Extend-and-Pretend in the U.S. CRE Market*

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Abstract

We show that in the post-pandemic period, weakly capitalized banks provided maturity extensions and granted payment relief to distressed commercial real estate (CRE) borrowers to preserve capital, leading to credit misallocation and a buildup of financial fragility. Using supervisory data, we detect this "extend-and-pretend" behavior in CRE mortgage lending and in bank lending to REITs exposed to distressed CRE. These maturity extensions increased the stock of CRE mortgages maturing in the near term, raising the risk of large losses materializing over a short period. Extend-and-pretend is also associated with reduced origination of new CRE mortgages and C&I credit to firms.

JEL Codes: G21, E51, R33.
Keywords: commercial real estate, credit misallocation, financial stability.

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1 Introduction

Commercial real estate (CRE) is one of the largest and historically most significant sources of credit risk on banks' balance sheets (FDIC, 2023). This asset class is especially exposed to rollover risk: loans are originated with substantial leverage and, unlike most residential mortgages, amortize over horizons that are considerably longer than their contractual maturities. As a result, borrowers often face large balloon payments at maturity and must refinance a substantial share of the original principal. This maturity structure creates strong incentives for lenders to postpone loss recognition. Because a balloon loan leaves most of its principal outstanding at maturity, enforcing repayment during a downturn can force banks to absorb a large loss immediately, whereas extending the loan preserves the possibility that property values, cash flows, or refinancing conditions recover before any loss is realized. In doing so, however, banks may forgo positive-NPV lending opportunities while deferring, rather than resolving, likely credit losses.

In this paper, using detailed supervisory data from the post-pandemic U.S. CRE market, we show that weakly capitalized banks are more likely to extend distressed CRE loans and grant payment relief in order to preserve capital rather than recognize losses—a pattern commonly described as "extend-and-pretend."[1] Against a backdrop of declining property valuations and rising interest rates, these short-term extensions push distressed loans into the near future, causing maturities to accumulate on the balance sheets of weakly capitalized banks. The resulting "maturity wall" concentrates rollover risk, leaving these banks particularly exposed to further declines in property cash flows or increases in interest rates. Finally, we show that banks engaging in extend-and-pretend reduce their supply of new credit, including both CRE and commercial and industrial lending, suggesting that scarce capital is diverted toward preserving legacy exposures rather than financing new lending opportunities.

[1]We use the term "extend-and-pretend" to describe the behavior of lenders that provide additional credit to their impaired legacy borrowers to avoid depleting their capital. This term is often used in industry reports (e.g., "Corporate Credit Concern", by Goldman Sachs on August 10, 2023) and media (e.g., "It's the Return of Extend and Pretend" by Bloomberg on June 16, 2023).

Our conceptual framework centers on the *cross-section* of bank capital as a means of distinguishing between extend-and-pretend and efficient loan restructuring. Maturity extensions and payment concessions are not, by themselves, evidence of inefficient delay: when borrower distress is temporary or liquidation is costly, renegotiation may preserve value. However, conditional on borrower, property, and loan characteristics, the efficient-restructuring motive should not vary systematically with the lender's capital position, as borrower viability and liquidation costs are properties of the loan rather than of the bank that holds it. Under extend-and-pretend, by contrast, the incentive to avoid loss recognition is strongest for weakly capitalized banks, for which recognizing CRE losses is most costly. We therefore interpret the disproportionate use of extensions and concessions by low-capital banks for otherwise similar distressed loans as evidence of extend-and-pretend rather than efficient restructuring. This sorting on bank capital has ambiguous welfare implications: extensions may prevent inefficient liquidation during a temporary downturn, but may also preserve impaired legacy exposures, crowd out new lending, and concentrate rollover risk for the banks least able to absorb future losses.

The empirical work relies on loan-level supervisory data on CRE mortgages held by stress-tested banks (FR Y-14Q Schedule H.2). This dataset features detailed property-level characteristics, including net operating income (gross rental income minus operating expenses). We also leverage similar loan-level C&I lending data (FR Y-14Q Schedule H.1), data for REITs from Capital IQ and CRSP, and bank-level information (FR Y-9C). We use bank-level information to measure marked-to-market capitalization by (i) adding unrealized gains and losses on all securities to the regulatory capital ratio and (ii) calculating the bank's "capital tightness," i.e., the distance between the bank's regulatory capital ratio and the bank-specific regulatory capital threshold. This measure is based on the idea that banks' economic capital is an important determinant of vulnerability to runs by uninsured depositors (Goldstein and Pauzner, 2005; Jiang et al., 2024).

Our analysis is structured in six parts. First, we provide descriptive evidence consistent with banks being sluggish in recognizing the deterioration in CRE—a pattern particularly pronounced among less-capitalized banks. We begin by showing that the rapid increase in interest rates since 2022:Q1 generated large mark-to-market losses on banks' securities portfolios. Against this backdrop, we document that less-capitalized banks have been significantly slower to classify CRE loans as nonperforming and have experienced fewer CRE mortgage defaults than better-capitalized banks. Consistent with this apparent sluggishness in loss recognition, the aggregate level of CRE nonperforming loans remains low by historical standards as of 2025:Q4, despite the sizable deterioration in CRE valuations over the post-pandemic period.

Second, we provide better-identified evidence of banks' extend-and-pretend behavior using supervisory loan-level data. The main identification concern is that less-capitalized banks may hold safer CRE mortgages, thereby mechanically generating lower defaults and fewer nonperforming loans. Importantly, banks' balance sheet weakness is largely driven by losses on securities, which are not directly related to the quality of banks' CRE portfolios. Our empirical strategy compares distressed CRE mortgages with similar lending terms, collateralized by comparable properties, but held by banks with different capitalization levels. To identify distressed mortgages, we use the industry-standard underwriting ratio "debt yield," defined as net operating income divided by outstanding loan balance.

To hold credit risk fixed, we exploit an institutional feature of the CRE market where discount rates are largely determined at the submarket level. Hence, including zip code×property type×quarter fixed effects absorbs local variation in expected property valuations, conditional on cash flows. Our use of debt yield captures residual property-specific credit risk, including building quality, age, and amenities. Finally, we control for loan-level characteristics, most importantly the loan interest rate, which captures the bank's assessment of borrower risk, as well as other unobserved loan terms such as covenants.

We find that distressed CRE mortgages granted by less-capitalized banks (i) are more likely to receive maturity extensions, (ii) are more likely to receive payment relief upon extension (lower interest rate or a transition into an interest-only amortization schedule), (iii) are less likely to default, and (iv) are assigned a lower probability of default by lenders compared with similar mortgages granted by better-capitalized banks. These effects are concentrated in the post-monetary tightening period, are robust to the inclusion of bank-quarter fixed effects (capturing bank-level unobservables), and are robust across a range of modeling choices, including control variables, fixed effects, and alternative debt yield thresholds used to define loan distress.

Third, we study banks' indirect exposure to CRE through their lending to equity REITs that own CRE portfolios. This analysis strengthens our identification strategy in two ways. First, we match REITs across banks using stock tickers and estimate *borrower*-quarter fixed effects. This within-borrower design (Khwaja and Mian, 2008) allows us to compare loans granted to the *same* distressed CRE REIT by banks with different capitalization levels, eliminating concerns about borrower-level (as opposed to property-level) unobservables such as sponsor quality. Second, we use the forward-looking nature of market equity prices, rather than debt yields, to measure borrower distress. Since REIT stock prices incorporate market expectations about the persistence of distress, this measure mitigates concerns that our results reflect efficient renegotiation in response to transitory cash flow shocks rather than extend-and-pretend. We find that a loan to a CRE REIT that has experienced a large post-pandemic valuation decline is (i) more likely to receive a maturity extension and (ii) assigned a lower default probability when granted by a less-capitalized bank than by a better-capitalized one.

Fourth, we show that banks' maturity extensions appear to increase the amount of CRE mortgages maturing in the near term, especially among less-capitalized banks. Rather than mitigating banks' exposure to rollover risk, our findings show that extend-and-pretend may have further exacerbated that risk through larger exposure to sudden losses in the near future. For example, as of 2024:Q4, CRE loans expiring within three years accounted for 37% of marked-to-market capital for less-capitalized banks, compared with 27% for better-capitalized banks. There was no significant difference between these two groups in 2020, consistent with the growing "maturity wall" arising from post-pandemic extend-and-pretend behavior.

Fifth, we show that extend-and-pretend keeps capital tied up in distressed loans, thereby reducing new lending through limited balance-sheet capacity and debt-overhang effects. Specifically, we aggregate our loan-level data to the bank-zip code-quarter level to analyze CRE origination, and to the bank-state-industry-quarter level to analyze C&I origination. We find that less-capitalized banks with more distressed CRE maturity extensions originate less new credit in both markets. Using zip code-quarter (and state-industry-quarter) fixed effects, we effectively compare two banks lending in the same local market at the same time, absorbing demand-side factors. In a placebo test, extensions of *non-distressed* CRE loans have no similar effect. In a counterfactual exercise that accounts for the possibility that borrowers may switch lenders, we find that extend-and-pretend leads to a 1.1% contraction in aggregate CRE mortgage origination, with no similar effect in the C&I market.

Lastly, we find suggestive evidence of extend-and-pretend among regional banks (assets between $10B and $100B), which are both important players in and highly exposed to the CRE mortgage market. Although we cannot replicate our loan-level analysis for these banks, greater capital tightness is associated with smaller nonperforming loan ratios. This relationship is stronger in the post-pandemic period and weaker when compared with the large banks in our supervisory data. This difference is consistent with regional banks holding fewer securities affected by rising rates and CRE mortgage credit quality being stronger at regional banks (Glancy and Kurtzman, 2024; Hinzen et al., 2026). However, regional banks are highly exposed to CRE: CRE mortgages account for 9% of assets for the stress-tested banks in our loan-level data, compared with 31% of total assets for regional banks.

