Does Mortgage Rate Lock-in Dampen Commercial Real Estate Busts?*

Sean Flynn[†2], Robert Kurtzman[‡1], and Alexei Tchistyi[§2]

[1]Federal Reserve Board
[2]Cornell University

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Abstract

We show that mortgage lock-in effects play a significant role in commercial real estate. We find a 17% reduction in sale probability and a 4% higher sales price for locked-in properties when market interest rates are 100bp above the fixed rate on the mortgage. Additionally, unlocked properties in more locked-in markets sell at higher prices, consistent with a market-wide price effect. Overall, our results indicate that lock-in effects mitigated price declines significantly in the recent bust.

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[†]Cornell SC Johnson College of Business, sjf236@cornell.edu.

[‡]Federal Reserve Board, robert.j.kurtzman@frb.gov.

[§]Cornell SC Johnson College of Business, avt33@cornell.edu.

1. INTRODUCTION

In this paper we examine whether fixed rate mortgage lock-in can dampen commercial real estate (CRE) busts. Our research question is motivated by two simple yet consequential observations. First, CRE prices have fallen significantly during the recent bust. Specifically, the Green Street CPPI price index shows a roughly 20% decline between June 2022 and December 2024, compared to a roughly 30% decline between August 2007 and March 2010. The work of Gupta, Mittal, and Van Nieuwerburgh (2025) suggests even larger potential declines in certain markets.

Second, the rapid rise in interest rates has generated a lock-in effect that is having wide-ranging impacts on *residential* housing markets. In particular, recent work has shown that lock-in significantly reduces supply and increases prices due to borrowers being hesitant to give up very low interest rates.

We hypothesize that CRE mortgage lock-in has prevented values from falling as much as they otherwise would have, effectively dampening the decline. We develop this hypothesis in the context of a bargaining model in which some property owners have a fixed mortgage rate lower than the current market interest rate (locked-in owners), whereas others have a mortgage rate that is higher than the market rate (unlocked owners). The model predicts that locked-in owners have a higher reservation value due to the fact that they have an interest rate advantage. This translates into a lower sale probability and higher average sale price for locked-in properties relative to unlocked properties. Additionally, the model predicts that the lock-in effect translates into higher prices for *all* properties, including unlocked properties, because it reduces supply.

We take the model predictions to the data using properties financed with securitized mortgages (commercial mortgage backed securities (CMBS) loans). Studying securitized loans is advantageous for our question because, in the time period we study, most are fixed rate and approximately 10 years to maturity. This is important because the lock-in effect should be the most salient for longer-term, fixed rate debt.[1]

[1] In contrast, most bank portfolio CRE loans are floating rate and shorter term (see, e.g., Glancy, Kurtzman, and Loewenstein 2025 or Glancy, Krainer, Kurtzman, and Nichols 2021), which would make bank loans a less ideal setting in which to study our questions.

Our key variable of interest, *Interest Rate Advantage*, is based on the difference between the origination interest rate on loan i and the current market interest rate on loans of the same property type. Because the rate lock-in effect should only be salient when the current market rate exceeds the rate on loan i, we set *Interest Rate Advantage* equal to the difference between the market rate and the rate on loan i 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, this variable 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 because they have no interest rate advantage relative to the current market.

In our empirical analysis, we first estimate the likelihood of a property sale as a function of *Interest Rate Advantage* and other observables. Consistent with the model, we find that, for the average locked-in property, a 1 percentage point larger interest rate advantage is associated with a 6.4 percentage point lower probability of transacting over a ten-year period (which is the average term of a mortgage in our sample). This represents a decline of 17% relative to the unconditional mean.

Second, we find a price impact commensurate with this reduction in sale probability. Specifically, a 1 percentage point larger interest rate advantage is associated with a roughly 4% increase in sales price for locked-in properties. To put this into context, consider the fact that during the recent CRE bust (June 2022–December 2024), the average *Interest Rate Advantage* is roughly 2 percentage points. This implies over 8% higher prices for locked-in properties, on average, during this period of time.

After establishing the impact of lock-in on properties with an interest rate advantage, we then study the effect of lock-in on CRE prices in the aggregate, with a focus on the 2022–2024 downturn. An important implication of the model, when generalized to multiple buyers and sellers, is that when a large share of properties are locked in, aggregate supply is reduced and equilibrium prices rise even for properties without an interest rate advantage. We show that at least half of the CRE market would have been exposed to lock-in during 2022–2024. Moreover, we show that unlocked properties sell for higher prices in more

locked-in markets, which is consistent with a spillover of lock-in effects onto all prices. We conclude that lock-in can dampen aggregate CRE price declines through both a direct effect on locked-in properties and a spillover effect through market-wide supply channels.

Our paper is the first to study and document the impact of fixed-rate mortgage lock-in in commercial real estate. By showing the price impact of lock-in, we contribute to recent work that studies the long-run impacts of the remote work shift on CRE values (see, e.g., Gupta, Mittal, and Van Nieuwerburgh 2025) by documenting that values would have likely declined further absent the lock-in effect.

Our paper is related to a growing literature that studies the impact of mortgage lock-in on supply and prices in residential markets. Fonseca and Liu (2024) show that lock-in restricts mobility of borrowers, reduces time on market, and increase prices in residential markets. Similarly, Aladangady, Krimmel, and Scharlemann (2024) show that lock-in reduces listings and results in greater house price growth, Batzer, Coste, Doerner, and Seiler (2024) show that lock-in reduces supply and increases price, and Katz and Minton (2025) show that lock-in reduces sales and discourages moves from owning to renting. Liebersohn and Rothstein (2025) focus on the mobility effects of lock-in. De la Roca, Giacoletti, and Liu (2025) document that the supply reduction and price increase associated with lock-in spills over to the rental market, resulting in higher asking rents in supply-constrained markets.

Another set of recent papers studies residential lock-in effects using structural models. These include Abel (2024), who focuses on the dynamics of home sales, Fonseca, Liu, and Mabille (2025), who focus on mobility and prices, and Gerardi, Qian, and Zhang (2025), who focus on welfare effects of lock-in for younger households and households in lower-income areas. Additionally, Amronin and Eberly (2023) use a structural model to illustrate how lock-in can subvert monetary policy transmission.

The remainder of the paper is structured as follows. In Section 2 we discuss the key institutional details of our setting and present the model. Section 3 describes our data and empirical methodology, while Section 4 presents the main empirical results. Section 5 evaluates spillovers to unlocked properties, and Section 6 concludes.

2. INSTITUTIONAL DETAIL AND THEORETICAL FRAMEWORK

In this section, we first outline the key institutional details of CRE mortgages and the CMBS market, and compare and contrast commercial and residential mortgages. We then model the effect of mortgage lock-in on the sales and prices of commercial real estate properties.

2.1. Institutional Detail

The U.S. CRE market is dominated by a few large lender types, namely banks, CMBS, and insurance companies. Loan terms vary significantly based on lender type (see Glancy, Krainer, Kurtzman, and Nichols (2021) for a comprehensive analysis of the differences in terms of average interest rate, LTV, size, property type, and term to maturity). In this paper we focus on CMBS loans. Like residential mortgages, most CMBS loans are longer-term (the average loan in our sample is roughly ten years to maturity, see Table 1) and fixed rate, which leads to the potential for the lock-in effect that is the focus of this paper.[2]

Despite these two similarities, the standard CMBS loan contains several features that are distinct from the residential mortgages that are the focus of the existing literature. First, whereas most residential mortgages are fully-amortizing, most CMBS loans are either non- or partially-amortizing. This necessitates either a property sale or refinancing at the end of the CMBS loan term in order to pay the balloon balance.

Second, 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.[3] Thus, CMBS borrowers may face a penalty for refinancing when rates drop significantly.

Third, CMBS loans are typically assumable. In contrast, most conventional residential mortgages are not

[2]Recent evidence from An, Cordell, and Smith (2023) suggests that, post-GFC, the CMBS market is shifting away from 10-year, fixed rate loans and into shorter-term floating rate loans. Despite this, on a value-weighted basis the current CMBS market is still dominated by longer-term, fixed rate loans.

[3]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.

assumable.[4] Because assumability allows the purchaser to assume the existing mortgage on the property at the time of sale, this feature can be particularly advantageous after rates have risen. See Berndt, Zheng, and Zhu (2025) for evidence that assumability can dampen lock-in effects in residential markets.

We do not incorporate assumability into our analysis due to lack of visibility in our transaction data and, more importantly, because we do not know precisely what frictions are involved with assumptions (e.g., the factors that lenders consider when approving assumptions and factors that would lead lenders to deny assumption).

Finally, residential properties are owned for shelter services, whereas commercial properties are owned for income production. This means that sellers do not necessarily become buyers subsequent to sale. Although not specific to mortgage contract features, this difference between residential and commercial real estate plays an important role in our model assumptions and is discussed in detail in Section 2.3.

2.2. Bilateral Bargaining

We start our analysis with a one-period model of bilateral bargaining between one buyer and one seller with a mortgage. We then generalize our setting to one with multiple buyers and sellers and an endogenous buyer-to-seller ratio.

In the bilateral setting there are two agents: a seller and a buyer. The seller owns a property that is used as collateral for a fixed-rate mortgage with M dollars of principal balance and an interest rate of r^{orig}. The timing works as follows: the mortgage is originated prior to $t = 0$, the seller can offer the property for sale (or choose not to sell) at $t = 0$, and at $t = 1$ the mortgage balance of M matures. If the property is not sold at $t = 0$, then at $t = 1$ the seller earns value S from owning the property and pays $(1 + r^{\text{orig}})M$ to the lender. Therefore, the seller's total payoff is $S - (1 + r^{\text{orig}})M$ at $t = 1$.

Our main focus is on mortgage lock-in effects, and to simplify our analysis we assume that all agents are

[4] Berndt et al. (2025) document that less than 4% of residential sales are associated with assumable loans. Industry commentary such as Mendoza (2024) also suggests that assumptions of residential FHA and VA loans are relatively low in recent years. The infrequency of assumptions in residential real estate is likely due factors such as residential sellers not being aware of the potential price implications of holding an assumable mortgage. Additionally, not all conventional mortgages have built-in assumption clauses, which may introduce additional frictions if a potential buyer wishes to assume the existing mortgage.

risk-neutral and mortgages are risk-free, i.e., the mortgage is always paid off in full by the current owner. At $t = 0$, the current market interest rate on mortgages is r_0. We assume it is possible for $r^{\text{orig}} \neq r_0$ because the seller's mortgage was originated prior to $t = 0$.

If the property is sold at $t = 0$, then it sells for P dollars and the seller repays the mortgage and reinvests the net proceeds $(P - M)$ at the current market rate r_0, which results in a payoff of $(1 + r_0)(P - M)$ at $t = 1$. The lowest price the seller is willing to accept is

$$P^S = \frac{S - (r^{\text{orig}} - r_0)M}{1 + r_0}, \tag{1}$$

which is the seller's reservation value. The seller is indifferent between selling and keeping the property when $P = P^S$, and the seller strictly prefers to sell the property when $P > P^S$.

To simplify notation, based on Fonseca and Liu (2024) we define

$$\Delta \equiv r^{\text{orig}} - r_0$$

to denote the difference between the market interest rate at mortgage origination and the interest rate at the time of property sale. Then, equation (1) becomes

$$P^S = \frac{S - \Delta M}{1 + r_0}. \tag{2}$$

We note that the lower the value of Δ, the higher the seller's reservation value. Intuitively, when Δ is low (negative), the seller benefits from an interest rate advantage due to the low interest rate on the existing mortgage, which translates into the higher reservation value.

