4026***	-0.3131	2.8570***	3.3650***	5.2588***
	(0.7590)	(0.7527)	(1.0082)	(0.8328)	(1.0312)
Ln real price	0.0013	0.0135	0.0116	0.0019	-0.0007
	(0.0123)	(0.0120)	(0.0122)	(0.0126)	(0.0128)
LTV	0.2693***	0.2106***	0.2112***	0.2244***	0.2205***
	(0.0313)	(0.0304)	(0.0305)	(0.0309)	(0.0308)
LTV>0.8	-0.0307	-0.0426**	-0.0430**	-0.0376*	-0.0385*
	(0.0205)	(0.0209)	(0.0209)	(0.0206)	(0.0207)
DSCR	-0.0267***	-0.0168**	-0.0163**	-0.0242***	-0.0252***
	(0.0071)	(0.0066)	(0.0067)	(0.0069)	(0.0070)
Quality score	0.0388*	0.0412*	0.0463**	0.0559**	0.0619**
	(0.0236)	(0.0223)	(0.0229)	(0.0237)	(0.0243)
Term at origination	-0.0075***	0.0230***	0.0225***	-0.0008	-0.0009
	(0.0011)	(0.0016)	(0.0015)	(0.0013)	(0.0013)
CBD indicator	0.0473***	0.0446**	0.0457**	0.0477***	0.0485***
	(0.0178)	(0.0178)	(0.0178)	(0.0178)	(0.0179)
Bldg. age (yrs)	0.0002	-0.0002	-0.0002	-0.0001	-0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Bldg. age (yrs) sqrd.	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ln bldg. sq. ft.	0.0454***	0.0352***	0.0379***	0.0480***	0.0508***
	(0.0105)	(0.0103)	(0.0106)	(0.0110)	(0.0112)
Term remaining		-0.0402***	-0.0415***		
		(0.0020)	(0.0021)		
$\Delta^-\times$Term remaining			-0.4390***		
			(0.0870)		
Rem. mat. lt1yr				0.2396***	0.2518***
				(0.0180)	(0.0196)
Rem. mat. gt5yr				-0.1079***	-0.1179***
				(0.0073)	(0.0079)
$\Delta^-\times$Rem. mat. lt1yr					5.2979***
					(1.3727)
$\Delta^-\times$Rem. mat. gt5yr					-2.9367***
					(0.6169)
Observations	4,391,335	4,391,335	4,391,335	4,391,335	4,391,335
Adjusted R-squared	0.0017	0.0022	0.0022	0.0021	0.0021
Proptype×Time FE	Y	Y	Y	Y	Y
CBSA FE	Y	Yes	Yes	Yes	Yes
OwnerType FE	Y	Y	Y	Y	Y
Refi FE	Y	Y	Y	Y	Y

Table 5: EFFECT OF NEGATIVE RELATIVE RATE ON SALES. *Note:* This table shows a linear regression of sales probability on an indicator for negative relative rate ($\Delta^-_{i,p,t}$) and controls, where the sample includes loans that are sold or refinanced, as well as the loans that mature without a sale or refinance or that have yet to mature. Controls are listed in the rows of the table. Fixed effects include the full interactions of date (year-month) and property type, owner and CBSA fixed effects, and an indicator for whether the loan is associated with a refinancing. Building square feet is in millions before taking the natural log. Standard errors, in parentheses, are clustered at the CBSA×property type level. $^+$, *, and ** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Ln Price				
	(1)	(2)	(3)	(4)	(5)
Δ^-	-9.6834***	-8.4267***	-3.7567	-9.4891***	-8.2971***
	(2.2745)	(2.3701)	(2.7964)	(2.3198)	(2.8835)
LTV	-0.4150***	-0.4023***	-0.3979***	-0.4116***	-0.4095***
	(0.1175)	(0.1191)	(0.1180)	(0.1180)	(0.1175)
LTV>0.8	0.0242	0.0254	0.0248	0.0246	0.0238
	(0.0426)	(0.0420)	(0.0419)	(0.0423)	(0.0423)
DSCR	0.0135	0.0139	0.0150	0.0130	0.0133
	(0.0236)	(0.0238)	(0.0236)	(0.0236)	(0.0235)
Quality score	1.3767***	1.3733***	1.3767***	1.3751***	1.3770***
	(0.0508)	(0.0502)	(0.0504)	(0.0505)	(0.0506)
Term at origination	0.0003	-0.0055*	-0.0061*	-0.0010	-0.0011
	(0.0021)	(0.0032)	(0.0033)	(0.0023)	(0.0023)
CBD indicator	0.4694***	0.4694***	0.4693***	0.4702***	0.4699***
	(0.0963)	(0.0961)	(0.0961)	(0.0962)	(0.0962)
Bldg. age (yrs)	-0.0042***	-0.0041***	-0.0041***	-0.0041***	-0.0041***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Bldg. age (yrs) sqrd.	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ln bldg. sq. ft.	0.9006***	0.8999***	0.9009***	0.9003***	0.9008***
	(0.0131)	(0.0131)	(0.0132)	(0.0131)	(0.0132)
Term remaining		0.0076***	0.0058**		
		(0.0028)	(0.0029)		
$\Delta^-\times$Term remaining			-0.8329***		
			(0.2953)		
Rem. mat. lt1yr				0.0125	0.0179
				(0.0183)	(0.0196)
Rem. mat. gt5yr				0.0279*	0.0209
				(0.0148)	(0.0169)
$\Delta^-\times$Rem. mat. lt1yr					4.4301
					(2.7015)
$\Delta^-\times$Rem. mat. gt5yr					-2.8594
					(2.7738)
Observations	8,185	8,185	8,185	8,185	8,185
Adjusted R-squared	0.8332	0.8334	0.8335	0.8333	0.8333
Proptype×Time FE	Y	Y	Y	Y	Y
CBSA FE	Y	Yes	Yes	Yes	Yes
OwnerType FE	Y	Y	Y	Y	Y
Refi FE	Y	Y	Y	Y	Y