Contribution to the literature. Our paper contributes to three strand of literature by showing that CRE's institutional features—substantial rollover risk, large bank exposure, and property-specific renegotiation—make delayed loss recognition a natural feature of the asset class, with consequences for bank fragility, credit allocation, and potentially real estate adjustment. CRE mortgages are largely held on banks' balance sheets and represent the largest source of credit risk for the typical U.S. bank.[2] In addition, CRE mortgages are large, heterogeneous, reliant on property-specific renegotiation, and amortize over horizons considerably longer than their contractual maturities.[3] Because of these characteristics,

[2]In the full population of bank holding companies (BHCs) that we analyze in Section 7, we calculate that the median BHC as of 2025:Q4 has a ratio of CRE loans to total loans of 47.8%. In comparison, the analogous ratios were 13.6%, 20.7%, and 1.3% for commercial and industrial loans, residential real estate loans, and consumer loans, respectively. Note that this population of BHCs includes small, community banks that specialize in CRE.

[3]Unlike the residential mortgage market, where securitization is supported by a large agency infrastructure (Fuster et al., 2023), the U.S. CRE mortgage market remains primarily a balance-sheet lending market, with securitization accounting for a substantially smaller share of financing. This difference reflects both the absence, outside parts of the multifamily segment, of a comparable agency securitization infrastructure and

extend-and-pretend is an important component of the adjustment of the CRE market to shocks. Our laboratory for analyzing these structural features at work is the post-pandemic shock to the U.S. CRE market.

Our findings indicate that financial frictions may play an important role in shaping the effects of the COVID pandemic on CRE and real estate markets more broadly. After the initial pandemic surge, remote work has stabilized at a much higher level than in the pre-pandemic period (Han and Liang, 2022; Barrero et al., 2021; Ghent et al., 2026), depressing real estate valuations in cities and favoring suburban areas (Gupta et al., 2022; Alcedo et al., 2024; Gokan et al., 2024). Van Nieuwerburgh (2023) shows that this shift also affects productivity, innovation, and local public finances. Office CRE is the real estate segment most exposed to the rise of remote work and has experienced large declines in occupancy, lease renewals, and rents in the post-pandemic period (Gupta et al., 2026). While there is some variation across cities (Rosenthal et al., 2022), the magnitudes are dramatic. For example, Gupta et al. (2026) documents a 39% decline in the long-run value of NYC office buildings. By showing banks' sluggishness in recognizing losses, our results indicate that financial frictions may slow the reallocation of capital from distressed CRE to new projects, thereby affecting cities, the broader productive sector, and local public finances.[4]

Our findings also relate to the 2023 banking turmoil in the U.S., which highlighted the fragility of deposits during hiking cycles (Jiang et al., 2024; Drechsler et al., forthcoming; Haddad et al., 2023). As rising rates reduce the market value of securities held, banks protect their book capital by cutting lending (Greenwald et al., 2024) and placing securities in non-marked-to-market portfolios (Granja et al., 2024; Fuster et al., 2026).[5] We document that banks also protect their capital by extending the maturity of their distressed credit

the unique features of CRE mortgages.

[4]Consistent with our findings, Loewenstein et al. (2021) documents that debt slows down use-type redeployment and redevelopment, and Glancy et al. (2025) shows that mortgage-financed properties are less likely to be redeveloped as owners anticipate redevelopment frictions.

[5]Granja et al. (2024) and Hanson et al. (2024) suggest that capital raising and requiring banks to hold enough short-term government securities might help banks navigate future interest rate hikes while still holding interest rate sensitive securities.

exposures and granting borrowers payment relief. Given our focus on CRE, our findings are also consistent with studies on banks' vulnerability to CRE distress during the 2022–23 hiking cycle (Jiang et al., 2025). In the time series, Glancy (2026) finds that the terms of loan extensions did not deteriorate after the 2023 banking turmoil. In contrast, our identification strategy relies on the cross-section of bank capital to capture banks' differential incentives to delay loss recognition—and crucially distinguish extend-and-pretend from efficient loan restructuring.[6]

Finally, our findings complement the extensive literature on zombie lending in C&I credit (see Acharya et al. (2022) for a review).[7] As in Caballero et al. (2008), our results are consistent with less-capitalized banks extending the maturity of their distressed loans to preserve capital. Hence, the extend-and-pretend mechanism in this paper is distinct from recent contributions suggesting that zombie lending can arise because of information asymmetries (Hu and Varas, 2021) or policy-induced risk-shifting (Acharya et al., 2025), or from the "evergreening" notion based on banks' concentrated lending (Faria-e-Castro et al., 2024).[8]

Outline. The remainder of the paper is structured as follows. Section 2 presents our data. Section 3 discusses the post-pandemic deterioration in CRE and the institutional features that make this asset class particularly exposed to rising rates and credit risk. Section 4 shows that distressed CRE loans are less likely to default, and more likely to receive maturity extensions and payment relief if the lender is weakly capitalized. Section 5 discusses the financial stability implications. Section 6 shows the effect of banks' behavior on credit allocation. Section 7 analyzes regional and community banks. Section 8 concludes.

[6]The last part of the analysis in Glancy (2026) also uses banks' cross-sectional variation in capitalization. However, the author uses bank regulatory capital without accounting for marked-to-market losses on securities—a key driver of bank fragility during the 2022–23 hiking cycle (Jiang et al., 2024). In Section 4.2, we analyze banks' behavior during both the pandemic and pre-pandemic periods.

[7]This literature has convincingly documented this behavior in the Japanese economy in the 1990s (Peek and Rosengren, 2005; Caballero et al., 2008) and in the European economy following the sovereign debt crisis (Acharya et al., 2024a).

[8]Our results also complement Favara et al. (2024) that finds no evidence of zombie lending in C&I credit by U.S. banks following the drop in the price of oil in 2014–15. As discussed above, our setting is substantially different due to the unique nature of the CRE shock and the concurrent depletion of bank capital.

2 Data

We now explain how we combine our data sources to obtain our final dataset (Section 2.1), and present a set of summary statistics, our measure of bank capital tightness, and our measure of loan distress (Section 2.2).

2.1 Data construction

Our empirical work combines several datasets. In our main analysis, we use (i) loan-level CRE lending data from the Federal Reserve Y-14Q Schedule H.2 data, (ii) loan-level C&I lending data from the Federal Reserve Y-14Q Schedule H.1 data, (iii) bank-level characteristics from the Federal Reserve Y-9C data, and (iv) stock prices and market segment classification for REITs from CRSP and Capital IQ, respectively.

The FR Y-14Q Schedule H.2 (CRE) and Schedule H.1 (C&I) regulatory datasets cover all bank holding companies (henceforth "banks") subject to Dodd-Frank stress tests. Each observation is a loan-quarter pair. In each quarter t, we observe the balance on loan l granted by bank b to borrower j, among several other variables. Our core sample period runs quarterly from 2022:Q1 to 2025:Q4 and includes only domestic banks (see Table OA.1 for the list of banks in our sample). In a quarterly panel, we observe 1,028,318 CRE and 143,305 C&I loans granted by 22 banks. These two datasets share a few characteristics and variables. We observe the loan rate, whether the loan is in default, whether the maturity is extended, whether the loan is modified (e.g., to "interest-only"), and the probability of default that lenders assign to each loan, among other variables. In the CRE data, we also observe the property's zip code, net operating income (NOI), and type (e.g., office, multifamily, hotel).

The FR Y-9C data (Consolidated Financial Statements for Holding Companies) is publicly available and includes a large set of bank-quarter level income statement and balance sheet characteristics. Depending on the variables, the sample period starts as early as the mid-'80s. We merge all our sample banks in the two loan-level datasets (CRE and C&I) with banks in the FR Y-9C. In addition to variables such as nonperforming loans ratios and net charge-offs by market (e.g., multifamily, nonfarm nonresidential, C&I), we observe risk-weighted assets, common equity tier 1, and the fair and book values of Held-To-Maturity (HTM) and

Available-For-Sale (AFS) securities held, among others.

The stock price data for REITs is from CRSP, and their classification as "CRE" REITs is from Capital IQ. Each REIT is further classified by the CRE asset class it covers, such as multifamily, office, industrial, hotel, data center, or retail. In one part of our analysis, we merge the Y-14 C&I loan-level data with REIT stock prices (from CRSP) and REIT classifications (from Capital IQ) to examine how banks manage their lending to distressed REITs. We obtain stock prices and loan-level observations for our entire sample period for 75 of the 100 REITs classified in the broad CRE category in Capital IQ.

2.2 Summary statistics

Table 1 shows the summary statistics of our main data. Specifically, Panel A and Panel B show summary statistics for the period 2022:Q1–2025:Q4 from (i) the Y-14 Schedule H.2 CRE loan-level data and (ii) the Y-9C bank-quarter level data, respectively.

Loan-level summary statistics. Panel A presents loan-level characteristics. The first three variables are the probability of default assigned by banks to each loan, a dummy equal to one if loan l is in default at time t, and a dummy equal to one if loan l is granted a maturity extension at time t. The NOI is defined as gross rental income minus operating expenses (which include maintenance, common charges, taxes, insurance premiums, and management fees)—it directly measures a property's ability to generate cash flow and thus service its debt.

CRE valuations. CRE valuations are often calculated as a perpetuity. The flow income is the NOI and the discount rate is an assumed cap rate based on the risk of the income stream:

$$V = \frac{\text{NOI}}{\text{Cap Rate}}.$$

We measure distress with a Distress dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%[9], i.e.,

$$\text{Debt Yield} \coloneqq \frac{\text{NOI}}{\text{Loan Balance}} < 8\%$$

Figure OA.1 shows that debt yields below this threshold predict future defaults in pre-pandemic data. As we show later, our results are robust to different thresholds.