At time $t = 0$, the seller is matched with a buyer. If the transaction takes place, the buyer expects to extract value u from the property at time $t = 1$. If the transaction does not take place, then the buyer earns return

r_0 on their capital. Thus, the highest price the buyer is willing to pay for the property is given by

$$P^B = \frac{u}{1+r_0}, \tag{3}$$

which represents the buyer's reservation value.

We assume that negotiations between the seller and buyer lead to the Nash bargaining solution. If $P^B < P^S$, then the property is not sold. If $P^B \geq P^S$, the seller and buyer agree on the sale price $P^* = \left(P^B + P^S\right)/2$, or

$$P^* = \frac{u+S-\Delta M}{2(1+r_0)}. \tag{4}$$

2.2.1. Assumptions on the Buyer's Utility Value

We assume that the buyer's value u is randomly distributed with

$$u = B - x,$$

where the constant B represents the upper bound on the buyer's valuation, with $B > S$. Random variable $x \geq 0$ is exponentially distributed with parameter λ, i.e., its probability density function $f(x,\lambda)$ and cumulative distribution function $F(x,\lambda)$ are given by

$$f(x,\lambda) = \lambda e^{-\lambda x} \quad x \geq 0, \tag{5}$$

$$F(x,\lambda) = 1 - e^{-\lambda x} \quad x \geq 0. \tag{6}$$

The exponential distribution allows an analytically tractable transition to the setup with multiple buyers.

2.2.2. Deriving the Probability of Sale

Next, we derive the probability of the property being sold, $\pi(\Delta,\lambda)$=Pr($P^B \geq P^S$), the expected sale price, $\bar{P}(\Delta,\lambda)$, and analyze how $\pi(\Delta,\lambda)$ and $\bar{P}(\Delta,\lambda)$ depend on the key model parameters Δ and λ.

Proposition 1. *The sale probability is given by*

$$\pi(\Delta,\lambda) = 1 - e^{-\lambda(B-S+\Delta M)}, \tag{7}$$

and is increasing in Δ *and* λ.

Conditional on the property being sold, its expected price is equal to

$$\bar{P}(\Delta,\lambda) = \frac{1}{2(1+r_0)}\left(B+S-\Delta M-\frac{1}{\lambda}+\frac{B-S+\Delta M}{e^{\lambda(B-S+\Delta M)}-1}\right). \tag{8}$$

$\bar{P}(\Delta,\lambda)$ *is decreasing in* Δ *and increasing* λ.

Proof. See Appendix A.2.

Proposition 1 says that the more negative Δ is, the lower the sale probability and the higher the average sale price, a result of the seller with a negative Δ benefiting from paying a mortgage rate r below the current market rate. This benefit results in a higher seller's reservation value. The buyer's reservation value is not affected by the past interest rate r^{orig}. As a result, the gains from trade are lower, and the seller and the buyer are less likely to agree on a mutually acceptable price. However, when they agree to trade, the average price is going to be higher to compensate the seller for the mortgage rate benefits associated with negative Δ.

Proposition 1 also says that both the sale probability and the average sale price is increasing in λ. This is because a higher λ is associated with a higher expected buyer's value u. In other words, the buyer's reservation value is increasing in λ, which translates into higher sale probabilities and sale prices.

2.3. *Multiple Buyers and Sellers in Equilibrium*

We now move beyond the setting with two agents to consider multiple buyers and sellers. Assume at time $t = 0$, the CRE market is populated with N_S sellers and N_B buyers. Each seller expects to earn value S from owning the property until time $t = 1$. A fraction α of the sellers have a fixed-rate mortgage with M dollars of principal balance and interest rate r that matures at time $t = 1$. As a result, their reservation value is given by equation (2).

The fraction $(1-\alpha)$ of the sellers do not have a locked-in mortgage. This could be due to multiple factors, including adjustable rate mortgages, fixed rate mortgages maturing at time $t = 0$, or no mortgage debt. Without rate lock, the seller's reservation value is equal to $\frac{S}{1+r_0}$. Let $l = 1$ if a seller is locked in, and $l = 0$ if a seller is not locked in. Then the seller's reservation value as a function of l can be written as follows:

$$P^S(l\Delta) = \frac{S - l\Delta M}{1 + r_0}. \tag{9}$$

At time $t = 0$, each seller is randomly matched with $k = \frac{N_B}{N_S}$ buyers.[5] As in Section 2.2, buyers' values u are independently distributed random variables, and buyers' reservation values are given by (3). The seller negotiates a deal with a buyer with the highest valuation using the Nash bargaining procedure as in Section 2.2. If $P^B < P^S(l)$, then the property is not sold. If $P^B \geq P^S(l)$, the seller and buyer agree on the sale price $P^* = \left(P^B + P^S(l)\right)/2$.

Note that we do not assume that sellers become buyers subsequent to sale. This differs from the common assumption in models of lock-in in residential real estate, because residential properties are owned for shelter services and therefore a household that sells must subsequently become a buyer, or at least choose to rent. In contrast, because CRE properties are owned for income production, sellers need not become buyers.[6] Consistent with this, as shown in Figure 1, only about 11% of sellers become buyers in the two

[5] In practice, the number of buyers k is an integer that can be different for different properties. Since we focus on averages across the entire CRE market, we treat k as a continuous variable.

[6] It is the case that certain sellers are economically motivated to become buyers. For example, closed-end real estate funds or asset managers with a target portfolio allocation in real estate assets are likely to roll the equity from a property sale into a new property. There can be important tax advantages to doing this, namely, 1031 exchanges in which sellers can avoid paying immediate capital gains tax by rolling the proceeds from sale into a new property within a specified amount of time. However,

years following a sale in our data.[7]

We note that among k buyers, the buyer with the highest valuation, $u = B - x$, is the one with the smallest x. The minimum of k independent exponential random variables is an exponentially distributed random variable with parameter $k\lambda$. Hence, the analytical results of Proposition 1 can be applied to the partial equilibrium setting by replacing λ with $k\lambda$, and Δ with $l\Delta$. In particular, the expected price is given by

$$\bar{P}(l\Delta, k\lambda) = \frac{1}{2(1+r_0)}\left(B + S - l\Delta M - \frac{1}{k\lambda} + \frac{B - S + l\Delta M}{e^{k\lambda(B-S+l\Delta M)} - 1}\right). \tag{10}$$

According to Proposition 1, $\bar{P}(l\Delta, k\lambda)$ is increasing in $(k\lambda)$ and decreasing in $(l\Delta)$. Since parameter λ is fixed and l is either 0 or 1, we can say that $\bar{P}(l\Delta, k\lambda)$ is increasing in k and weakly decreasing Δ.

We now endogenize the buyer-to-seller ratio k, by assuming that locked-in property owners are less likely to list their properties. In particular, let Q be the total number of identical CRE properties. Owners that are not locked in list their properties with probability γ, while locked-in owners offer their properties for sale with probability $\gamma(1 - \phi(\Delta))$, where $\phi(\Delta)$ is a decreasing function of Δ, with $\phi(0) = 0$. When Δ is negative, an owner with an interest rate advantage is less likely to try to sell the property. Thus, $\phi(\Delta)$ represents the reduction in property listings due to locked-in properties.

We can express the total number of sellers as follows

$$\begin{aligned} N_S &= Q(\alpha\gamma(1 - \phi(\Delta)) + (1 - \alpha)\gamma) \\ &= \gamma Q(1 - \alpha\phi(\Delta)). \end{aligned}$$

Then, the buyer-to-seller ratio $k(\Delta)$ becomes

$$k(\Delta) = \frac{N_B}{\gamma Q(1 - \alpha\phi(\Delta))}. \tag{11}$$

Ling and Petrova (2020) show that only a small share (5-6%) of sales in their sample of CoStar data are 1031 exchanges. Therefore, this activity may not constitute the strategy of most CRE sellers.

[7] This is based on the full sample of sales transactions with non-missing buyer and seller IDs from 2001 through 2022 (instead of 2024, due to the two year forward-looking window), with minimal data cleaning outside of dropping missing or negative sales prices.

We note that $k(\Delta)$ is a decreasing function of Δ. The more negative Δ is, the fewer properties are listed for sale and the higher the buyer-to-seller ratio is.

Recall that the average price $\bar{P}(l\Delta, k(\Delta)\lambda)$ is increasing in $k(\Delta)$ and weakly decreasing Δ. Because $k(\Delta)$ is decreasing in Δ, $\bar{P}(l\Delta, k(\Delta)\lambda)$ is a decreasing function of Δ. Plugging (11) into (10), we can rewrite the expected price $\hat{P}(\Delta, l)$ as a function of Δ and l. Thus, we have the following proposition.

Proposition 2.

Conditional on the property being sold, its expected price is given by

$$\hat{P}(\Delta, l) = \frac{1}{2(1+r_0)} \left(B + S - l\Delta M - \frac{1}{k(\Delta)\lambda} + \frac{B - S + l\Delta M}{e^{k(\Delta)\lambda (B - S + l\Delta M)} - 1} \right). \tag{12}$$

$\hat{P}(\Delta, l)$ *is decreasing in* Δ *for all* l.

Proposition 1 established that properties with more negative Δ are sold at higher prices. Proposition 2 highlights the second effect of rate lock-in (negative Δ) on CRE prices. By reducing CRE supply to the market, rate lock-in has an amplifying effect on *all* CRE prices, including properties that are not locked in.

Propositions 1 and 2 lead to the following empirical predictions.

Hypothesis 1: Properties with more negative Δ are less likely to be sold.

Hypothesis 2: Properties with more negative Δ are sold at higher prices.

A final empirical implication of the model is that lock-in results in higher prices for all properties, not just properties with more negative Δ, because lock-in reduces supply. This effect should be stronger when more buyers finance their properties with a fixed rate mortgage (higher α), all else equal.

3. DATA AND EMPIRICAL METHODOLOGY

3.1. Data

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 fixed-rate CMBS loans since 2001. We require transactions with non-missing RCA markets and non-missing property types, with values at time of sale or refinancing that are non-missing and above $1. Additionally, we do not include "development sites" in our analysis.

Because RCA provides point-in-time data at the time of a transaction, rather than a time series for each property-loan pair, we construct a property-loan pair panel after cleaning the data. Data cleaning 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 properties with hotel loans given there are very few in our sample and we are thus not confident in our ability to properly construct market rates for these properties. Additionally, we require that property-loan pairs have at least 12 months of data.

After cleaning the transaction-level data, we create a property-loan pair 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 stated 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 panel thus spans from 2001 through December 2024.

After constructing the property-loan-month panel, we undertake additional data cleaning for our regressions. Specifically, we drop properties without RCA property quality scores ("Q-scores"),[8] age (or loans

[8] 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.

with building ages below 0 at the time of transaction), or size, as these variables are necessary for the empirical analysis.

The first cleaning step before constructing the panel reduces the sample of transactions with a fixed rate CMBS loan from 169,782 to 140,918. Most of these dropped transactions have missing loan maturity dates. When we then construct the property-loan pair panel, the sample falls further to 88,599 loans (see Table 1), mostly because of the restriction that transactions include the building square footage, building age, and the RCA quality score.

3.2. Empirical Methodology

To construct our key independent variable of interest, we first calculate the difference between the interest rate on a CMBS loan at origination and the prevailing market interest rate for similar CMBS loans in a given month. This is our proxy for Δ in the model:

$$\Delta_{i,p,t} = r_{i,p,orig} - R_{p,t}, \tag{13}$$

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 unweighted average interest rate for fixed-rate CMBS loans of property type p originated in month t.[9] Recall that although the RCA data is at the property transaction level, we construct our panel dataset using the loan associated with each particular property.