Table 6: EFFECT OF NEGATIVE RELATIVE RATE ON TRANSACTION PRICES. *Note:* This table shows a linear regression of log of transaction price on an indicator for negative relative rate ($\Delta^-_{i,p,t}$) and controls, where the sample includes loans that are sold or refinanced, as well as the loans that mature without a sale or refinance or that have yet to mature. Controls are listed in the rows of the table. Fixed effects include the full interactions of date (year-month) and property type, owner and CBSA fixed effects, and an indicator for whether the loan is associated with a refinancing. Building square feet is in millions before taking the natural log. Standard errors, in parentheses, are clustered at the CBSA×property type level. $^+$, *, and ** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Sales x 100				
	(1)	(2)	(3)	(4)	(5)
Δ^-	5.9288***	-0.7954	1.5575	2.6233***	3.6621***
	(0.7847)	(0.7898)	(1.0658)	(0.8561)	(1.0411)
Ln real price	-0.0017	0.0115	0.0103	-0.0014	-0.0032
	(0.0126)	(0.0122)	(0.0123)	(0.0129)	(0.0131)
LTV	0.2603***	0.2039***	0.2040***	0.2148***	0.2116***
	(0.0314)	(0.0307)	(0.0307)	(0.0309)	(0.0309)
LTV>0.8	-0.0246	-0.0361*	-0.0364*	-0.0313	-0.0318
	(0.0196)	(0.0200)	(0.0200)	(0.0198)	(0.0198)
DSCR	-0.0289***	-0.0192***	-0.0190***	-0.0279***	-0.0285***
	(0.0075)	(0.0069)	(0.0070)	(0.0073)	(0.0073)
Quality score	0.0449*	0.0453**	0.0482**	0.0622**	0.0663***
	(0.0241)	(0.0228)	(0.0231)	(0.0244)	(0.0248)
Term at origination	-0.0076***	0.0232***	0.0229***	-0.0008	-0.0009
	(0.0012)	(0.0016)	(0.0015)	(0.0014)	(0.0014)
CBD indicator	0.0525***	0.0494***	0.0500***	0.0527***	0.0533***
	(0.0173)	(0.0172)	(0.0172)	(0.0173)	(0.0173)
Bldg. age (yrs)	0.0002	-0.0002	-0.0002	-0.0001	-0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Bldg. age (yrs) sqrd.	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ln bldg. sq. ft.	0.0477***	0.0364***	0.0379***	0.0504***	0.0522***
	(0.0108)	(0.0105)	(0.0107)	(0.0113)	(0.0115)
Term remaining		-0.0401***	-0.0409***		
		(0.0020)	(0.0021)		
$\Delta^-\times$Term remaining			-0.3406***		
			(0.0992)		
Rem. mat. lt1yr				0.2411***	0.2531***
				(0.0181)	(0.0195)
Rem. mat. gt5yr				-0.1078***	-0.1130***
				(0.0072)	(0.0077)
$\Delta^-\times$Rem. mat. lt1yr					6.4700***
					(1.5995)
$\Delta^-\times$Rem. mat. gt5yr					-1.7501**
					(0.6878)
Observations	4,415,403	4,415,403	4,415,403	4,415,403	4,415,403
Adjusted R-squared	0.0017	0.0022	0.0022	0.0021	0.0021
Proptype×Time FE	Y	Y	Y	Y	Y
CBSA FE	Y	Yes	Yes	Yes	Yes
OwnerType FE	Y	Y	Y	Y	Y
Refi FE	Y	Y	Y	Y	Y