To see why the debt yield captures loan-level credit risk (while being unaffected by potentially manipulated appraisals), consider the following two observations. First, substituting the perpetuity valuation formula into the definition of the loan-to-value ratio (LTV) yields Debt Yield = Cap Rate/LTV. This expression mechanically links debt yield to solvency risk as Debt Yield $<$ Cap Rate $\Rightarrow$ $\text{LTV}_t > 1$, i.e., an underwater borrower. Second, a borrower is in distress when the NOI falls below debt service obligations, i.e., when NOI $<$ Loan Balance $\times\, r$, or equivalently when Debt Yield $< r$.[10]

Bank-level summary statistics and *bank capital tightness*. Panel B presents a set of bank-level characteristics, including three measures of banks' capitalization. First, the Capital Ratio, obtained by dividing common equity tier 1 by risk-weighted assets. Second, the MTM Capital Ratio, which takes into account marked-to-market gains and losses on securities held in the AFS and HTM portfolios.[11] Third, Capital Tightness, defined as the distance between the regulatory capital threshold of bank b in quarter t and its time t MTM Capital

[9]The 8% debt yield threshold is widely used by both practitioners and researchers. It (i) marks the point at which commercial mortgage lenders begin to treat loans as financially stressed and activate contractual protections, such as cash-management provisions (S&P Global Ratings, 2019), (ii) is used to identify loan-level financial distress in academic studies of CRE credit risk (Glancy et al., 2025), and (iii) is cited as a minimum underwriting benchmark in market commentaries assessing refinancing feasibility (CBRE Research, 2023).

[10]This expression assumes the loan is non-amortizing. This is a reasonable assumption given that as discussed later, CRE loans have very long amortization periods relative to their maturity, or are non-amortizing.

[11]Under bank accounting rules, a bank that sells any security from its HTM portfolio is typically required to mark all HTM securities to market. Note that common equity tier 1 capital already includes unrealized gains and losses on AFS securities for 9 (AOCI Capital) of our 22 sample banks. The other 13 (non-AOCI-Capital) banks in our sample are exempt from doing so. See Table OA.1 for the identity of these banks, and see Greenwald et al. (2024) for a detailed discussion of this different regulatory treatment. Banks do not need to adjust their regulatory capital for unrealized gains and losses on HTM securities.

Unit of obs.: loan-quarter level | No. of obs.: 1,028,318 | Source: Y-14 CRE | Period: 2022:Q1–2025:Q4							
Panel A	mean	St.dev	p10	p25	p50	p75	p90
Probability of Default (PD)	2.34	9.18	0.17	0.17	0.37	1.10	3.62
Default (dummy)	0.97	9.78	0.00	0.00	0.00	0.00	0.00
Extension (dummy)	2.86	16.67	0.00	0.00	0.00	0.00	0.00
Net Operating Income (M$)	1.00	5.22	0.10	0.16	0.31	0.72	2.03
Distress (dummy)	0.21	0.41	0.00	0.00	0.00	0.00	1.00
Amount Outstanding (M$)	8.80	21.04	1.08	1.48	2.68	6.61	20.94
Interest Rate	4.90	1.76	3.10	3.45	4.32	6.43	7.40
Time to Maturity (quarters)	48.72	44.00	4.00	11.00	28.00	102.00	113.00

Unit of obs.: bank-quarter level | No. obs.: 308 | Source: Y-9C | Period: 2022:Q1–2025:Q4							
Panel B	mean	St.dev	p10	p25	p50	p75	p90
Total Assets (T$)	0.96	1.14	0.17	0.20	0.43	1.56	3.07
Capital Ratio	11.54	1.79	9.39	10.27	11.05	12.55	14.65
MTM Capital Ratio	8.88	2.95	5.59	7.02	8.53	10.58	13.38
Capital Tightness	−0.04	2.15	−2.39	−1.36	−0.23	0.92	2.35
Deposits (%Assets)	69.01	16.13	30.22	63.92	75.16	78.85	81.46
CRE Lending (%Assets)	0.06	0.05	0.01	0.01	0.06	0.09	0.12
C&I Lending (%Assets)	0.11	0.08	0.01	0.03	0.10	0.18	0.22
Nonfarm Nonresidential Lending (%Assets)	0.04	0.03	0.01	0.01	0.03	0.06	0.08
Nonperforming Loans CRE (%)	1.91	2.05	0.21	0.53	1.21	2.76	3.96
Nonperforming Loans Nonfarm Nonresidential (%)	2.53	2.69	0.26	0.69	1.56	3.63	5.01
Nonperforming Loans Multifamily (%)	1.00	2.29	0.00	0.00	0.07	0.96	2.44
Nonperforming Loans C&I (%)	1.06	1.42	0.09	0.41	0.69	1.06	2.02
Net Charge-offs CRE (%)	0.08	0.14	−0.00	0.00	0.02	0.11	0.22
Net Charge-offs Nonfarm Nonresidential (%)	0.12	0.23	−0.00	0.00	0.03	0.16	0.33
Net Charge-offs Multifamily (%)	0.03	0.18	−0.00	0.00	0.00	0.00	0.07
Net Charge-offs C&I (%)	0.09	0.08	0.00	0.03	0.06	0.13	0.21

Table 1: Summary statistics. This table shows summary statistics of selected variables used in our analysis. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Panel A shows summary statistics at the loan-quarter level using Y-14 Schedule H.2 (CRE) data. Panel B shows summary statistics at the bank-quarter level using Y-9C data. The variables in Panel A are defined as follows. The Probability of Default (PD) is assigned by banks to each loan in quarter t. The Extension and Default dummies take the value of one if the loan maturity is extended in quarter t or if the loan enters default in quarter t, respectively. The Distress dummy is equal to one if the property's debt yield (NOI/loan balance) is less than 8%. The variables in Panel B are defined as follows. Capital Ratio is the ratio of common equity tier 1 capital to risk-weighted assets. MTM Capital ratio is the common equity tier 1 capital, adjusted for changes in the market value of securities held in the HTM and AFS portfolios, divided by risk-weighted assets. The Capital Tightness variable, defined in Section 2.2, is the time-varying difference between bank-level MTM Capital Ratio and the contemporaneous bank-specific regulatory threshold. Nonperforming Loans and Net Charge-offs are expressed as a share of total lending (for each category of lending). Source: FR Y-9C, FR Y-14 Schedule H.2.

Ratio. A positive, large value of the capital tightness variable indicates that bank b is weakly capitalized. A small (negative) value of the capital tightness variable indicates that bank b's regulatory capital (with securities marked-to-market) is well above its regulatory threshold at time t. Bank-level regulatory thresholds are available in Table OA.1. Summary statistics for less-capitalized (high capital tightness) and better-capitalized (low capital tightness) banks are available in Table OA.2 and Table OA.3.

The marking-to-market of securities captures the idea that banks are vulnerable to runs by uninsured depositors as interest rates rise, thereby reducing the value of the securities held. This vulnerability builds on Goldstein and Pauzner (2005), and is discussed in Jiang et al. (2024), Drechsler et al. (forthcoming), and Haddad et al. (2023). Specifically, Jiang et al. (2024) shows that the rise in interest rates since 2022:Q1 caused a 10% drop in the marked-to-market value of U.S. banks' assets, which can lead to self-fulfilling solvency runs even when banks' assets are fully liquid.[12] As the Federal Reserve raised interest rates, the market value of banks' securities holdings fell sharply, creating large unrealized losses. Figure 1 shows the 5-year Treasury yield (dashed line) and the bank capital tightness (solid line).

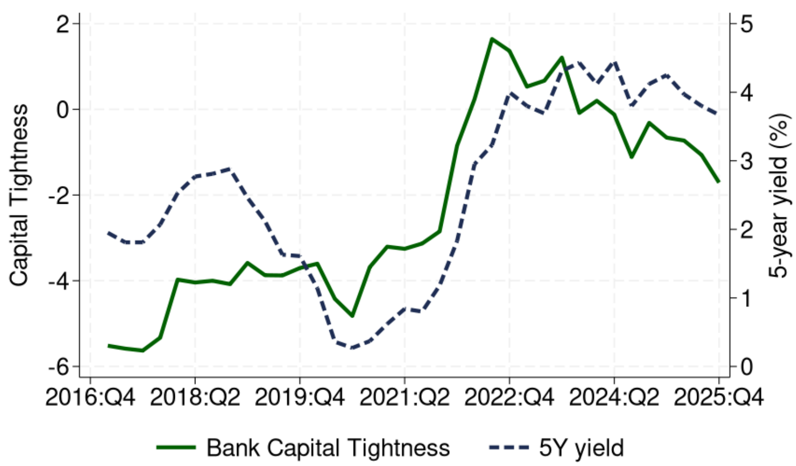

Figure 1: Banks' capital tightness as 5-year Treasury yields increase. This figure shows the time-series evolution of the 5-year Treasury yield (dashed line, secondary y-axis) and the bank-level capital tightness (solid line, primary y-axis) from 2017:Q1 to 2025:Q4. The capital tightness is the cross-sectional mean of Capital Tightness (defined in Section 2.2). We use the 5-year yield, as banks' securities holdings have a duration of around 4 years (Greenwald et al., 2024). Source: FR Y-9C, FRED.

[12] In addition, while having a limited effect on regulatory capital, marked-to-market losses also increase the likelihood that banks will be monitored by regulators and credit rating agencies (Moody's, 2025).

The figure documents a sharp decline in bank capitalization (increased capital tightness) as the 5-year yield rose from below 1% in 2021:Q3 to 4.4% in 2023:Q4. Although yields have partially retreated since then, the capital tightness remains well above its pre-tightening level as of 2025:Q4. Figure OA.2 shows that this erosion was broad-based: the entire cross-sectional distribution of capital tightness shifted to the right between 2020:Q4 and 2022:Q4.

3 CRE mortgages in the post-pandemic period

We now present evidence of post-pandemic deterioration in CRE and discuss the institutional features of CRE mortgages that make banks particularly exposed to these valuation drops.

Deterioration in CRE valuations. The post-pandemic period has been marked by substantial volatility in CRE valuations, with notable declines in select segments and a significant drop in transaction volume. As discussed, CRE properties are long-lived assets and are thus valued by practitioners as perpetuities. Both the discount rate (cap rate) and the cash flow (NOI) component of CRE valuations have moved adversely since 2022:Q1.