Recall that our model predicts that the mortgage rate differential captured by $\Delta_{i,p,t}$ only increases the seller's reservation value when it is negative. We capture this asymmetry by defining our key independent variable of interest, $Interest\,Rate\,Advantage$, in the following way:

$$Interest\,Rate\,Advantage_{i,p,t} = \begin{cases} 0 & \text{if } \Delta_{i,p,t} \geq 0, \\ \Delta_{i,p,t} & \text{if } \Delta_{i,p,t} < 0. \end{cases}$$

[9] Other papers, such as De la Roca et al. (2025), use alternative measures such as the ratio of monthly payments, rather than the difference in interest rates, to measure rate lock-in.

This variable incorporates the idea that the lock-in effect is not salient unless the current market rate is higher than the fixed rate on the property associated with loan i, which gives the property owner an interest rate advantage relative to other owners borrowing at current market rates.

We then test Hypothesis 1 by estimating

$$\text{Sale}_{i,p,t} = \beta InterestRateAdvantage_{i,p,t-1} + \eta_1 X_i + \eta_2 Z_{i,t-1} + \zeta_{i,t} + \varepsilon_i, \tag{14}$$

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. We estimate this regression on our property-loan pair panel such that the unit of observation is a property-loan-month.

Controls that do not vary with time (X_i) include the log of the previous transaction price of the property in 2017 dollars, an indicator for whether origination LTV is greater than 75%, an indicator for whether the origination DSCR is less than 1.25, the Q-score of the property, the square footage of the property, an indicator for whether the property is located in a central business district (CBD), an indicator for whether the loan is an Agency CMBS loan (i.e., a multifamily loan issued by Fannie Mae or Freddie Mac), and an indicator for whether the loan is associated with a refinancing. Time-varying controls ($Z_{i,t-1}$, which are lagged one month) are property age and age-squared, an indicator for whether the loan has less than a year remaining to maturity, an indicator for whether it is less than 2 years since loan origination, and an indicator for a transaction associated with the property being distressed.[10] In the most saturated specification, fixed effects ($\zeta_{i,t}$) include property type×year-quarter, owner type (similar to the groupings in Ghent 2021), and geographic market×year-quarter (we use the RCA CRE market definition, which is similar to CBSA; there are 158 RCA markets in the dataset used in our baseline regression). Standard errors are clustered at the market×property type level.

To estimate the impact of an interest rate advantage on sale price (Hypothesis 2), we estimate a version of equation 14 in which the dependent variable is the log transaction price. For this regression, we use

[10] We define this measure based on RCA's *DistressedStatus* field, which indicates whether a property is distressed at the time of transaction. Specifically, any loan with a status that is not marked as "Resolved" and that is non-missing is included in this indicator variable.

a transaction-level dataset in which we require each property to be observed at least twice (i.e., a sample of repeat transactions), such that the unit of observation is a transaction. In this dataset, the timing of observables is such that t is the month of sale, $t-1$ is the month prior to the sale, and $t=0$ is the date of loan origination or the date of the previous property transaction, whichever is later. Our price equation has the following form:

$$\text{LnPrice}_{i,p,t} = \beta \mathit{Interest\,Rate\,Advantage}_{i,p,t-1} + \eta_1 X_i + \eta_2 Z_{i,t-1} + \zeta_{i,t} + \varepsilon_i. \tag{15}$$

Controls that do not vary with the time (X_i) include an indicator for whether origination LTV is greater than 75%, an indicator for whether the origination DSCR is less than 1.25, the origination term to maturity, an indicator for whether the loan is an Agency CMBS loan, and an indicator for whether the loan is associated with a refinancing. Time-varying controls as of month $t-1$ ($Z_{i,t-1}$) are property size, age, age-squared, Q-score, an indicator for whether the loan has less than a year remaining to maturity, an indicator for whether it is less than 2 years since loan origination, a CBD indicator, and an indicator for a distressed sale. Fixed effects ($\zeta_{i,t}$) are as in equation (14). Standard errors are clustered at the market×property type level.

4. MAIN RESULTS

Table 1 summarizes our sample at the property-loan pair level, while Table 2 summarizes it at the property-loan-month level. Panel A of Table 1 summarizes all property-loan pairs 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 the dependent variable is always 0 in the regressions of sales probability (equation (14)) and always missing in the regressions of prices (equation (15)).

Table 3 tabulates the property types in our sample. Because RCA has very few hospitality property trans-

actions, we drop all hospitality properties from the sample. Table 4 tabulates the owner types in RCA in a manner similar to Ghent (2021).

Figure 2 plots the number of loans outstanding in our property-loan-month panel over the sample period. Figure 3 presents a time series of transaction counts and sales volume for the repeat sales subsample (the property-loan pairs from the middle panel of Table 1). This figure shows that the sales of properties that appear at least twice in the sample period were lower earlier in the sample and rose after the GFC. There are many sales during the recent bust (2022–2024), though the monthly frequency was lower than the average level during the 2015–2020 time period. Figure 4 plots sales counts by remaining loan 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.[11] 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. This nonlinearity in sales by remaining term motivates our use of control variables in equations 14 and 15 that capture loans with less than 1 year remaining to maturity, as well as loans that are less than 2 years since origination.

Figure 5 plots the average interest rate differential $\Delta_{i,p,t}$ over time. The interest rate differential declines and is persistently negative at two points in the sample: during the aftermath of the GFC, and during the 2022–2024 rate increases. The latter period is notable due to the magnitude of the negative differential. To illustrate how such a negative differential may translate into lock-in effects, Figure 6 shows a time series of loans with $\Delta_{i,p,t} < 0$. Panel A shows the time series for any level of interest rate advantage, and Panel B shows the time series for loans with an interest rate advantage of at least 1% ($\Delta_{i,p,t} \leq -1$). As Panel B shows, during the aftermath of the GFC and the recent period of rate increases, large shares of loans have a significant interest rate advantage and hence would have been locked-in.

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

4.1. Main regression results

Columns 1 through 3 of Table 5 report the results of estimating equation 14. 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. Additionally, we multiply *Interest Rate Advantage* by -1 such that a more negative interest rate differential is associated with a more positive *Interest Rate Advantage*.

We layer in various levels of fixed effects across columns. The property type$\times$year-quarter fixed effects account for time-varying national trends in property types, such as the sharp decline in office property value that followed the remote work shift. The market$\times$year-quarter fixed effects account for time-varying local market conditions and capture differences in liquidity across markets at a point in time.

Finally, the owner type fixed effects account for differences in owner types. Certain types of investors, such as private equity funds, may have incentives to sell that are related to investment time horizons. If the investment horizon incentive is correlated with the interest rate advantage, then this may drive our results since sales and price dynamics may be related to investment horizon and not solely the interest rate advantage. Alternatively, as shown in Ghent (2021), delegated investors select into more liquid markets. If market liquidity is correlated with the interest rate advantage, then we might observe different sales and price dynamics for delegated investors that are unrelated to the interest rate advantage.

Across specifications in columns 1 through 3, the sign on *Interest Rate Advantage* is negative and significant, indicating that as the interest rate differential becomes more negative, the likelihood of sale decreases. This is consistent with Hypothesis 1: locked-in properties are less likely to be sold compared to properties that are not locked in. The coefficient can be interpreted as follows. In column 3, the most saturated specification, when the rate differential is negative, a 100bp further reduction in the rate differential is associated with a 0.053 percentage point lower probability of a sale. Because the data are monthly, this specification implies a 0.64 percentage point lower probability of sale over a year (0.053×12=0.64), which transaltes to 6.4 percentage points over the 10-year life of the loan ($0.053\times12\times10$=6.36).

To further interpret this coefficient, consider the fact that, as Table 2 shows, the unconditional mean of *Sale* at a monthly level is 0.32%. This implies that, over a ten-year period, the average sale likelihood is 0.32%×120=38.4%. A 6.4 percentage point reduction in sale probability over a ten-year period is therefore about 17% of the unconditional mean.

In terms of the price impact, in columns 4 through 6 of Table 5 we report the results of estimating equation 15, in which the log of sales price is the dependent variable. We again multiply *Interest Rate Advantage* by -1 to ease in interpreting the results. The sign on *Interest Rate Advantage* is positive and significant across specifications, which indicates that as the interest rate differential becomes more negative and lock-in effects become stronger, transaction prices increase. This is consistent with Hypothesis 2. The coefficient on *Interest Rate Advantage* in our most saturated specification in column 6 indicates that a 100bp reduction in the rate differential is associated with an approximately 4% higher sales price for locked-in properties.

To put the price impact in column 6 into further context, consider that the average interest rate advantage was around 200bps during the 2022–2024 time period (see Figure 5). This would imply an economically meaningful increase in sales price of 2×4=8% for locked-in properties relative to what their price would have been absent the interest rate advantage.

4.2. Robustness

In this section we report the results of several robustness checks for our main results. First, we reestimate our results using a market rate derived from monthly Trepp LLC CMBS data. Second, we reestimate our results excluding agency CMBS loans. Finally, we examine the results when we use the full interest rate differential as our main independent variable.

Our first exercise is motivated by the fact that the RCA data may not capture the full universe of CMBS loans. This could be because RCA only reports transactions in excess of $2.5 million, for example. We are therefore interested in whether the results are sensitive to using a market rate calculated from an alternative CMBS data provider. We use Trepp LLC CMBS data to calculate the market interest rate $R_{p,t}$ and then

recalculate the interest rate differential for our RCA loan sample using the Trepp-derived market rate. We then recalculate *Interest Rate Advantage* and reestimate equations 14 and 15 and report the results in Tables 6. The results are very similar to those in our main analysis.

Second, because our main results in Table 5 include both private-label and agency CMBS, we consider the impact of including agency loans on the results. Although the impact of rate lock should not be property-type specific, and although agency borrowers should not have different incentives with respect to lock-in compared to non-agency borrowers, we nevertheless test whether our results are sensitive to the inclusion of agency loans by dropping them and reestimating equations 14 and 15. The results are reported in Table 7. Note that the number of observations is significantly smaller compared to the main analysis given the large number of agency CMBS loans. Overall, the results for sales likelihood in columns 1 through 3 are similar to those in the main analysis. The size of the coefficient on *Interest Rate Advantage* for the pricing regressions in columns 4 through 6 is larger, indicating that the lock-in effect is stronger for private-label CMBS loans.

Finally, we consider the overall impact of an interest rate differential, rather than focusing on negative differentials. Recall that our main independent variable is equal to $\Delta_{i,p,t}$ if $\Delta_{i,p,t} < 0$, and 0 otherwise. In order to assess the extent to which sales probability and prices are affected by a positive differential (intuitively, an interest rate *dis*advantage that would occur when market rates are lower than the rate on the mortgage), we use $\Delta_{i,p,t}$ as the main independent variable. Ex-ante, when $\Delta_{i,p,t} > 0$ we would expect some degree of symmetry relative to our main results in the form of higher sales probability and lower prices. However, because CMBS loans are subject to significant prepayment penalties, we expect that the relation between sales probability or prices and $\Delta_{i,p,t}$ will be less pronounced compared to the relation between sales or prices and *Interest Rate Advantage*.

In Table 8 we report the results of this exercise. We do not multiply Δ by -1, therefore, the results have the opposite signs of those in Table 5. The results are consistent with some degree of symmetry, albeit muted, as the coefficients on $\Delta_{i,p,t}$ for both sales and prices are 60 and 70 percent of the size of the coefficients on *Interest Rate Advantage* in our main specification, respectively.

5. EVALUATING THE AGGREGATE IMPACT

In this section, we evaluate the overall impact of lock-in effects on CRE prices, focusing on the recent downturn (2022–2024). We begin by estimating the total amount of the market that would have been locked in during this time period, and therefore subject to the direct price effect we document in Table 5. We then evaluate the impact of lock-in on unlocked properties.