Table 7: EFFECT OF TREPP NEGATIVE RELATIVE RATE ON SALES. *Note:* This table shows a linear regression of sales probability on an indicator for negative relative rate ($\Delta^-_{i,p,t}$) and controls, where the sample includes loans that are sold or refinanced, as well as the loans that mature without a sale or refinance or that have yet to mature. $\Delta^-_{i,p,t}$ is calculated using Trepp data. Controls are listed in the rows of the table. Fixed effects include the full interactions of date (year-month) and property type, owner and CBSA fixed effects, and an indicator for whether the loan is associated with a refinancing. Building square feet is in millions before taking the natural log. Standard errors, in parentheses, are clustered at the CBSA×property type level. $^+$, *, and ** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. *Source:* Authors' calculations using data from MSCI Real Capital Analytics and Trepp.

	Ln Price				
	(1)	(2)	(3)	(4)	(5)
Δ^-	-10.5302***	-9.2784***	-5.0266	-10.3860***	-9.4137***
	(2.2955)	(2.3742)	(3.1250)	(2.3399)	(2.9029)
LTV	-0.4298***	-0.4173***	-0.4130***	-0.4266***	-0.4245***
	(0.1194)	(0.1207)	(0.1196)	(0.1198)	(0.1193)
LTV>0.8	0.0323	0.0332	0.0326	0.0323	0.0314
	(0.0418)	(0.0413)	(0.0412)	(0.0416)	(0.0415)
DSCR	0.0060	0.0061	0.0068	0.0053	0.0054
	(0.0243)	(0.0245)	(0.0244)	(0.0244)	(0.0243)
Quality score	1.3811***	1.3778***	1.3801***	1.3795***	1.3808***
	(0.0502)	(0.0497)	(0.0497)	(0.0500)	(0.0500)
Term at origination	0.0005	-0.0053*	-0.0056*	-0.0008	-0.0010
	(0.0020)	(0.0032)	(0.0032)	(0.0022)	(0.0022)
CBD indicator	0.4657***	0.4659***	0.4662***	0.4665***	0.4663***
	(0.0977)	(0.0974)	(0.0973)	(0.0976)	(0.0976)
Bldg. age (yrs)	-0.0041***	-0.0041***	-0.0040***	-0.0041***	-0.0041***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Bldg. age (yrs) sqrd.	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ln bldg. sq. ft.	0.9013***	0.9006***	0.9012***	0.9011***	0.9014***
	(0.0132)	(0.0132)	(0.0133)	(0.0132)	(0.0133)
Term remaining		0.0076***	0.0061**		
		(0.0028)	(0.0029)		
$\Delta^-\times$Term remaining			-0.8003**		
			(0.3935)		
Rem. mat. lt1yr				0.0147	0.0193
				(0.0186)	(0.0196)
Rem. mat. gt5yr				0.0294**	0.0237
				(0.0149)	(0.0166)
$\Delta^-\times$Rem. mat. lt1yr					4.8885
					(3.0827)
$\Delta^-\times$Rem. mat. gt5yr					-2.4999
					(2.8248)
Observations	8,183	8,183	8,183	8,183	8,183
Adjusted R-squared	0.8336	0.8338	0.8338	0.8336	0.8337
Proptype×Time FE	Y	Y	Y	Y	Y
CBSA FE	Y	Yes	Yes	Yes	Yes
OwnerType FE	Y	Y	Y	Y	Y
Refi FE	Y	Y	Y	Y	Y

Table 8: EFFECT OF TREPP NEGATIVE RELATIVE RATE ON TRANSACTION PRICES. *Note:* This table shows a linear regression of log of transaction price on an indicator for negative relative rate ($\Delta^-_{i,p,t}$) and controls, where the sample includes loans that are sold or refinanced, as well as the loans that mature without a sale or refinance or that have yet to mature. $\Delta^-_{i,p,t}$ is calculated using Trepp data. Controls are listed in the rows of the table. Fixed effects include the full interactions of date (year-month) and property type, owner and CBSA fixed effects, and an indicator for whether the loan is associated with a refinancing. Building square feet is in millions before taking the natural log. Standard errors, in parentheses, are clustered at the CBSA×property type level. $^+$, *, and ** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. *Source:* Authors' calculations using data from MSCI Real Capital Analytics and Trepp.