On the discount rate side, the long duration of CRE properties makes them highly vulnerable to interest rate increases, particularly when rates start from low levels. For example, if initial cap rates are 4%, a 200-basis-point increase in cap rates results in a 33% decline in valuations, holding cash flows constant. On the cash flow side, the rise of remote work has put significant downward pressure on NOI, particularly in the office and hotel segments. While return-to-work policies have been implemented by many firms, hybrid work arrangements appear to be persistent (Ghent et al., 2026; Barrero et al., 2021). Gupta et al. (2026) estimates that persistent remote work will produce a 46% long-term decline in the value of New York City office space.[13]

[13] Barrero et al. (2021) estimates that 20% of workdays will be permanently performed from home, compared with just 5% before the pandemic. Panel A in Figure OA.3 shows that, as of 2024:Q1, the share of work time provided at home stabilized at 28% compared to a pre-pandemic level of 6.2% (2018–19 average). Panel B shows that weekday subway ridership in NYC has stabilized at around 64% of the pre-pandemic level.

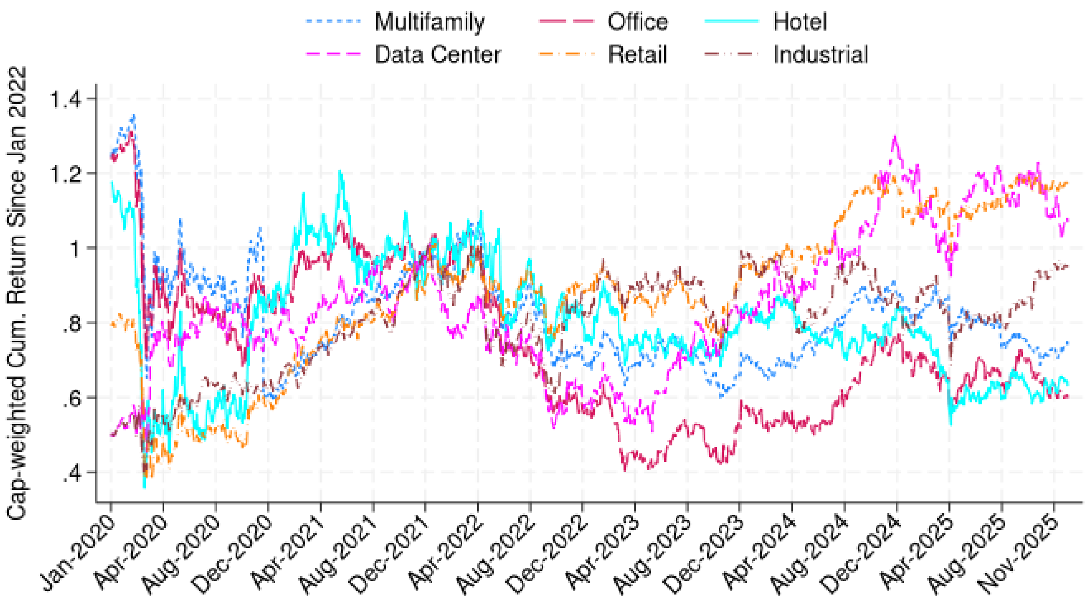

Figure 2: Decline in CRE valuations. This figure shows capitalization-weighted cumulative returns for equity REITs investing in multifamily, office, hotel, data center, retail, and industrial CRE segments. The sample period runs from January 1, 2020, to December 31, 2025. The lines are normalized to one on January 3, 2022. Sources: CRSP, Capital IQ.

Figure 2 documents these valuation declines. The figure plots cumulative stock returns for equity REITs investing in multifamily, office, hotel, data center, retail, and industrial CRE from January 2020 to December 2025. The lines are normalized to one on January 3, 2022, at the beginning of the Federal Reserve's hiking cycle. Measuring CRE stress using REITs' valuations (rather than property transaction prices) has two main advantages. First, REITs' stocks are reasonably liquid, especially compared to the CRE property market since 2022:Q1.[14] Second, transaction prices may suffer from selection as sellers might choose to sell less-devalued properties. Note that REITs tend to hold higher-quality, institutional-grade properties, so the valuation declines shown in Figure 2 likely represent a lower bound on the distress experienced by the broader CRE market.

The figure shows that CRE valuations dropped sharply at the onset of the pandemic,

[14] Figure OA.4 shows that the volume of transactions in office and multifamily CRE dropped by 62% and 64% between 2021 and 2023, respectively.

recovered in 2021, and have progressively deteriorated since monetary tightening began in 2022:Q1. While the rapid rise in interest rates affected all property types, the office and hotel segments experienced particularly large valuation declines, consistent with the rise in remote work. By December 2025, office valuations were about 40% lower than their 2021:Q4 level. Other evidence consistent with office-specific stress includes (i) high and increasing vacancy rates (Figure OA.5), (ii) the increasing number of actual transactions at less than 50% of the original sale price for office CRE (Figure OA.6), and (iii) anecdotal reports of office spaces being transacted at extraordinary discounts in cities like New York and San Francisco.[15]

Banks' exposure to CRE devaluation. The institutional features of CRE mortgage financing amplify the effect of property valuation declines on banks. First, CRE deals typically involve substantial leverage, with loan-to-value ratios of around 70% (Scott, 2020). Hence, a 30% decline in property valuations, similar to the magnitudes we observe in some segments in Figure 2, is enough to wipe out the equity of many borrowers.

Second, lenders are highly exposed to these valuation declines. Unlike residential mortgages, CRE mortgages typically have amortization periods much longer than the loan's maturity. Hence, a sizable loan balance often remains to be paid at maturity. The median amortization period in our sample is 25 years, substantially longer than the median loan maturity of 7 years. In addition, 33.0% of mortgages in our data are interest-only loans, with this share jumping from 23.9% in 2020 to 35.6% in 2022–24.

Third, banks hold around half of all CRE mortgages outstanding on their balance sheets. While equity in CRE properties is held primarily by high-net-worth individuals and institutional investors, debt is held primarily by banks. Specifically, Figure 3 shows that banks hold 50.7% of the $5.8 trillion CRE mortgage market as of 2023:Q4. While our loan-level data covers only mortgages issued by stress-tested banks (26.8% of CRE mortgages held by

[15] See, for example, *"The Brutal Reality of Plunging Office Values Is Here"* from Bloomberg on February 13, 2024; *"Fire Sale: $300 Million San Francisco Office Tower, Mostly Empty. Open to Offers"* from the Wall Street Journal on April 27, 2023; or *"Buyers Snap Up Aging and Empty Office Building for Deep Discounts"* from the New York Times on June 12, 2024.

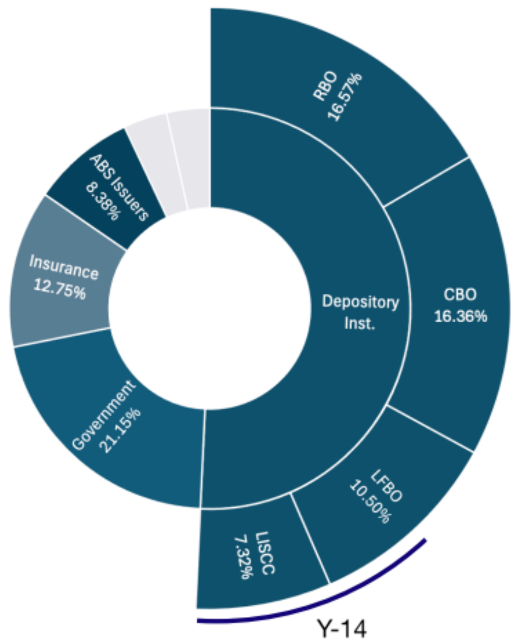

Figure 3: Holders of commercial real estate debt. This figure shows the holders of CRE debt in the U.S. as of 2023:Q4. The inner part is generated using the Financial Accounts Z.1 data (sum of commercial mortgage assets by sector and multifamily residential mortgages, non-seasonally adjusted). The breakdown of the depository institution slice is based on Y-9C and Call Report data. The Large Institution Supervision Coordinating Committee (LISCC) is composed of eight U.S. global systemically important banks (G-SIBs) and three Foreign Banking Organizations (FBOs). Large and Foreign Banking Organizations (LFBOs) are non-LISCC U.S. firms with total assets exceeding $100 billion, as well as non-LISCC FBOs. Community Banking Organizations (CBOs) have total assets less than $10 billion. Regional Banking Organizations (RBOs) have total assets between $10 billion and $100 billion. Call Report observations are excluded if their holding company ID appears in the Y-9C to avoid double-counting. Bank size is measured using total assets. Shares are rescaled to match the Z.1 Depository Institutions slice. The two grayed-out areas correspond to REITs and Other. Source: Y-9C, Financial Accounts Z.1 data.

banks), we discuss in Section 5 how our findings extend to small regional and community banks using bank-level Y-9C data.

4 Banks' sluggish assessment of deteriorating CRE

We now discuss our conceptual framework and show that banks have been sluggish in assessing the deterioration in CRE, a pattern particularly pronounced among less-capitalized banks. Section 4.1 presents descriptive evidence using raw data. Section 4.2 shows better identified evidence that less-capitalized banks have been lenient in assessing their exposure to distressed CRE mortgages and sluggish in realizing the associated losses since 2022:Q1. Section 4.3 documents a similar behavior in bank lending to REITs exposed to distressed CRE.

Conceptual framework. Our conceptual framework centers on banks' reluctance to recognize losses that would trigger costly capital write-downs. This incentive is particularly acute in CRE mortgage lending because these mortgages are largely held on banks' balance sheets, typically feature large balloon payments at maturity, and finance highly leveraged borrowers, leaving banks directly exposed to declines in property values. These vulnerabilities became especially pronounced after 2022:Q1. Rapidly rising interest rates led to large mark-to-market losses in banks' securities portfolios, putting pressure on bank economic capital. At the same time, higher discount rates (higher cap rates) and the rise of remote work (lower NOI) depressed CRE valuations, magnifying borrower distress in a highly levered sector.

In this environment, banks have incentives to engage in extend-and-pretend behavior, granting maturity extensions and other forms of payment relief to distressed CRE borrowers in the hope that market conditions improve over time. Since banks' motives for granting extensions and relief are unobservable, we focus on the *cross-sectional* prediction of our theory in order to distinguish between extend-and-pretend-driven behavior versus efficient restructuring. Holding borrower and property risk fixed, any efficient-renegotiation motive should not vary systematically with the bank's capital position, since borrowers' prospects and liquidation costs are primarily properties of the loan rather than of the bank that happens to hold it. In contrast, extend-and-pretend should be more prevalent among less-capitalized banks, for which recognizing CRE losses is more costly. Maturity extensions and concessions, therefore, serve not only to support borrowers but also to delay loss recognition and preserve scarce capital.