5.1. How much of the CRE market was locked in during 2022–2024?

In this section, we provide evidence that at least half the CRE market was likely locked in between 2022-2024. As a starting point, we calculate the shares of mortgage debt held by various types of investors in the U.S. Data from the Financial Accounts of the United States indicates that, in 2023, 26.8% of the CRE mortgage debt was securitized in CMBS, 52.2% was held by banks, 12.5% was held by insurers, and 8.5% was held by other sectors and intermediaries.[12] We focus on the first three groups and then discuss the other sectors and intermediaries, as well as the all cash transactions in the market.

We next approximate the share of CMBS, bank, and insurer CRE loans that were fixed rate, and therefore exposed to lock-in effects, during 2022–2024. In terms of CMBS, Figure 7 illustrates the share of outstanding CMBS that are fixed rate over our sample period. Although the fixed-rate share has declined over time, the market is still dominated by fixed-rate debt. During 2022–2024, the average fixed rate share outstanding was 94.4%. As shown in Figure 6, nearly 100% of this fixed-rate subset of CMBS were in fact locked in during this time period. Therefore, we expect that around 94% of the CMBS market was fixed-rate and locked in.

In terms of banks and insurance companies, we rely on Glancy et al. (2021), who show that for 2012 to 2017 originations, about 34% of bank loans are fixed rate and the average term for bank loans is over 6.5 years. They also show that nearly all (97%) of insurance company loans are fixed rate and have an average

[12] We derive this data from Tables L.219 (multifamily mortgages) and L.220 (commercial mortgages) in the Financial Accounts of the United States for 2023. CMBS includes government-sponsored enterprises, agency- and GSE-backed mortgage pools, ABS issuers, and mREIT holdings of CMBS; banks includes U.S.-chartered depository institutions, foreign banking offices in the U.S., credit unions, and banks in U.S.-affiliated areas; insurers includes property-casualty insurance companies and life insurance companies; the "other" category includes all other holders listed on either table of the Financial Accounts.

term of more than 13 years during that time period. Altogether, if we assume 94% of CMBS debt, 34% of bank loans, and 97% of insurer loans are fixed rate, we can approximate that about 55% of the CRE debt market would have been exposed to rate lock-in effects between 2022 and 2024.

Beyond properties financed with mortgages, cash transactions are common in CRE. For example, in the raw RCA data, about 30% of transactions are not financed with a mortgage.[13] As shown in Glancy et al. (2024), many cash buyers are REITs or other borrowers that likely issue unsecured debt and use the proceeds to purchase with cash. We cannot precisely estimate the share of such unsecured debt that is fixed rate. However, given the all-cash transaction share in our sample, and because roughly 50% of CMBS, bank, and insurer debt was fixed rate, only 19% of unsecured CRE debt would have to be fixed rate in order for half of the overall market to be exposed to lock-in effects.

5.2. The impact of lock-in effects on unlocked properties

The market-level implications of lock-in depend not only on how locked-in properties are affected, but also on how reduced supply affects the prices of unlocked properties. As discussed in Proposition 2, lock-in should result in higher prices for properties that are not locked in ("unlocked" properties, which can either be properties with adjustable rate mortgages or properties with $\Delta > 0$), due to the reduction in supply from locked-in owners, all else equal. In this section, we test this idea by exploiting cross-sectional variation in the exposure of unlocked properties to lock-in effects.

We begin by constructing a proxy for market-level exposure to lock-in effects. We do so by measuring the fixed-rate share: the share of all mortgage-financed properties with a fixed rate loan in each market and each month. This time-varying fixed-rate share captures exposure to lock-in because fixed-rate mortgages are more likely to be locked in when market rates rise (see, for example, the share of fixed-rate CMBS that were locked in as illustrated in Figure 6). Thus, markets with higher fixed-rate shares are likely to have more properties locked-in compared to markets with lower fixed-rate shares.

Next, we define an indicator equal to 1 if a market's fixed rate share is above the median in month t, and

[13] This number is lower than the 50% share of cash transactions reported in Glancy et al. (2024), as they consider a smaller sample of properties in RCA (investment properties only) in their analysis.

0 otherwise.[14] As shown in Figure 8, the average fixed rate share across markets trends down over time, because CMBS and insurer loans become a smaller share of transactions relative to banks, and because more CMBS loans are floating rate later in the sample. We also create an indicator equal to 1 when *Interest Rate Advantage*($\times -1$) is positive and 0 otherwise (which we label as $\mathbb{1}$(*Interest Rate Advantage*>0)). This indicator measures when a property is locked in or unlocked.

We include both indicators and their interaction in a regression of the form of equation (15). This specification allows for the coefficient on the standalone high fixed-rate-share indicator to identify the effect of market-level lock-in exposure on unlocked properties. Note that the regressions do not include market-by-time fixed effects because the high fixed-rate-share indicator varies at the market-by-time level.

An important aspect of this exercise is that market-level fixed-rate exposure must be approximated. This is because most transactions that are not financed with CMBS mortgages do not report a maturity date for the mortgage in the RCA data. To address this, we approximate maturities using lender-type averages from Glancy et al. (2021). Specifically, we assume a 10-year term for all insurance company loans and a 5-year term for all bank loans. (If there is a maturity date in RCA, we use it, but most insurer and bank loans do not have a maturity date.)

Additionally, we must make assumptions about interest rate type for bank and insurer loans as this is also usually missing in the RCA data for these lender types. While nearly all insurer loans are fixed rate, bank loans exhibit greater heterogeneity. In the absence of comprehensive data, we conservatively classify bank loans as all adjustable rate.[15] This introduces measurement error in market-level exposure, reducing effective cross-market-over-time variation and attenuating estimated effects rather than generating spurious amplification. Importantly, though, absent a mechanism linking this error to contemporaneous demand shocks after conditioning on market and property type-by-time fixed effects, this measurement error induces attenuation bias, making our estimates conservative rather than biasing them upward.

[14] We note that when we use a continuous fixed rate share variable we obtain qualitatively similar results.

[15] The most comprehensive source of information on these loan terms that we are aware of comes from Glancy et al. (2021). In Table 1 of their paper, they show that insurers are 97% fixed rate, and we round up as we believe those few non-fixed rate loans are potentially anomalous. Bank loans are one-third fixed rate in Table 1 of Glancy et al. (2021), but their sample only includes loans for the large stress tested banks, and so without further information we conservatively classify all bank loans as adjustable rate.

The results are shown in Table 9. $\mathbb{1}$(*Interest Rate Advantage*>0) is positive and significant across specifications, indicating that locked-in properties sell for higher prices than unlocked properties, consistent with the main results. The key variable of interest is *High Fixed-Rate Share* in columns 2 and 4 (the interaction regressions). This is positive and significant, and the magnitude indicates that unlocked properties in locked-in markets sell for 9% higher prices than unlocked properties in unlocked markets (markets with low fixed rate shares). Because all specifications include property type-by-time and market fixed effects, these patterns are unlikely to reflect time-varying differences in local liquidity or demand conditions. These findings are consistent with Proposition 2, whereby lock-in raises equilibrium prices through reduced market-wide supply.

6. CONCLUSION

We document the existence of a significant fixed-rate mortgage lock-in effect for commercial real estate loans. Consistent with a simple bargaining model, we show that when market interest rates are higher than the fixed rate on a mortgage, the property is less likely to sell, and conditional on sale sells at a higher price. Our empirical estimates suggest a 100bp interest rate advantage is associated with a reduction in sale probability of 17% relative to the mean, and a 4% higher sales price. We also show that lock-in effects spill over and result in higher prices for unlocked properties. Overall, our findings suggest that rate lock-in effects likely dampened the post-COVID decline in CRE values by constraining supply during a period of rising interest rates.

References

ABEL, J. (2024): "Mortgage Lock-In and Home Sales Volume Dynamics," Working Paper.

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

AMRONIN, G. AND J. EBERLY (2023): "Macro Shocks and Housing Markets," 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.

BERNDT, A., J. ZHENG, AND M. ZHU (2025): "Breaking the Lock-In Effect: How Assumable Mortgages Shape Housing Prices and Supply Dynamics," Working Paper.

DE LA ROCA, J., M. GIACOLETTI, AND L. LIU (2025): "Aggregate Rate Changes, Local Rent Growth: The Mortgage Lock-In Channel," Working Paper.

FONSECA, J. AND L. LIU (2024): "Mortgage Lock-In, Mobility, and Labor Reallocation," Journal of Finance, 79, 3729–3772.

FONSECA, J., L. LIU, AND P. MABILLE (2025): "Unlocking Mortgage Lock-In: Evidence From a Spatial Housing Ladder Model," Working Paper.

GERARDI, K., F. QIAN, AND D. ZHANG (2025): "Mortgage Lock-in, Lifecycle Migration, and the Welfare Effects of Housing Market Liquidity," Working Paper.

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 (2025): "The Value of Renegotiation Frictions: Evidence from Commercial Real Estate Market," Journal of Financial Intermediation, 62, 101144.

GUPTA, A., V. MITTAL, AND S. VAN NIEUWERBURGH (2025): "Work from Home and the Office Real Estate Apocalypse," American Economic Review (forthcoming).

KATZ, J. AND R. MINTON (2025): "Mortgage Rate Lock and House Prices," Working Paper.

LIEBERSOHN, J. AND J. ROTHSTEIN (2025): "Household Mobility and Mortgage Rate Lock," Journal of Financial Economics, 124.

LING, D. C. AND M. PETROVA (2020): "The Impact of Like-Kind Exchanges on Investment, Leverage, and Liquidity," Journal of Real Estate Literature, 28, 30–49.

MENDOZA, C. (2024): "Assumable mortgages surge in popularity as buyers hunt for low rates," Mortgage Professional America.

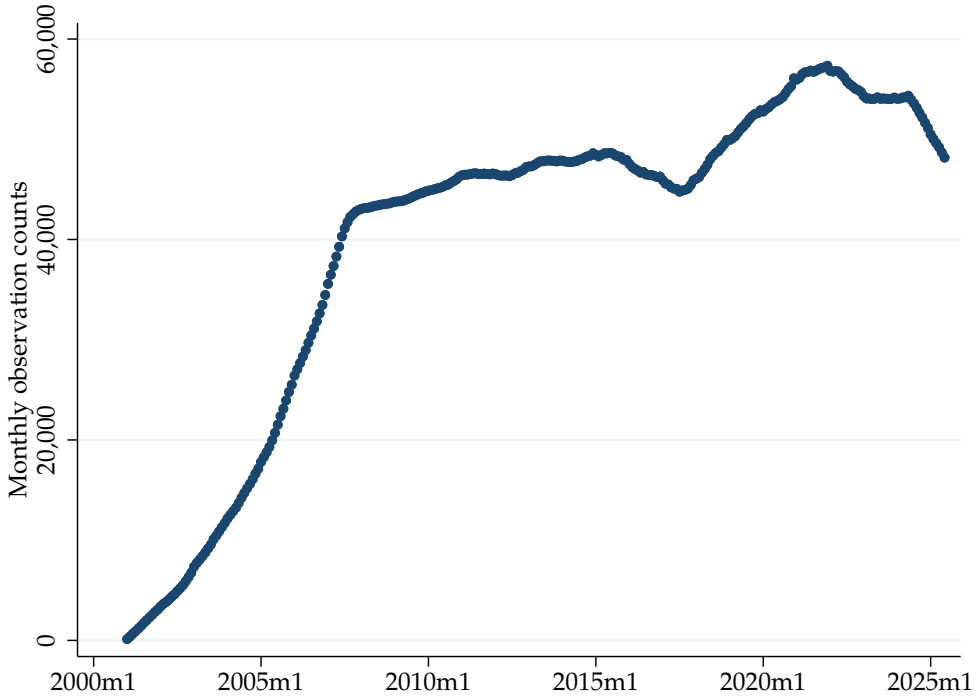
FIGURES

Figure 1: Seller Repurchase Rate over Time



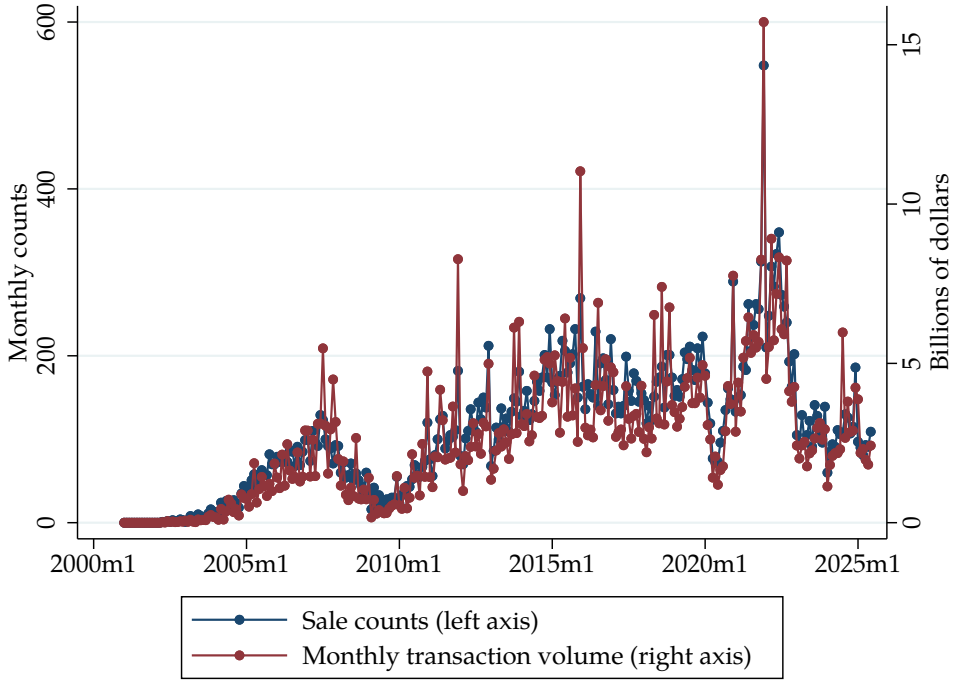
Note: The figure plots the annual average share (expressed in percentage terms) of sales that are followed by the purchase of a new property by the same seller within two years, for the sample ending in 2022.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 2: Counts of Loan Panel Observations over Time



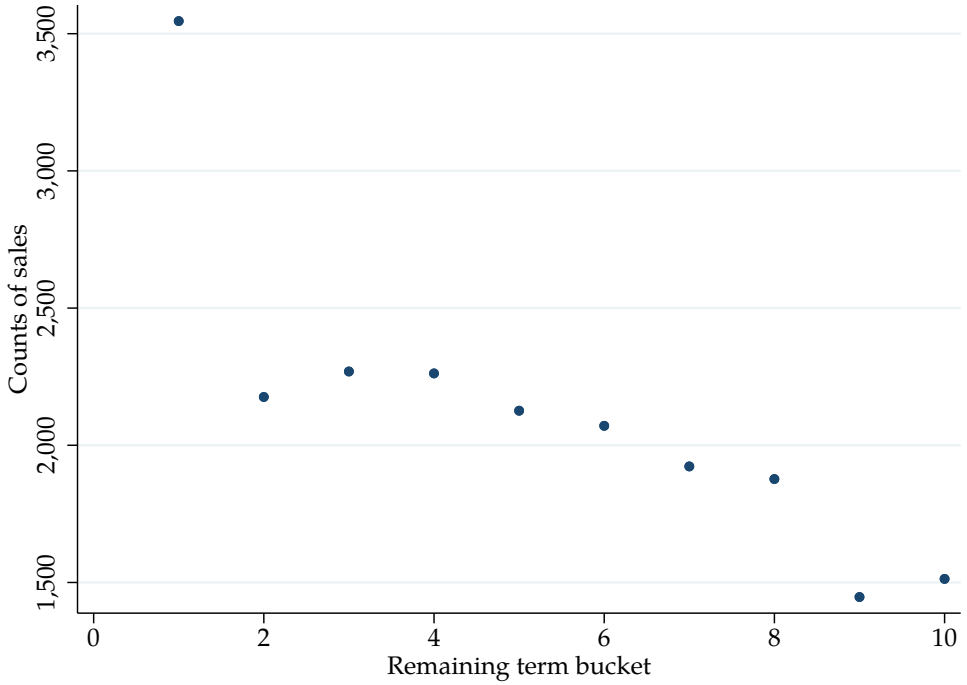
Note: The figure plots counts of observations in our property-loan pair panel by month in the sample of data used in our analysis.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 3: Repeat Sales over Time in the RCA Sample of Loans



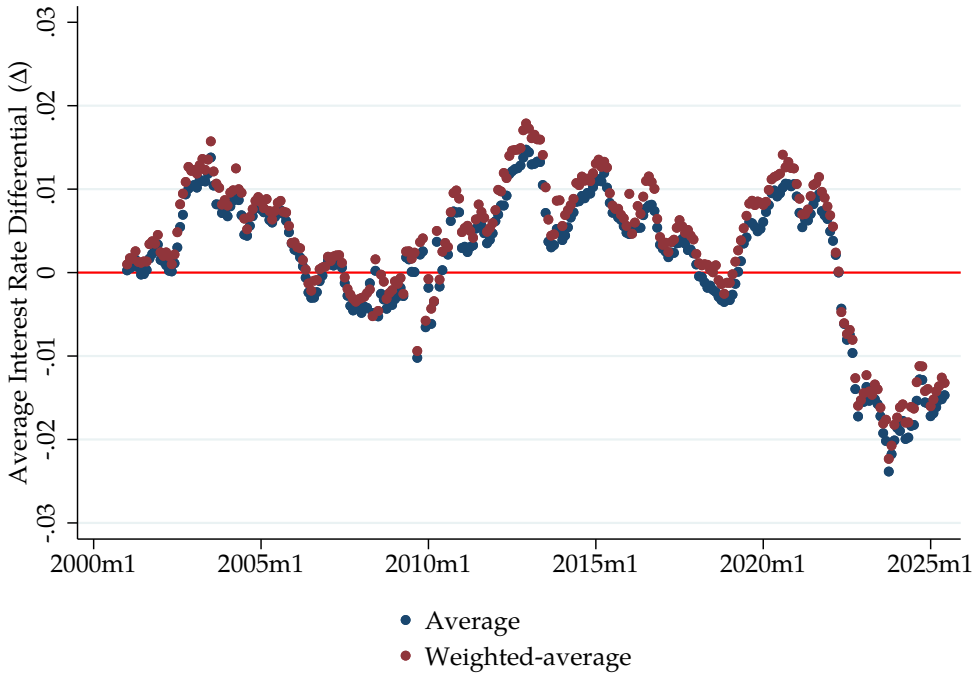
Note: The figure plots monthly sale counts (left axis) and total sale volume (in billions of dollars, right axis) of properties that appear at least twice in the sample, i.e., properties with repeat sales.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 4: Sales by Term Remaining Bucket



Note: The figure plots counts of the sales of properties that appear at least twice in the sample, i.e., properties with repeat sales, by remaining term to maturity bucket. Buckets are 0-1 years remaining to maturity, 1-2 years remaining to maturity, 2-3 years remaining to maturity,..., 9+ years remaining to maturity.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

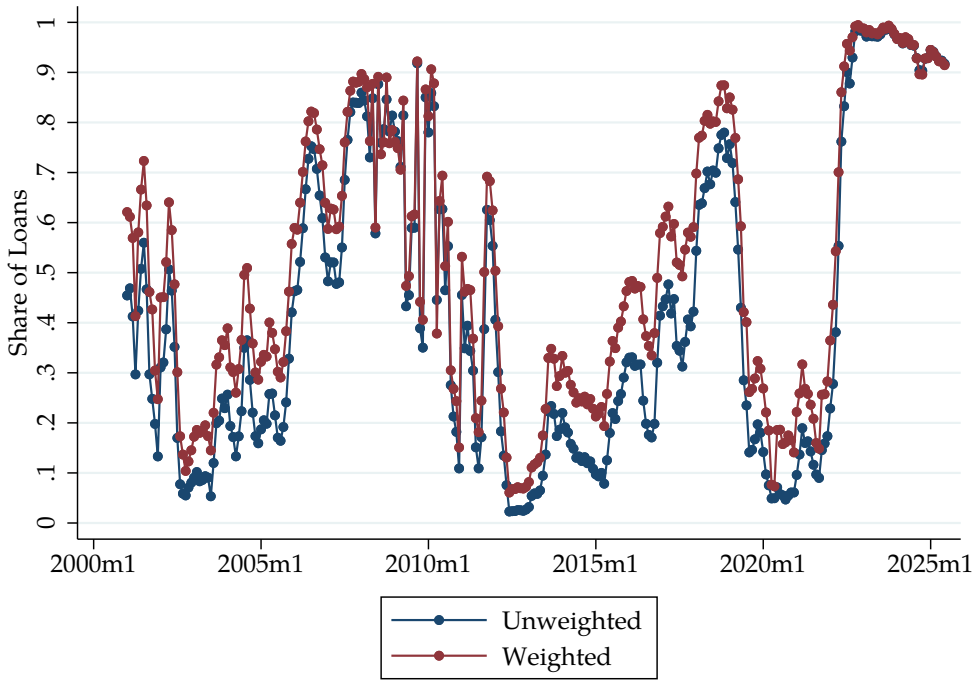
Figure 5: Average Interest Rate Differential over Time



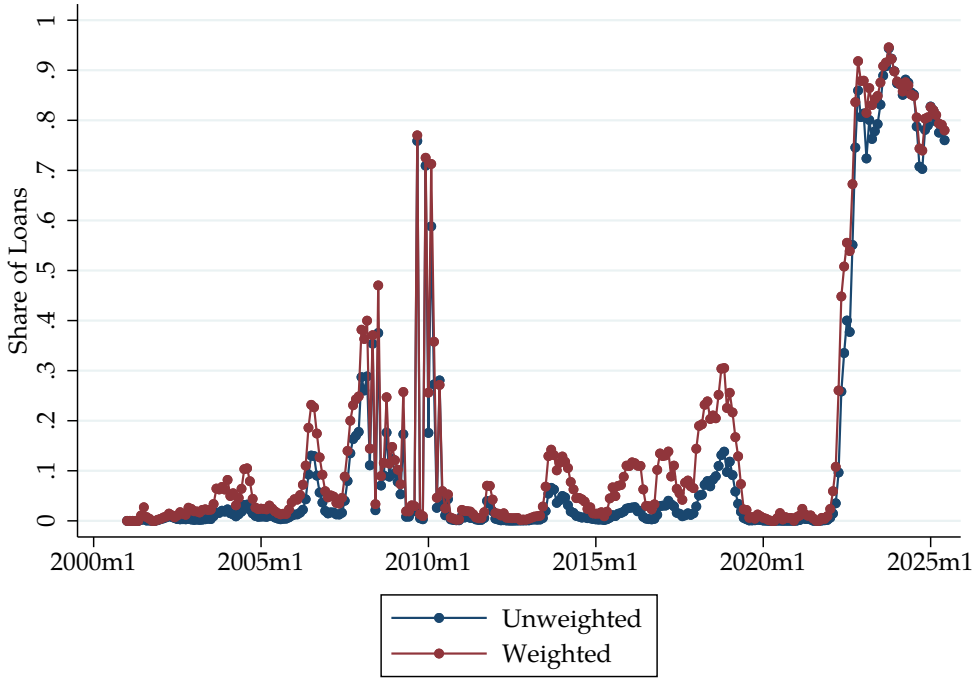
Note: The figure plots the unweighted and weighted (by property value) average of the interest rate differential (defined in (13)) over time.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 6: Shares of CMBS Loans with an Interest Rate Advantage Over Time