A formal welfare analysis of extend-and-pretend is beyond the scope of this paper. On the one hand, maturity extensions may prevent a disorderly wave of defaults, mitigating disruptions to credit markets and the real economy. On the other hand, extend-and-pretend is concentrated among less-capitalized banks. This "diabolic sorting"—with weakly capitalized banks supporting impaired borrowers, as in the model of Acharya et al. (2025)—can distort credit allocation and impair financial stability. In our analysis, we show that less-capitalized banks reduce the supply of new credit, leaving some borrowers credit constrained, while simultaneously accumulating large volumes of distressed CRE mortgages maturing in the near term, increasing the risk that losses materialize abruptly following future adverse shocks.

4.1 Descriptive time-series evidence

We now show that (i) the level of CRE nonperforming loans is, as of 2025:Q4, still low by historical standards and (ii) less-capitalized banks drive both this sluggishness in assessing the deterioration in CRE and the relatively low number of loan defaults.

Figure 4 shows the median, 25^{th} percentile, and 75^{th} percentile of the distribution of the CRE nonperforming loans ratio (stock of nonperforming loans divided by the stock of loans) across our sample of banks. Note that the rapid deterioration in valuations (which started in 2022:Q1) documented in Figure 2 is followed by a small increase in the nonperforming loans ratio with a two-year lag. Figure OA.7 shows a similar pattern for net charge-offs.

Consistent with the extend-and-pretend hypothesis, Figure 5 and Figure 6 show that less-capitalized banks drive (i) the sluggishness in assessing the deterioration in CRE and (ii) the relatively low number of defaults. Figure 5 shows the evolution of CRE nonperforming loans ratio for less-capitalized banks (dashed lines) and better-capitalized banks (solid lines).

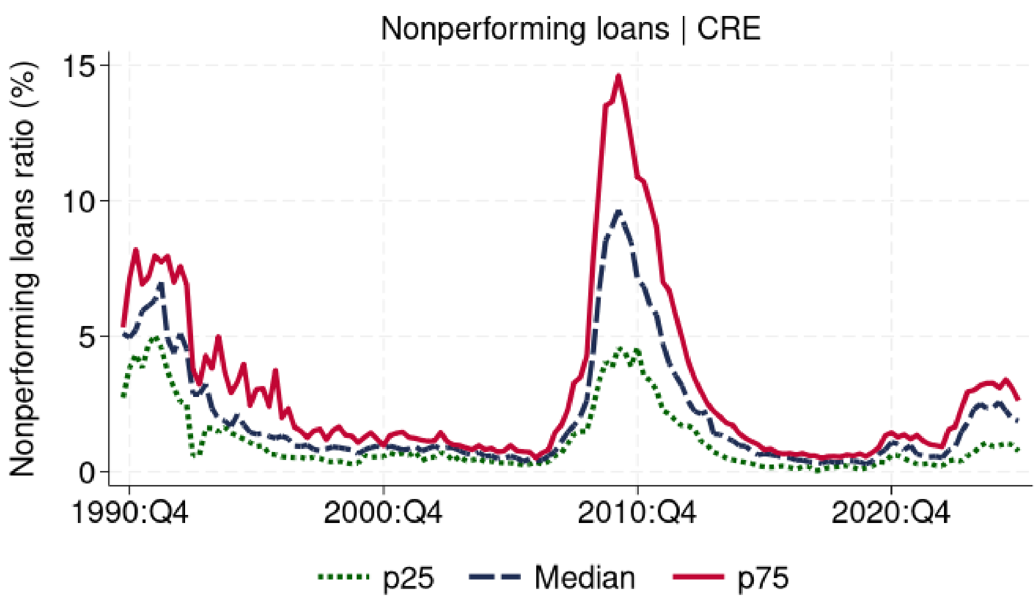

Figure 4: Nonperforming CRE loans. This figure shows the evolution of the CRE nonperforming loans ratio (stock of nonperforming loans divided by the stock of loans). The solid line, long dash line, and short dash line indicate the third quartile, the median, and the first quartile at any given point in time in the cross-section of our sample banks. The data runs quarterly from 1990:Q3 to 2025:Q4. Source: FR Y-9C.

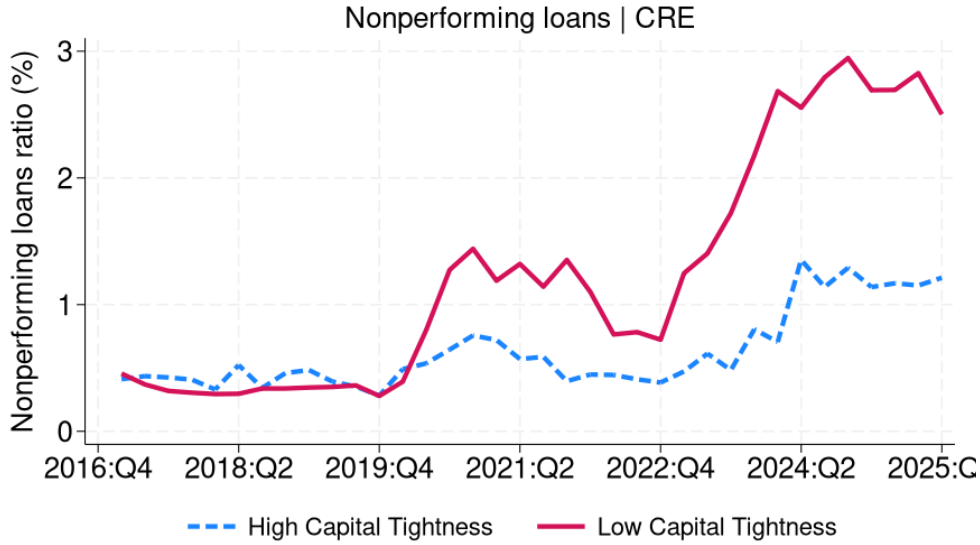

Figure 5: Nonperforming CRE loans, less-capitalized vs. better-capitalized banks. This figure shows the time-series evolution of the CRE nonperforming loans ratio (stock of nonperforming loans divided by the stock of loans). The solid line (dashed line) indicates the median nonperforming loans ratio for better-capitalized or low capital-tightness (less-capitalized or high capital-tightness) banks. Our sample banks are split into two groups based on whether their capital tightness exceeds or falls below the median in 2022:Q4. The data runs quarterly from 2017:Q1 to 2025:Q4. Source: FR Y-9C, FR Y-14 H.2.

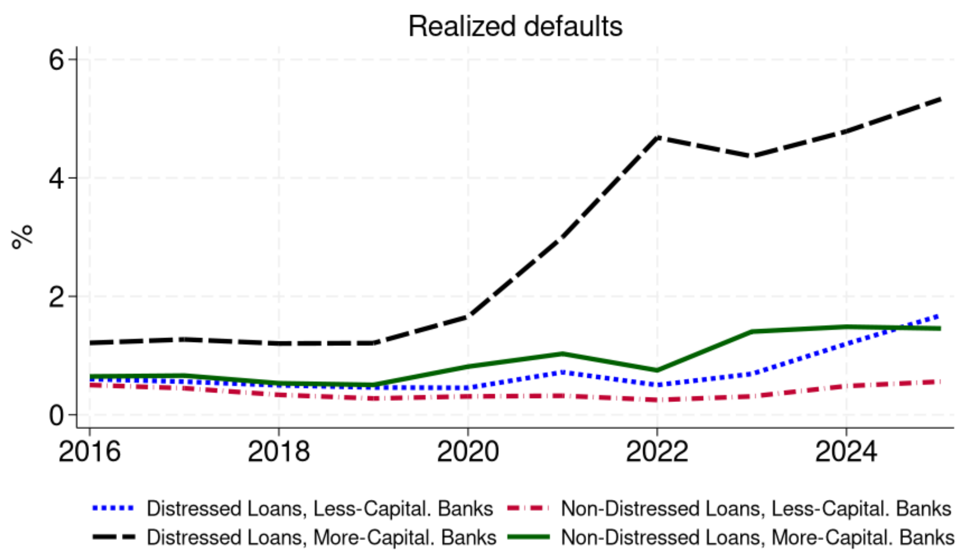

Figure 6: Realized defaults, less-capitalized vs. better-capitalized banks. This figure shows the time-series evolution of realized defaults for distressed loans granted by better-capitalized banks (longdash line), non-distressed loans granted by better-capitalized banks (solid line), distressed loans granted by less-capitalized banks (shortdash line), and non-distressed loans granted by less-capitalized banks (dashdot line). Our sample banks are split into two groups based on whether their capital tightness exceeds or falls below the median in 2022:Q4. Distressed loans have a debt yield generated by the property serving as collateral below 8%. The data runs quarterly from 2017:Q1 to 2025:Q4. Source: FR Y-9C, FR Y-14 H.2.

This graph documents that better-capitalized banks have been more active in classifying loans as nonperforming than less-capitalized banks.[16] Figure 6 shows the evolution of realized defaults for distressed loans granted by better-capitalized banks (longdash line), non-distressed loans granted by better-capitalized banks (solid line), distressed loans granted by less-capitalized banks (shortdash line), and non-distressed loans granted by less-capitalized banks (dashdot line). This graph shows that distressed loans have experienced more defaults when granted by better-capitalized banks than by less-capitalized banks—a divergence only observed in distressed loans.

4.2 Loan-level evidence from CRE mortgages

We now show that distressed CRE mortgages granted by less-capitalized banks (i) are more likely to receive a maturity extension, (ii) are more likely to receive payment relief, (iii) default less frequently, and (iv) are assigned a lower probability of default by lenders compared to similar mortgages granted by better-capitalized banks, especially since 2022:Q1.

Identifying variation. The key identification concern with the non-parametric figures discussed in Section 4.1 is that less-capitalized banks (i.e., banks with high capital tightness) might systematically lend to better-credit-quality borrowers, generating a mechanical correlation between bank capitalization and loan outcomes. To address this concern, our empirical specification absorbs the main determinants of property-level credit risk.