(a) CMBS with any Interest Rate Advantage

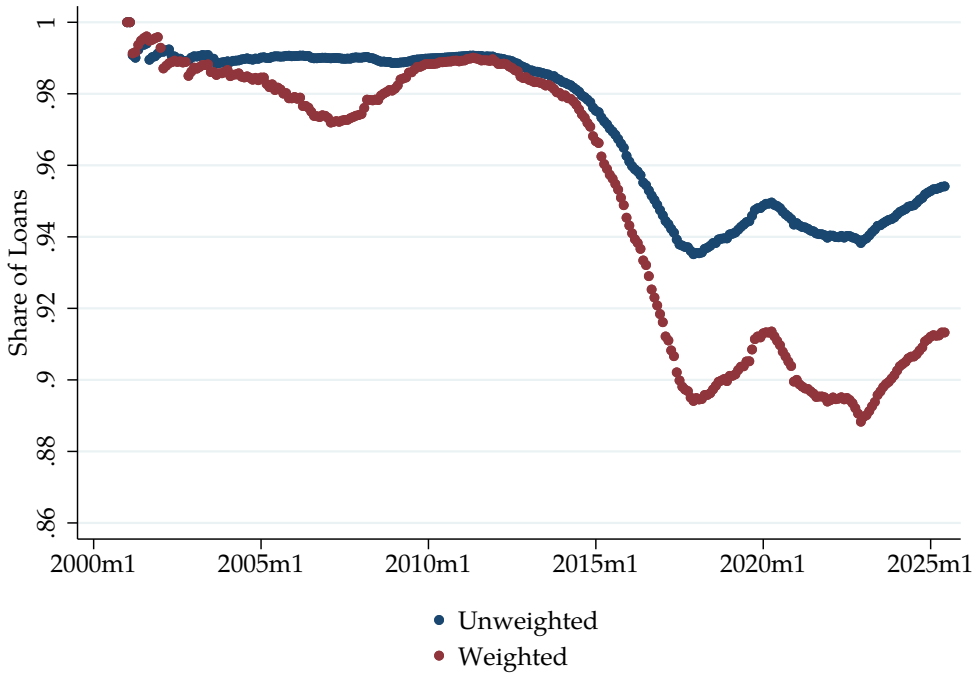


(b) CMBS with a Large Interest Rate Advantage ($\geq 1\%$)



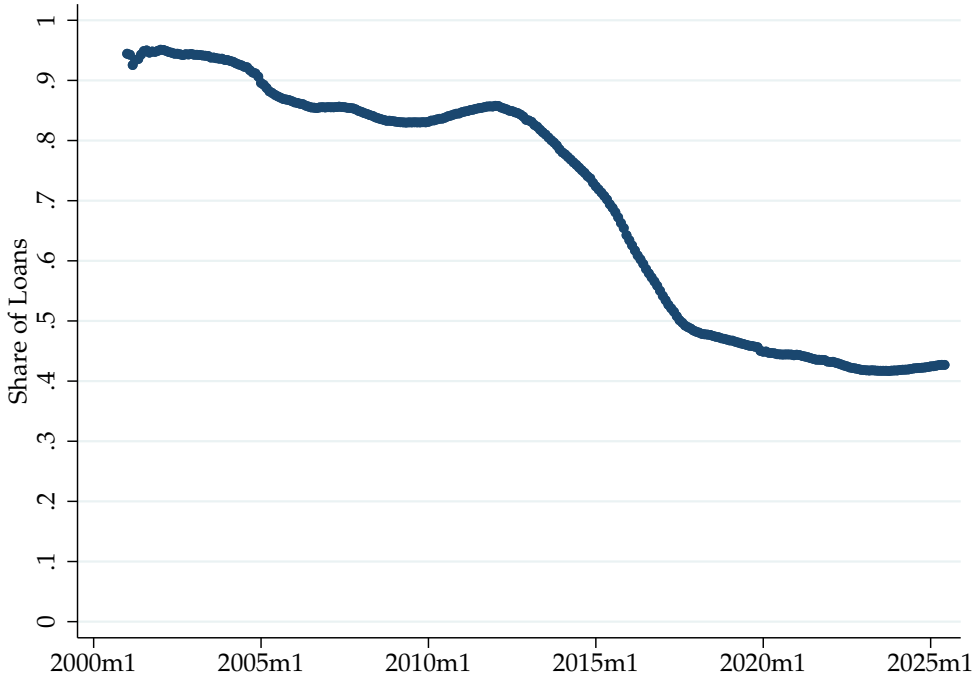
Note: The figures plot the unweighted and weighted (by property value) share of fixed rate CMBS loans with an interest rate advantage, i.e. a negative interest rate differential (defined in (13)), over time. The top panel shows the unconditional shares, while the bottom panel conditions on the interest rate advantage being at least 1% (i.e., $\Delta_{i,p,t} \leq -1$).
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 7: Fixed Rate Share of CMBS Loans over Time



Note: The figure plots the simple average and weighted (by property value) share of CMBS loans with a fixed rate. The underlying data meet the cleaning criteria described in the paper but include all adjustable rate CMBS as well.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

Figure 8: Average Fixed Rate Share of CMBS, Insurer, and Bank Loans over Time



Note: The figure shows the average fixed rate share of CMBS, bank, and insurance company CRE loans in the sample over time.
Source: Authors' calculations using data from MSCI Real Capital Analytics.

TABLES

Panel A: Statistics for all loans						
Variable	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	88,682	0.05	0.05	0.01	0.02	0.09
Term remaining at time of transaction (years)	88,682	3.69	2.17	4.75	0	34.92
Term at origination (years)	88,682	10.59	10.01	3.94	1.05	40.03
LTV at origination	88,682	0.6705	0.6970	0.1140	0.0840	0.8050
DSCR at origination	88,682	1.5785	1.4000	0.5770	1	7.5600
Distressed loan indicator	88,682	0.05	0	0.22	0	1
Quality score	88,682	0.52	0.52	0.27	0.01	1
Transaction price (millions of dollars)	88,682	26	11	81	0	5700
Loan size at origination (millions of dollars)	88,682	16	7	40	0	3002
CBD indicator	88,682	0.10	0	0.29	0	1
Agency loan indicator	88,682	0.42	0	0.49	0	1
Building age at time of transaction (years)	88,682	37	32	26	0	283
Building size in square feet (1,000s) at time of transaction	88,682	136	83	184	0	10247

Panel B: Statistics for loans on properties that are sold before or at maturity						
Variable	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	21,710	0.05	0.05	0.01	0.02	0.09
Term remaining at time of transaction (years)	21,710	4.85	4.25	4.13	0	34.92
Term at origination (years)	21,710	10.28	10.00	3.37	1.29	40.03
LTV at origination	21,710	0.6983	0.7210	0.0941	0.0840	0.8050
DSCR at origination (ratio)	21,710	1.5037	1.3800	0.4082	1	7.5600
Distressed loan indicator	21,710	0.00	0	0.06	0	1
Quality score	21,710	0.50	0.50	0.27	0.01	1
Transaction price (millions of dollars)	21,710	25	11	85	0	5400
Loan size at origination (millions of dollars)	21,710	16	8	47	0	3002
CBD indicator	21,710	0.07	0	0.26	0	1
Agency loan indicator	21,710	0.38	0	0.49	0	1
Building age at time of transaction (years)	21,710	32	29	23	0	255
Building size in square feet (1,000s) at time of transaction	21,710	153	100	195	1	10247

Panel C: Statistics for loans on properties that are not sold before or at maturity						
Variable	Count	Mean	Median	SD	Min	Max
Interest rate at origination (%)	66,972	0.05	0.05	0.01	0.02	0.09
Term remaining at time of transaction (years)	66,972	3.31	0.83	4.87	0	34.75
Term at origination (years)	66,972	10.69	10.01	4.10	1.05	40.03
LTV at origination	66,972	0.6614	0.6880	0.1183	0.0840	0.8050
DSCR at origination (ratio)	66,972	1.6027	1.4100	0.6200	1	7.5600
Distressed loan indicator	66,972	0.06	0	0.25	0	1
Quality score	66,972	0.52	0.53	0.27	0.01	1
Transaction price (millions of dollars)	66,972	26	11	80	0	5700
Loan size at origination (millions of dollars)	66,972	15	7	38	0	2901
CBD indicator	66,972	0.10	0	0.31	0	1
Agency loan indicator	66,972	0.43	0	0.49	0	1
Building age at time of transaction (years)	66,972	39	34	27	0	283
Building size in square feet (1,000s) at time of transaction	66,972	130	78	180	0	10247

Table 1: SUMMARY STATISTICS AT PROPERTY-LOAN PAIR LEVEL. *Note:* Loan and property characteristics based on the transaction-level data. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Variable	Count	Mean	Median	SD	Min	Max
$\Delta_{i,p,t}$	6,654,059	0.0007	0.0016	0.0119	-0.0537	0.0542
Interest Rate Advantage	6,654,059	0.0043	0	0.0075	0	0.0537
Lt1yr to maturity	6,654,059	0.07	0	0.25	0	1
Lt2yr since origination	6,654,059	0.28	0	0.45	0	1
Indicator for sale	6,654,059	0.0032	0	0.0564	0	1
Indicator for refi	6,654,059	0.0025	0	0.0497	0	1
Indicator for sale or refi	6,654,059	0.0057	0	0.0750	0	1
Indicator for prepayment	6,654,059	0.0029	0	0.0538	0	1

Table 2: SUMMARY STATISTICS AT PROPERTY-LOAN-MONTH LEVEL. *Note:* This table reports summary statistics at the property-loan-month level for the monthly panel of property-loan pairs we construct using the transaction-level data as described in Section 3.1. *Indicator for sale* is equal to 1 in a month in which the property associated with loan i sells, and 0 otherwise. *Indicator for refi* is equal to 1 in a month in which loan i is refinanced, and 0 otherwise. *Indicator for prepayment* is equal to 1 in a month in which loan i is either refinanced prior to maturity or the property is sold prior to maturity, and 0 otherwise. All other variables are defined in Table A.1. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Property type	Count	Count Shr. (%)	Volume ($ bn.)	Volume Shr. (%)
Industrial	5,846	6.6%	$91.3 bn.	4.0%
Multifamily	42,483	47.9%	$994.0 bn.	43.9%
Office	13,876	15.6%	$638.7 bn.	28.2%
Retail	26,477	29.9%	$542.8 bn.	23.9%
Total	88,682	100.0%	$2,266.8 bn.	100.0%

Table 3: PROPERTY TYPE SUMMARY STATISTICS FOR LOANS IN THE SAMPLE. *Notes:* Count Shr. is the count of loans in the property type relative to the count of total loans in the sample (in percentage terms). Volume Shr. is the volume of loans in the property type relative to the total volume in the sample. Volumes in billions of dollars reflect nominal transaction value at time of transaction. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

Buyer Type	Count	Count Shr. (%)	Volume ($ bn.)	Volume Shr. (%)
Bank	156	0.2%	$14.0 bn.	0.6%
Developer/Owner/Operator	60,244	67.9%	$1,336.8 bn.	59.0%
Equity Fund	3,246	3.7%	$184.6 bn.	8.1%
Investment Manager	2,691	3.0%	$146.6 bn.	6.5%
Other/Unknown	13,107	14.8%	$175.3 bn.	7.7%
Pension Fund	115	0.1%	$35.1 bn.	1.5%
REIT	4,420	5.0%	$282.1 bn.	12.4%
REOC	309	0.3%	$16.4 bn.	0.7%
Small	4,394	5.0%	$75.8 bn.	3.3%
Total	88,682	100.0%	$2,266.8 bn.	100.0%