In CRE, credit risk is largely driven by property valuations. As discussed, properties are typically valued as perpetuities, with NOI divided by the cap rate. While we observe NOI in our data, cap rates are unobservable. However, an important institutional feature of CRE markets is that cap rates are typically inferred from comparable transactions within the same submarket, defined as a location-property type pair. For instance, practitioner reports routinely quote cap rate ranges for categories such as "Houston suburban office" or

[16]Importantly, the cross-sectional variation in bank capitalization is largely driven by mark-to-market losses that reflect the duration of banks' securities holdings rather than the quality of their CRE portfolios.

Brooklyn multifamily," with adjustments for asset quality, lease structure, condition, tenancy, and other property-specific characteristics.[17] This practice reflects the central role of location and property type in determining CRE risk exposures: properties within the same submarket are jointly exposed to local economic conditions, amenities, work-from-home patterns, tax policy, and other common shocks.

Motivated by this institutional feature, we saturate our specification with zip code × property type × time fixed effects, which absorb the submarket-level component of cap rates. Conditional on these fixed effects, the remaining variation in property values reflects building-specific characteristics such as age, quality, and amenities. To the extent that these characteristics are priced in the rental market, their contribution to property values should be largely captured by controlling for the property's net operating income.

Specification. We estimate the following specification in the CRE loan-level data:

$$\begin{aligned} \mathrm{Y}_{lt} = \alpha &+ \beta_1 \text{Capital Tightness}_{bt} \times \text{Distress}_{lt} \\ &+ \beta_2 \text{Capital Tightness}_{bt} + \beta_3 \text{Distress}_{lt} + \boldsymbol{\gamma' X}_{lt-1} + \eta_{zpt} + \epsilon_{lt} \end{aligned} \tag{1}$$

where l is a loan, b is a bank, z is a zip code, p is a property type, and t is a quarter.[18]

We use four outcome variables: (i) a dummy equal to one if the maturity of loan l is extended in quarter t, (ii) a dummy equal to one if, upon a maturity extension, loan l is granted a reduction in interest rate or a transition into an interest-only amortization schedule, (iii) a dummy equal to one if loan l is in default in quarter t, and (iv) the default probability that bank b assigns to loan l in quarter t. Together, these outcomes trace the mechanics of extend-and-pretend. The first two outcomes capture whether banks extend the maturity of distressed loans, granting them payment relief. The third and fourth outcomes capture

[17]This benchmarking practice is reflected in practitioner cap rate surveys (CBRE, 2026) and regulatory guidance (Office of the Comptroller of the Currency, 2022).

[18]We observe ten property types, i.e., retail; industrial (excluding warehouse/distribution); hotel/hospitality/gaming (including resorts); multi-family for rent (including low income housing); homebuilders except condo; condo/co-op; office (including medical office); mixed; land and lot development; other.

whether banks allow distressed loans to default and whether banks' internal risk assessments understate loan-level default probabilities.

The independent variable of interest is the interaction between the capital tightness of bank b in quarter t (Capital Tightness$_{bt}$) and a variable capturing whether loan l is distressed in quarter t (Distress$_{lt}$). As discussed in Section 2.2, we measure distress with a dummy equal to one if the property's debt yield is below 8%. The vector $\boldsymbol{X}_{lt-1}$ contains a set of lagged loan-level control variables meant to capture heterogeneity in credit risk within fixed effects submarket clusters. These variables are the interest rate, loan balance, time to maturity, and NOI at origination. The sample period runs quarterly from 2022:Q1 to 2025:Q4, and we double-cluster the standard errors at the zip code and bank levels.

Identifying assumption. Our assumption is that bank capitalization is uncorrelated with residual property-level credit risk within fixed-effects submarket clusters, conditional on our loan-level controls. We consider two remaining concerns about this assumption.

The first potential concern is that less-capitalized banks might systematically lend to *sponsors* (borrowers) with better unobservable characteristics—e.g., sponsors with deep pockets or greater ability to support distressed properties through equity injections. In this case, such sponsors would experience fewer defaults regardless of bank incentives, potentially confounding our estimates. Since banks typically charge lower interest rates to sponsors they perceive as lower risk, our loan-level interest rate control partially absorbs this variation. We also address this concern more directly through an exercise that exploits bank lending to publicly traded REITs exposed to distressed CRE in Section 4.3. Since REITs can be matched across banks in our sample and frequently borrow from multiple banks, we can implement the Khwaja and Mian (2008) within-borrower estimator by replacing our submarket fixed effects with *borrower*-quarter fixed effects, thus fully absorbing all time-varying borrower-level variation, including sponsor quality. These results are highly consistent with our main estimates for CRE mortgages.

The second potential concern is that our results might reflect differences in banks' risk tolerance rather than incentives arising from different capitalization levels. We offer three responses. First, our results are robust to the inclusion of bank-quarter fixed effects, which absorb bank-specific differences in credit risk assessment and the propensity to offer maturity extensions. Second, risk tolerance should govern how banks act conditional on their assessment of default probabilities—it should not affect the assessed probabilities themselves. Yet, we find substantial cross-sectional heterogeneity in bank-assigned default probabilities across observationally similar loans—a pattern difficult to reconcile with a pure risk-tolerance explanation. Third, we find weaker or no effects in the pre-2022 sample. If time-invariant differences in risk tolerance were driving our results, there is no reason to expect this behavior to emerge only after interest rate increases eroded bank capital.

Result #1: Maturity extensions and payment relief. We now discuss the estimation of specification (1). We first show that distressed mortgages held by less-capitalized banks are more likely to receive maturity extensions and payment relief than similar mortgages held by better-capitalized banks. The outcome variables in Table 2 are (i) a dummy equal to one if the maturity of loan l is extended at time t (Extension_{lt}, top panel) and (ii) a dummy equal to one if loan l receives payment relief upon maturity extension, i.e., a reduction in interest rate or a transition into an interest-only amortization schedule (Relief_{lt}, bottom panel).[19] Note that the estimation in the bottom panel is run in the subsample of extensions, thus checking whether banks provide payment relief at the time of extending the loan maturity date. For each dependent variable, we progressively add fixed effects and loan-level controls. The table omits loan-level controls for readability. For the full table with all estimated coefficients, see Table OA.4.

These results suggest that less-capitalized banks (high capital tightness) are more likely to extend the maturities of distressed mortgages and provide payment relief than better-capitalized banks, consistent with less-capitalized banks helping distressed mortgages to avoid a potential default. The magnitudes are sizable. Based on the most stringent specification, distressed CRE mortgages granted by less-capitalized banks (i.e., p75 of the cross-sectional

[19]The reduction in rate is a reduction in the spread for floating rate mortgages. The median length of an extension is one year, the third quartile (p75) is two years, and the ninth decile (p90) is six years.

Extensions_{lt}	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	0.145***	0.167***	0.117***	0.113***
	(0.047)	(0.043)	(0.036)	(0.036)
$\text{Capital Tightness}_{bt}$	0.033	−0.104	0.038	
	(0.095)	(0.111)	(0.338)	
Distress_{lt}	0.013	0.300***	0.235**	0.229**
	(0.087)	(0.094)	(0.090)	(0.083)
Observations	852,818	622,343	622,343	622,343
R^2	0.325	0.319	0.322	0.330

$\text{Relief}_{lt} \mid \text{Extension}_{lt} = 1$	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	3.020**	4.764***	4.142***	4.509***
	(1.073)	(1.404)	(1.218)	(0.982)
$\text{Capital Tightness}_{bt}$	−2.587***	−2.104	−1.412	
	(0.871)	(1.468)	(2.447)	
Distress_{lt}	5.074***	2.614	2.659	3.838
	(1.999)	(2.460)	(2.814)	(2.666)
Observations	9,638	3,986	3,986	3,930
R^2	0.664	0.682	0.697	0.722

Zip Code-Property Type-Quarter FE	✓	✓	✓	✓
Loan-Level Controls		✓	✓	✓
Bank FE			✓	
Bank-Quarter FE				✓

Table 2: Extending-and-pretending CRE credit since 2022, maturity extensions and payment relief. This table shows estimation results from specification (1). The dependent variable is (i) a dummy equal to one if the maturity of loan l is extended at time t in the top panel and (ii) a dummy equal to one if loan l receives payment relief at time t, i.e., a reduction in interest rate or a transition into an interest-only amortization schedule in the bottom panel. The bottom panel is estimated in the subsample of observations where $\text{Extension}_{lt} = 1$. Distress_{lt} is a dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%. The $\text{Capital Tightness}_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. The loan-level controls are $\text{Interest Rate}_{lt-1}$, the interest rate on the loan at time $t-1$, $\text{Time to Maturity}_{lt-1}$, the time to maturity (in quarters) of loan l at time $t-1$, $\text{Outstanding Balance}_{lt}$, the log of the outstanding amount on loan l at time $t-1$, and $\text{NOI at Origination}_{l}$, the log of the NOI of loan l at origination. Loan-level controls are omitted for brevity (see Table OA.4 for the full table). The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors double-clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

distribution of $\text{Capital Tightness}_{bt}$ as of 2022:Q4) have a 0.3 and 7.5 percentage point higher probability of receiving a maturity extension and payment relief upon extension compared to similar distressed CRE mortgages granted by better-capitalized banks (i.e., p25 of the cross-sectional distribution of $\text{Capital Tightness}_{bt}$ as of 2022:Q4), relative to a mean probability of receiving a maturity extension and payment relief upon extension of 2.4% and 21.3%, respectively.

Result #2: Realized defaults and bank-assigned probability of default. Table 3 shows the estimation results, where the outcome variable is now a dummy equal to one if loan l is in default at time t (Default_{lt}, top panel) and the default probability that the lender bank b assigns to loan l at time t (PD_{lt}, bottom panel). Again, we omit loan-level controls for readability. See Table OA.5 for the full table.