Table 4: OWNER TYPE SUMMARY STATISTICS ACROSS CMBS TRANSACTIONS. *Notes:* Based on Ghent (2021), we define small owners as those "Developer/Owner/Operators" or "Unknown" investors with fewer than 5 transactions. REITs include the owner groups "REIT" or "Non Traded REIT." The other groups are as listed in the data, with "Other/Unknown" including all remaining investors. *Count Shr.* is the count of loans in the respective buyer type divided by the total count of loans in the sample (in percentage terms). *Sale Shr.* is the count of sales in the buyer type relative to the count of loans in the buyer type (in percentage terms). Total for Sale Shr. is then the share of total sales out of total loans (in percentage terms). Volumes in billions of dollars reflect nominal transaction value at time of transaction in the sample. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Sales×100			Ln Price		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Advantage(× − 1)	-5.30***	-5.79***	-5.27***	7.99***	6.74***	4.18**
	(0.60)	(0.58)	(0.62)	(1.50)	(1.48)	(1.63)
Lt1yr to maturity	0.43***	0.45***	0.45***	-0.00	-0.01	-0.00
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Lt2yr since origination	-0.37***	-0.38***	-0.39***	0.05***	0.05***	0.03*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Ln. real price	-0.05***	-0.06***	-0.03**			
	(0.01)	(0.01)	(0.01)			
LTV > 0.75	0.09***	0.07***	0.08***	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DSCR < 1.25	0.04***	0.03***	0.03***	-0.03***	-0.03***	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Distressed indicator	-0.34***	-0.35***	-0.34***	-1.36***	-1.36***	-1.15***
	(0.02)	(0.02)	(0.02)	(0.41)	(0.41)	(0.42)
Quality score	0.08***	0.07***	0.03	1.19***	1.17***	1.17***
	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.06)
Term at origination	-0.01***	-0.01***	-0.01***	-0.00***	-0.00**	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CBD indicator	-0.01	-0.01	-0.01	0.25***	0.25***	0.26***
	(0.02)	(0.02)	(0.02)	(0.06)	(0.05)	(0.06)
Bldg. age (decades)	0.0162***	0.0135***	0.0102***	-0.0290***	-0.0299***	-0.0275***
	(0.0034)	(0.0033)	(0.0031)	(0.0068)	(0.0068)	(0.0081)
Bldg. age (decades) sqrd.	-0.0011***	-0.0011***	-0.0008***	0.0020***	0.0020***	0.0021***
	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)	(0.0006)
Ln bldg. sq. ft.	0.10***	0.09***	0.06***	0.88***	0.86***	0.87***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Agency loan indicator	-0.02	-0.03**	-0.04***	0.08***	0.08***	0.06***
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Prev. trans. refi indicator	-0.51***	-0.52***	-0.53***			
	(0.02)	(0.02)	(0.02)			
Observations	6,654,059	6,654,059	6,654,032	21,203	21,203	18,359
Adjusted R^2	0.004	0.004	0.004	0.798	0.800	0.824
Prop Type x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Owner Type FE	N	Y	Y	N	Y	Y
Market FE	Y	Y	N	Y	Y	N
Market x Year-Quarter FE	N	N	Y	N	N	Y

Table 5: EFFECT OF INTEREST RATE ADVANTAGE ON SALES AND TRANSACTION PRICES. *Note:* This table shows a linear regression of sales multiplied by 100 (columns 1-3) and log of transaction price (columns 4-6) on *Interest Rate Advantage* and controls. We multiply *Interest Rate Advantage* by -1 such that a more negative interest rate differential is associated with a more positive *Interest Rate Advantage*. The sample in columns 1 through 3 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, while columns 4 through 6 only include sold properties. Building square feet is in millions before taking the natural log. The distressed indicator is 1 for loans where RCA's *DistressedStatus* field is non-missing and not marked as "Resolved." Standard errors, in parentheses, are clustered at the market×property type level. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All variables defined in Table A.1. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Sales×100			Ln Price		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Advantage(× − 1)	-5.32***	-5.79***	-5.14***	8.38***	7.15***	4.87***
	(0.64)	(0.62)	(0.67)	(1.50)	(1.48)	(1.63)
Lt1yr to maturity	0.44***	0.46***	0.46***	0.00	-0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Lt2yr since origination	-0.37***	-0.39***	-0.39***	0.05***	0.05***	0.03*
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Ln real price	-0.05***	-0.06***	-0.03**			
	(0.01)	(0.01)	(0.01)			
LTV > 0.75	0.09***	0.07***	0.08***	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DSCR < 1.25	0.04***	0.03***	0.03***	-0.03***	-0.03**	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Distressed indicator	-0.34***	-0.35***	-0.35***	-1.52***	-1.52***	-1.24***
	(0.02)	(0.02)	(0.02)	(0.47)	(0.47)	(0.45)
Quality score	0.07***	0.07***	0.03	1.19***	1.17***	1.17***
	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.07)
Term at origination	-0.01***	-0.01***	-0.01***	-0.00**	-0.00**	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CBD indicator	-0.01	-0.01	-0.01	0.26***	0.25***	0.26***
	(0.02)	(0.02)	(0.02)	(0.06)	(0.05)	(0.06)
Bldg. age (decades)	0.0172***	0.0145***	0.0109***	-0.0301***	-0.0310***	-0.0287***
	(0.0036)	(0.0035)	(0.0033)	(0.0070)	(0.0070)	(0.0082)
Bldg. age (decades) sqrd.	-0.0012***	-0.0012***	-0.0008***	0.0021***	0.0021***	0.0023***
	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0005)	(0.0006)
Ln. bldg. sq. ft.	0.10***	0.09***	0.07***	0.88***	0.87***	0.87***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Agency loan indicator	-0.03	-0.03**	-0.05***	0.08***	0.08***	0.06***
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Prev. trans. refi indicator	-0.51***	-0.53***	-0.54***			
	(0.02)	(0.02)	(0.02)			
Observations	6,406,129	6,406,129	6,406,101	20,746	20,746	18,006
Adjusted R^2	0.004	0.004	0.004	0.798	0.800	0.824
Prop Type x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Owner Type FE	N	Y	Y	N	Y	Y
Market FE	Y	Y	N	Y	Y	N
Market x Year-Quarter FE	N	N	Y	N	N	Y

Table 6: EFFECT OF INTEREST RATE ADVANTAGE ON SALES AND TRANSACTION PRICES: TREPP MEASURE OF MARKET INTEREST RATE. *Note:* This table shows a linear regression of sales multiplied by 100 (columns 1-3) and log of transaction price (columns 4-6) on *Interest Rate Advantage* and controls. We multiply *Interest Rate Advantage* by -1 such that a more negative interest rate differential is associated with a more positive *Interest Rate Advantage*. *Interest Rate Advantage* is constructed using Trepp LLC CMBS data to define the market interest rate. The sample in columns 1 through 3 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, while columns 4 through 6 only include sold properties. Building square feet is in millions before taking the natural log. The distressed indicator is 1 for loans where RCA's *DistressedStatus* field is non-missing and not marked as "Resolved." Standard errors, in parentheses, are clustered at the market×property type level. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All variables defined in Table A.1. *Source:* Authors' calculations using data from MSCI Real Capital Analytics and Trepp, LLC.

	Sales×100			Ln Price		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Advantage(× −1)	-5.26***	-5.78***	-5.21***	13.79***	12.21***	14.08*
	(0.67)	(0.67)	(0.70)	(3.24)	(3.23)	(8.18)
Lt1yr to maturity	0.41***	0.43***	0.42***	0.01	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Lt2yr since origination	-0.30***	-0.32***	-0.32***	0.06***	0.05***	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)
Ln. real price	0.00	-0.01	0.02			
	(0.01)	(0.01)	(0.01)			
LTV > 0.75	0.07***	0.05***	0.05***	-0.01	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
DSCR < 1.25	0.04***	0.04***	0.04***	-0.03**	-0.02*	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
Distressed indicator	-0.34***	-0.35***	-0.35***	-1.58***	-1.58***	-0.82
	(0.01)	(0.01)	(0.01)	(0.47)	(0.47)	(0.50)
Quality score	0.09***	0.08***	0.03	1.49***	1.46***	1.53***
	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.08)
Term at origination	-0.01***	-0.01***	-0.01***	-0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CBD indicator	0.01	0.00	0.00	0.28***	0.27***	0.27***
	(0.02)	(0.02)	(0.02)	(0.07)	(0.06)	(0.10)
Bldg. age (decades)	0.0005	-0.0025	-0.0052*	-0.0382***	-0.0390***	-0.0293*
	(0.0031)	(0.0031)	(0.0030)	(0.0099)	(0.0100)	(0.0174)
Bldg. age (decades) sqrd.	-0.0002	-0.0001	0.0002	0.0030***	0.0030***	0.0034***
	(0.0003)	(0.0003)	(0.0003)	(0.0007)	(0.0007)	(0.0011)
Ln. bldg. sq. ft.	0.07***	0.06***	0.03***	0.90***	0.88***	0.89***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Prev. trans. refi indicator	-0.42***	-0.45***	-0.45***			
	(0.01)	(0.01)	(0.01)			
Observations	4,439,373	4,439,373	4,438,633	12,910	12,910	7,155
Adjusted R^2	0.003	0.003	0.002	0.762	0.764	0.807
Prop Type x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Owner Type FE	N	Y	Y	N	Y	Y
Market	Y	Y	N	Y	Y	N
Market x Year-Quarter FE	N	N	Y	N	N	Y

Table 7: EFFECT OF INTEREST RATE ADVANTAGE ON SALES AND TRANSACTION PRICES: EXCLUDING AGENCY LOANS. *Note:* This table shows a linear regression of sales multiplied by 100 (columns 1-3) and log of transaction price (columns 4-6) on *Interest Rate Advantage* and controls. We multiply *Interest Rate Advantage* by -1 such that a more negative interest rate differential is associated with a more positive *Interest Rate Advantage*. Agency CMBS loans are excluded. The sample in columns 1 through 3 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, while columns 4 through 6 only include sold properties. Building square feet is in millions before taking the natural log. The distressed indicator is 1 for loans where RCA's *Distressed-Status* field is non-missing and not marked as "Resolved." Standard errors, in parentheses, are clustered at the market×property type level. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All variables defined in Table A.1. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Sales×100			Ln Price		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Differential, $\Delta_{i,p,t}$	2.54***	3.51***	3.12***	-5.28***	-4.60***	-2.92***
	(0.41)	(0.39)	(0.44)	(0.75)	(0.75)	(0.82)
Lt1yr to maturity	0.43***	0.44***	0.45***	0.01	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Lt2yr since origination	-0.36***	-0.37***	-0.37***	0.03***	0.03***	0.02
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Ln. real price	-0.05***	-0.06***	-0.03**			
	(0.01)	(0.01)	(0.01)			
LTV $>$ 0.75	0.09***	0.07***	0.08***	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DSCR $<$ 1.25	0.03***	0.03***	0.03***	-0.02**	-0.02*	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Distressed indicator	-0.34***	-0.34***	-0.34***	-1.35***	-1.35***	-1.15***
	(0.02)	(0.02)	(0.02)	(0.41)	(0.41)	(0.42)
Quality score	0.08***	0.08***	0.03	1.18***	1.16***	1.16***
	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.06)
Term at origination	-0.01***	-0.01***	-0.01***	-0.00**	-0.00*	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CBD indicator	-0.01	-0.01	-0.01	0.25***	0.25***	0.26***
	(0.02)	(0.02)	(0.02)	(0.06)	(0.05)	(0.06)
Bldg. age (decades)	0.0163***	0.0137***	0.0103***	-0.0284***	-0.0293***	-0.0272***
	(0.0035)	(0.0033)	(0.0031)	(0.0068)	(0.0068)	(0.0081)
Bldg. age (decades) sqrd.	-0.0011***	-0.0011***	-0.0008***	0.0019***	0.0019***	0.0021***
	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)	(0.0006)
Ln bldg. sq. ft.	0.10***	0.09***	0.07***	0.88***	0.86***	0.87***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Agency loan indicator	-0.02	-0.03*	-0.04***	0.07***	0.07***	0.05**
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Prev. trans. refi indicator	-0.51***	-0.52***	-0.53***			
	(0.02)	(0.02)	(0.02)			
Observations	6,654,059	6,654,059	6,654,032	21,203	21,203	18,359
Adjusted R^2	0.004	0.004	0.004	0.799	0.800	0.824
Prop Type x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Owner Type FE	N	Y	Y	N	Y	Y
Market	Y	Y	N	Y	Y	N
Market x Year-Quarter FE	N	N	Y	N	N	Y

Table 8: EFFECT OF INTEREST RATE DIFFERENTIAL ON SALES AND TRANSACTION PRICES. *Note:* This table shows a linear regression of sales multiplied by 100 (columns 1-3) and log of transaction price (columns 4-6) on the interest rate differential ($\Delta_{i,p,t}$) and controls. The interest rate differential is not multiplied by -1, so the coefficient signs appear opposite those in Table 5 and the subsequent tables. The sample in columns 1 through 3 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, while columns 4 through 6 only include sold properties. Building square feet is in millions before taking the natural log. The distressed indicator is 1 for loans where RCA's *DistressedStatus* field is non-missing and not marked as "Resolved." Standard errors, in parentheses, are clustered at the market×property type level. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All variables defined in Table A.1. *Source:* Authors' calculations using data from MSCI Real Capital Analytics.

	Ln Price	
	(1)	(2)
$\mathbb{1}$(*Interest Rate Advantage*>0)	7.87***	6.65***
	(1.45)	(1.44)
High Fixed-Rate Share	0.09***	0.09***
	(0.02)	(0.02)
High Fixed-Rate Share$\times\mathbb{1}$(*Interest Rate Advantage*>0)	-0.01	-0.01
	(0.02)	(0.02)
Lt1yr to maturity	-0.00	-0.01
	(0.01)	(0.01)
Lt2yr since origination	0.05***	0.05***
	(0.01)	(0.01)
LTV >0.75	0.01	0.01
	(0.01)	(0.01)
DSCR <1.25	-0.03***	-0.03**
	(0.01)	(0.01)
Distressed indicator	-1.36***	-1.36***
	(0.41)	(0.41)
Term at origination	-0.00***	-0.00**
	(0.00)	(0.00)
CBD indicator	0.25***	0.25***
	(0.06)	(0.05)
Bldg. age (decades)	-0.03***	-0.03***
	(0.01)	(0.01)
Bldg. age (decades) sqrd.	0.00***	0.00***
	(0.00)	(0.00)
Ln bldg. sq. ft.	0.8787***	0.8649***
	(0.0068)	(0.0068)
Quality score	1.1925***	1.1695***
	(0.0489)	(0.0484)
Agency loan indicator	0.08***	0.08***
	(0.02)	(0.02)
Observations	21,203	21,203
Adjusted R^2	0.799	0.800
Prop Type x Year-Quarter FE	Y	Y
Owner Type FE	N	Y
Market FE	Y	Y

Table 9: EFFECT OF MARKET FIXED RATE SHARES ON TRANSACTION PRICES. *Note:* This table shows a linear regression of log of transaction price on $\mathbb{1}$(*Interest Rate Advantage* >0) (an indicator equal to 1 if *Interest Rate Advantage*$(\times -1)$ is positive, and 0 otherwise), *High Fixed-Rate Share* (an indicator equal to 1 if the share of fixed-rate mortgage loans outstanding in loan i's market is above the median in month t, and 0 otherwise), and the interaction of these measures, along with additional controls. All other variables defined in Table A.1. Building square feet is in millions before taking the natural log. The distressed indicator is 1 for loans where RCA's *DistressedStatus* field is non-missing and not marked as "Resolved." Standard errors, in parentheses, are clustered at the market$\times$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.

A. APPENDIX

A.1. Variable Definitions

Table A.1: Variable definitions

Variable	**Definition**
$\Delta_{i,p,t}$	The difference between the interest rate on loan i at origination and the current market interest rate, as defined in equation 13
Interest Rate Advantage	Equal to $\Delta_{i,p,t}$ when $\Delta_{i,p,t} < 0$, and equal to 0 when $\Delta_{i,p,t} \geq 0$
Ln real price	Natural log of the previous transaction price in 2017 dollars
LTV>0.75	Indicator equal to 1 when origination loan-to-value ratio is greater than 75%, and 0 otherwise
DSCR<1.25	Indicator equal to 1 when origination debt service coverage ratio is less than 1.25, and 0 otherwise
Distressed indicator	Indicator equal to 1 when the transaction is associated with a distressed property (as defined by RCA), and 0 otherwise
Lt1yr to maturity	Indicator equal to 1 when the loan has less than a year remaining to maturity, and 0 otherwise
Lt2yr since origination	Indicator equal to 1 when it is less than 2 years since loan origination, and 0 otherwise
Quality score	RCA property quality score
Term at origination	Term to maturity at time of loan origination
CBD indicator	Indicator equal to 1 if property is located in central business district (CBD), and 0 otherwise
Bldg age	Building age in decades
Ln bldg sq ft	Natural log of building square feet
Agency loan indicator	Indicator equal to 1 if loan is an agency CMBS loan, and 0 otherwise
Prev trans refi indicator	Indicator equal to 1 if previous transaction observed in RCA was a refinancing, and 0 otherwise
High Fixed-Rate Share	Indicator equal to 1 if the share of fixed-rate mortgage loans outstanding in loan i's market is above the median in month t, and 0 otherwise
$\mathbb{1}$(*Interest Rate Advantage* > 0)	Indicator equal to 1 if the interest rate advantage is positive ($\Delta_{i,p,t} < 0$), and 0 otherwise

A.2. Proof of Proposition 1

The probability π of sale is equal to

$$\begin{aligned}\pi &= \Pr(P^B \geq P^S) = \Pr(u \geq S - \Delta M) \\ &= \Pr(x \leq B - S + \Delta M) \\ &= 1 - e^{-\lambda(B-S+\Delta M)}.\end{aligned}$$

Since the exponential function is strictly increasing and $(B - S + \Delta M) > 0$, $\pi(\Delta, \lambda)$ is increasing in Δ and λ.

The expected sale price is equal to the expected value of P^*, which is given by (4), conditional on $P^B \geq P^S$, or $u \geq S - \Delta M$. Thus, we can write

$$\begin{aligned}\bar{P}(\Delta, \lambda) &= \frac{1}{2(1+r_0)} E\left[u + S - \Delta M \middle| u \geq S - \Delta M\right] \\ &= \frac{1}{2(1+r_0)} E\left[B - x + S - \Delta M \middle| x \leq B - S + \Delta M\right] \\ &= \frac{1}{2(1+r_0)} \left(2B - (B - S + \Delta M) - E\left[x \middle| x \leq B - S + \Delta M\right]\right) \\ &= \frac{1}{2(1+r_0)} \left(2B - Z - E\left[x \middle| x \leq Z\right]\right), \qquad \text{(A.1)}\end{aligned}$$

where Z is defined as follows

$$Z \equiv B - S + \Delta M.$$

Integrating by parts yields

$$\int_0^Z x\lambda e^{-\lambda x} dx = \frac{1}{\lambda} - \left(Z + \frac{1}{\lambda}\right) e^{-\lambda Z}.$$

We use the above integral to calculate

$$\begin{aligned} E\left[x|x\leq Z\right] &= \frac{1}{1-e^{-\lambda Z}}\int_0^Z x\lambda e^{-\lambda x}dx \\ &= \frac{1}{1-e^{-\lambda Z}}\left(\frac{1}{\lambda}-\left(Z+\frac{1}{\lambda}\right)e^{-\lambda Z}\right) \\ &= \frac{1}{\lambda}-\frac{Ze^{-\lambda Z}}{1-e^{-\lambda Z}} \\ &= \frac{1}{\lambda}-\frac{Z}{e^{\lambda Z}-1}. \end{aligned}$$

Plugging it into (A.1) yields

$$\bar{P}(\Delta,\lambda)=\frac{1}{2(1+r_0)}\left(2B-Z-\frac{1}{\lambda}+\frac{Z}{e^{\lambda Z}-1}\right), \tag{A.2}$$

which is equivalent to (8).

To investigate how $\bar{P}(\Delta,\lambda)$ depends on λ and Δ, we differentiate (A.2) with respect to λ and Z. We note that Z is positive, linear in Δ and independent of λ.

$$\begin{aligned} 2(1+r_0)\frac{\partial\bar{P}}{\partial\lambda} &= \frac{1}{\lambda^2}-\frac{Z^2e^{\lambda Z}}{\left(e^{\lambda Z}-1\right)^2} \\ &= \frac{1}{\lambda^2}\left(1-\left(\frac{\lambda Ze^{0.5\lambda Z}}{e^{\lambda Z}-1}\right)^2\right). \end{aligned}$$

To prove that $\frac{\partial\bar{P}}{\partial\lambda}>0$, we need to show that $\frac{e^{\lambda Z}-1}{\lambda Z}>e^{0.5\lambda Z}$. According to the Taylor series,

$$e^y=\sum_{n=0}^{\infty}\frac{y^n}{n!}.$$

Thus,

$$\frac{e^{\lambda Z}-1}{\lambda Z} = \sum_{n=1}^{\infty}\frac{(\lambda Z)^{n-1}}{n!} = 1+\frac{1}{2}\lambda Z+\frac{1}{6}(\lambda Z)^2+..., \tag{A.3}$$

$$e^{0.5\lambda Z} = \sum_{n=0}^{\infty}\frac{(\lambda Z)^{n}}{2^n n!} = 1+\frac{1}{2}\lambda Z+\frac{1}{8}(\lambda Z)^2+... \ . \tag{A.4}$$

One can see that the first sum (A.3) is greater than the second sum (A.4), since the first two terms are identical, but all the other terms are strictly greater in the first sum for $Z>0$. Thus, $\frac{\partial \bar{P}}{\partial \lambda}>0$, and $\bar{P}(\Delta,\lambda)$ is increasing λ.

Finally, differentiating (A.2) with respect to Z yields

$$\begin{aligned} 2(1+r_0)\frac{\partial \bar{P}}{\partial Z} &= -1+\frac{e^{\lambda Z}-1-\lambda Z e^{\lambda Z}}{\left(e^{\lambda Z}-1\right)^2} \\ &= \frac{\phi(Z)}{\left(e^{\lambda Z}-1\right)^2}, \end{aligned}$$

where

$$\phi(Z) = -e^{2\lambda Z}+3e^{\lambda Z}-2-\lambda Z e^{\lambda Z}.$$

To prove that $\frac{\partial \bar{P}}{\partial Z}<0$ for $Z>0$, we need to show that $\phi(Z)<0$ for $Z>0$. We note that $\phi(Z)$ is a continuously differentiable function, $\phi(0)=0$, and

$$\frac{\partial \phi(Z)}{\partial Z} = -2\lambda e^{\lambda Z}\left(e^{\lambda Z}-1\right)-\lambda^2 Z e^{\lambda Z}<0 \text{ for } Z>0.$$

Thus, $\phi(Z)<0$, and $\frac{\partial \bar{P}}{\partial Z}<0$ for $Z>0$. Since Z is strictly increasing in Δ, we have $\bar{P}(\Delta,\lambda)$ is decreasing in Δ. **Q.E.D.**