The top panel shows that mortgages held by less-capitalized banks are less likely to default compared to similar mortgages held by better-capitalized banks. The magnitude of the effect is sizable. Based on column (4), distressed CRE mortgages granted by less-capitalized banks (i.e., p75 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4) have a 0.4 percentage point lower probability of default compared to similar distressed CRE mortgages granted by well-capitalized banks (i.e., p25 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4), relative to a mean observed probability of default for distressed borrowers of 1.2%.

The bottom panel shows that distressed mortgages are classified as less risky by less-capitalized banks than by better-capitalized banks. Based on the estimates in column (4), a less-capitalized bank (i.e., p75 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4) assigns a 1.2 percentage point lower probability of default to similar distressed borrowers compared to a better-capitalized bank (i.e., p25 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4), relative to a mean assigned probability of default for distressed borrowers of 3.5%. This finding is consistent with two mechanisms. First, as shown in Plosser and Santos (2018), banks with high capital tightness may assign low default probabilities to improve their regulatory capital ratios (lower risk weights). Second, less-capitalized banks might take into account their propensity to extend-and-pretend when assigning default probabilities to their distressed borrowers.

Additional results. We now present additional results. Table 4 shows the estimated coefficient of interest (β_1 in specification (1)) and the associated standard error in the most

LHS: Default_{lt}	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	−0.408*	−0.566**	−0.441*	−0.415*
	(0.212)	(0.270)	(0.233)	(0.228)
$\text{Capital Tightness}_{bt}$	−0.059	−0.244	−0.264	
	(0.085)	(0.173)	(0.347)	
Distress_{lt}	0.953*	0.949	0.842	0.855
	(0.544)	(0.588)	(0.562)	(0.562)
Observations	852,818	622,343	622,343	622,343
R^2	0.274	0.275	0.284	0.290

LHS: Probability of Default (PD_{lt})	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	−0.420*	−0.633**	−0.620**	−0.629**
	(0.217)	(0.238)	(0.221)	(0.226)
$\text{Capital Tightness}_{bt}$	0.087	−0.013	0.226	
	(0.086)	(0.113)	(0.155)	
Distress_{lt}	2.755***	2.896***	2.855***	2.858***
	(0.581)	(0.606)	(0.592)	(0.595)
Observations	682,271	523,192	523,192	523,192
R^2	0.337	0.344	0.350	0.352

Zip Code-Property Type-Quarter FE	✓	✓	✓	✓
Loan-Level Controls		✓	✓	✓
Bank FE			✓	
Bank-Quarter FE				✓

Table 3: Extending-and-pretending CRE credit since 2022, realized defaults and bank-assigned probability of default. This table shows estimation results from specification (1). The dependent variable is (i) a dummy equal to one if loan l is in default at time t in the top panel and (ii) the probability of default assigned by bank b to loan l at time t in the bottom panel. Distress_{lt} is a dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%. The $\text{Capital Tightness}_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. The loan-level controls are $\text{Interest Rate}_{lt-1}$, the interest rate on the loan at time $t-1$, $\text{Time to Maturity}_{lt-1}$, the time to maturity (in quarters) of loan l at time $t-1$, $\text{Outstanding Balance}_{lt}$, the log of the outstanding amount on loan l at time $t-1$, and NOI at Origination_l, the log of the NOI of loan l at origination. Loan-level controls are omitted for brevity (see Table OA.5 for the full table). The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors double-clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

stringent specification, i.e., with the inclusion of all time-varying loan-level controls, zip code-property type-quarter fixed effects, and bank-quarter fixed effects. Each row corresponds to a different test, and each column corresponds to a different outcome variable (Extension_{lt}, Relief_{lt}, Default_{lt}, and PD_{lt}). The first line (row 0) reports the baseline estimation results for

Specification	Extension$_{lt}$		Relief$_{lt}$		Default$_{lt}$		PD$_{lt}$	
	β_1	SE	β_1	SE	β_1	SE	β_1	SE
0. Baseline	0.113***	(0.036)	4.509***	(0.982)	−0.415*	(0.228)	−0.629**	(0.226)
1. Alt. Distress threshold	0.090*	(0.047)	3.698***	(0.919)	−0.371*	(0.207)	−0.583***	(0.203)
2. 2017:Q1–2019:Q4 sample	−0.085	(0.123)	0.590	(1.289)	−0.057	(0.035)	−0.050	(0.040)
3. 2020:Q1–2021:Q4 sample	0.553***	(0.158)	2.870***	(0.924)	−0.254**	(0.095)	−0.602	(0.371)

Table 4: Additional tests. This table shows a set of estimation results, reporting the estimated coefficients β_1 from specification (1), together with the associated standard errors, in the most stringent version of the specification (with the inclusion of all time-varying loan-level controls, zip code-property type-quarter fixed effects, and bank-quarter fixed effects). In the first two columns, the dependent variable is a dummy equal to one if the loan maturity l is extended at time t and a dummy equal to one if loan l receives payment relief at time t (the second column is run in the subsample of Extension$_{lt}$=1), respectively. In the third and fourth columns, the dependent variables are a dummy equal to one if loan l is in default at time t and the probability of default assigned by bank b to loan l at time t, respectively. The first row reports the baseline specification for reference. The three other specifications correspond to (i) the use of an alternative "Distress" variable that uses asset class-specific debt yield thresholds (7% for condo/co-op, 8% for multifamily, homebuilders, mixed, and land development, 9% for office and other, 10% for retail and industrial, and 11% for hotel), (ii) the baseline specification (1) estimated in the 2017:Q1–2019:Q4 sample, and (iii) the baseline specification (1) estimated in the 2020:Q1–2021:Q4 sample. Standard errors are double-clustered at the bank and zip code level. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

reference. Row 1 shows that our results are robust to using an alternative asset class-specific debt yield threshold. Specifically, the debt yield threshold is here set at 7% for condo/co-op, 8% for multifamily, homebuilders, mixed, and land development, 9% for office and other, 10% for retail and industrial, and 11% for hotel.[20] Row (2) shows that our results are absent in the pre-pandemic period (2017:Q1–2019:Q4). Row (3) shows that, with the exception of extensions, our results are weaker in the pandemic period (2020:Q1–2021:Q4) before the rise in interest rates and the concurrent deterioration in CRE (both trends started in 2022:Q1).[21]

[20]These asset class-specific thresholds are based on the observation that, holding debt yields constant, various CRE segments may have different inherent risk. For example, for a given debt yield, hotel CRE is riskier than multifamily CRE (see Figure OA.1).

[21]While less-capitalized banks granted more maturity extensions than better-capitalized banks during 2020–21, this difference is a small fraction of the very large volume of pandemic extensions provided by *all* banks (Glancy, 2026). Specifically, for extensions, the point estimate for the interaction term (β_1 in specification (1)) is 5 times larger in 2020–21 (−0.553) than in 2022–25 (−0.113). However, the point estimate on the uninteracted Distress$_{lt}$ variable (β_3 in specification (1)) is 21 times larger during 2020–21 (3.625) compared with 2022-25 (0.173). Table OA.6 shows the full estimations during 2017:Q1–2019:Q4 and 2020:Q1–2021:Q4.

4.3 Loan-level evidence from REITs

We now show that, since 2022:Q1, less-capitalized banks have been lenient in assessing their indirect exposure to distressed CRE through their lending to equity REITs.[22] The analysis of bank lending to REITs has two advantages over the previous analyses of CRE mortgages. First, instead of relying on properties' debt yields, we can measure distress using market equity prices, which are inherently forward-looking. For example, the market capitalization of a REIT whose properties are temporarily distressed would decline less if the future outlook for those properties is positive. Second, from an identification standpoint, we can match the same borrower across banks using each REIT's stock ticker. We can then compare the lending behavior of two banks with different capital levels to the *same* borrower and examine how this behavior varies depending on whether the borrowing REIT is distressed.

Specifically, we run the following specification using the loan-level C&I data:

$$\mathrm{Y}_{lt} = \alpha + \beta_1 \text{Capital Tightness}_{bt} \times \text{Distress}_{jt} + \beta_2 \text{Capital Tightness}_{bt} + \boldsymbol{\gamma'} \boldsymbol{X}_{lt-1} + \eta_{jt} + \epsilon_{lbjt} \quad (2)$$

where l is a loan outstanding in quarter t held by bank b to REIT j. The sample period runs quarterly from 2022:Q1 to 2025:Q4. The outcome variables are (i) a dummy equal to one if the maturity of the loan l is extended at time t (Extension_{lt}) and (ii) the default probability that the lending bank assigns to loan l at time t (PD_{lt}).[23] The variable Distress_{jt} is the change in market capitalization of REIT j from 2020:Q1 to quarter t, defined so that higher values correspond to larger declines in market capitalization. The vector $\boldsymbol{X}_{lt-1}$ is a collection of lagged loan-level controls, namely the log of the balance on loan l in quarter $t-1$, the interest rate on the loan at time $t-1$ (in basis points), the time to maturity (in quarters) of loan l in quarter $t-1$, the time from origination (in quarters) of loan l in quarter $t-1$, and a dummy equal to one if loan l has a floating rate in quarter $t-1$. As discussed,

[22] Acharya et al. (2024b) shows that the indirect exposure of banks to CRE through REITs is especially pronounced for large banks.

[23] There are no realized defaults during our sample period and we do not have enough power to analyze payment relief upon extensions (our sample only includes 75 equity REITs).

	Maturity Extension$_{lbjt}$			Probability of Default (PD_{lbjt})		
Capital Tightness$_{bt}$ × Distress$_{jt}$	0.841***	0.725***	0.848**	−0.139***	−0.148***	−0.153***
	(0.123)	(0.155)	(0.296)	(0.030)	(0.021)	(0.030)
Capital Tightness$_{bt}$	0.703***			−0.113*		
	(0.188)			(0.057)		
Outstanding Balance$_{lt-1}$			0.429			-0.018
			(0.267)			(0.132)
Interest Rate$_{lt-1}$			0.565			0.041
			(0.395)			(0.042)
Time to Maturity$_{lt-1}$			−1.048***			−0.024
			(0.264)			(0.018)
Time from Origination$_{lt-1}$			0.070			−0.000
			(0.044)			(0.004)
Floating Rate$_{lt-1}$			1.177			−0.080
			(1.906)			(0.156)
Borrower-Quarter FE	✓	✓	✓	✓	✓	✓
Bank-Quarter FE		✓	✓		✓	✓
Observations	4,482	4,437	4,443	4,386	4,344	4,342
R^2	0.451	0.491	0.521	0.622	0.676	0.694

Table 5: Extending-and-pretending since 2022, evidence from REITs. This table shows estimation results from specification (2). The dependent variables are a dummy equal to one if the maturity of the loan l is extended at time t (columns (1)-(3)) and the probability of default assigned by bank b to REIT j at time t (columns (4)-(6)). Distress$_{jt}$ is the change in market capitalization of REIT j from 2020:Q1 to quarter t (positive values indicate a drop in market capitalization). The Capital Tightness$_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level MTM common equity tier 1 capital and the bank-specific regulatory threshold. Outstanding Balance$_{lt-1}$ is the log of the outstanding amount on loan l at time $t-1$. Interest Rate$_{lt-1}$ is the interest rate on the loan at time $t-1$. Time to Maturity$_{lt-1}$ is the time to maturity (in quarters) of loan l at time $t-1$. Time from Origination$_{lt-1}$ is the time from origination (in quarters) of loan l at time $t-1$. Floating Rate$_{lt-1}$ is a dummy equal to one if loan l has a floating rate at time $t-1$. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors clustered at the bank level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: CRSP, Capital IQ, FR Y-9C, FR Y-14 Schedule H.1.

the regression also includes borrower-time fixed effects to control for unobserved borrower characteristics. Finally, we cluster standard errors at the bank level. Table OA.7 shows the summary statistics of the variables used in this analysis.

Table 5 shows the estimation results. The dependent variable is the maturity extension dummy in columns (1)-(3) and the probability of default in columns (4)-(6). For each dependent variable, we progressively include bank-quarter fixed effects and time-varying loan controls. The estimated coefficients on the interaction term are significant and stable across specifications, documenting that the same borrower is (i) more likely to receive a maturity extension and (ii) assigned a systematically lower probability of default by a less-capitalized bank compared to a better-capitalized bank. Based on columns (3) and (6), a less-capitalized bank (i.e., p75 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4) is 1.7 percentage points more likely to grant a maturity extension and assigns a 0.3 percentage point lower probability of default to the same distressed REIT (50% drop in market capitalization) compared to a better-capitalized bank (i.e., p25 of the cross-sectional distribution of Capital Tightness_{bt} as of 2022:Q4), relative to a mean probability of extension of 7.0% and a mean assigned probability of default for distressed borrowers of 0.8%. Consistent with the results presented in the previous section, Table OA.8 shows that these results disappear in 2020–2021.

5 Maturity wall and financial stability

We next show that extend-and-pretend does not merely delay loss recognition; it appears to defer rollover risk into the near future. Because CRE loans are structured around large balloon payments, short-term maturity extensions postpone rather than resolve the borrower's refinancing problem. As a result, extensions can cause distressed loans to accumulate at near-term maturities, creating a maturity wall concentrated among the weakly capitalized banks least able to absorb future losses. This buildup represents a distinct financial stability concern: the same behavior that helps banks avoid losses today may increase their exposure to refinancing shocks tomorrow.

Figure 7 uses our loan-level CRE data to document the time-series evolution of the maturity structure of CRE loans. Each line shows, for a given year, the balance (in dollars) of CRE mortgages maturing in each future year. For example, to produce the 2022:Q4 line, we subset the stock of mortgages outstanding as of this date to find the balances expiring in 2023, 2024, 2025, and so on. This line shows that, as of 2022:Q4, there were $73.6 billion in CRE mortgages maturing in 2023, $84.2 billion maturing in 2024, $79.7 billion maturing in 2025, and so on. The graph clearly shows that banks have increasingly front-loaded the maturity structure of their CRE portfolios, peaking in 2024:Q4. Over time, the lines become taller and steeper (resembling a wall), and their distribution becomes more thin-tailed.

Figure 8 shows that less-capitalized banks drive the expansion of the maturity wall. Each line shows the maturity structure of bank CRE loans, but we now split the sample into less-capitalized and better-capitalized banks. The light gray lines represent loans held in

2020:Q4, and the colored lines represent loans held in 2024:Q4. We find that in 2024:Q4, CRE loans expiring within three years account for about 37.0% of marked-to-market capital for less-capitalized banks, compared with 27.8% for better-capitalized banks. There was no significant difference between the two bank groups in 2020:Q4. The expanding maturity wall is consistent with the extensions to distressed borrowers documented above.

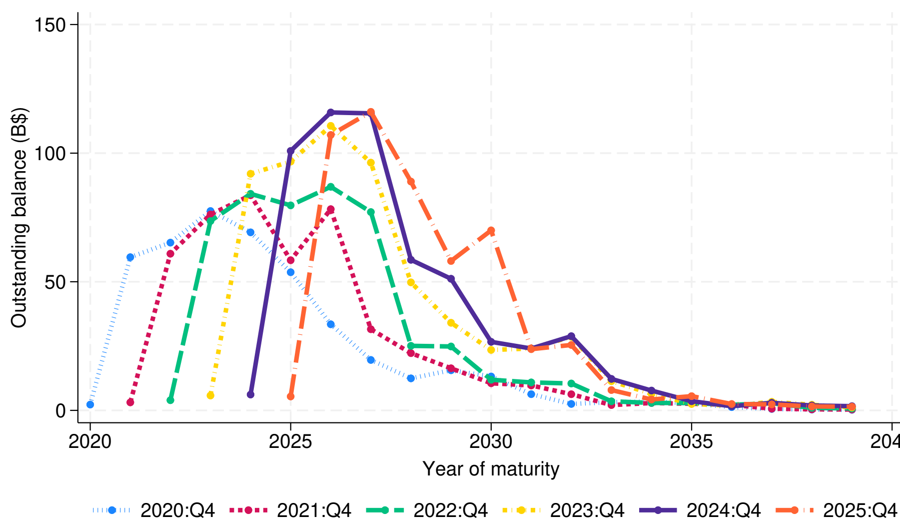

Figure 7: A rapidly expanding maturity wall. This figure shows the maturity wall faced by our sample banks as of 2020:Q4, 2021:Q4, 2022:Q4, 2023:Q4, 2024:Q4, and 2025:Q4. Each line shows, as of one of these dates, the dollar value of CRE mortgages expiring in each year in the future (x-axis). Mortgages maturing after 2040 are excluded for expositional purposes. Source: FR Y-14Q Schedule H.2.

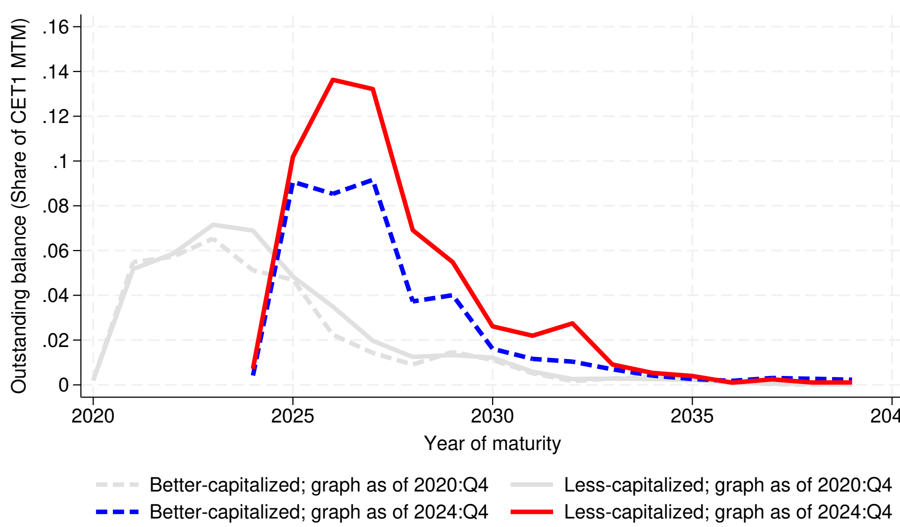

Figure 8: The increase in the maturity wall is driven by less-capitalized banks. This figure shows the maturity wall faced by our sample banks as of 2020:Q4 (light gray lines) and 2024:Q4 (colored lines). Each line shows the dollar value of CRE mortgages expiring in the corresponding future year, normalized by aggregate MTM CET1 Capital. Our sample banks are split into two groups, better- and less-capitalized, based on whether their Capital Tightness$_{bt}$ variable is below or above median in 2022:Q4. Mortgages maturing after 2040 are excluded for expositional purposes. Source: FR Y-14Q Schedule H.2.

Given distressed borrowers' weak cash flows relative to outstanding balances, these loans are unlikely to remain solvent if interest rates rise further. In this sense, the expanding maturity wall reflects a concentrated bet on the future path of interest rates. Each extended loan implicitly assumes that interest rates will fall sufficiently before the new maturity date to enable refinancing on sustainable terms. If rates remain elevated, many of these loans will require yet another round of extensions, pushing the wall forward and further concentrating near-term maturities. If rates were to rise further, the resulting increase in cap rates could push more borrowers into outright default, putting additional pressure on banks whose capital would be simultaneously eroded by further mark-to-market losses on their securities portfolios.

These patterns highlight the distinct financial stability cost of extend-and-pretend. By granting short-term extensions, banks postpone loss recognition without materially reducing the balances at risk. The result is a more concentrated maturity structure in which repayment depends on whether property cash flows, collateral values, and refinancing conditions improve before the extended loans come due. If these conditions do not improve, banks face either repeated extensions or the recognition of losses that have been rolled forward. Because this rollover risk is concentrated among weakly capitalized banks, extend-and-pretend may increase the banking system's vulnerability to future shocks even as it reduces measured distress in the short run.

6 Decline in new credit origination

In this section, we show that banks' sluggish recognition of losses is associated with a decline in the origination of new C&I and CRE credit. As banks extend distressed CRE loans to avoid recognizing losses, impaired legacy exposures remain on their balance sheets, reducing their capacity and incentives to originate new loans. This contraction may reflect limited balance-sheet capacity, as scarce capital remains tied to legacy exposures, as well as a debt-overhang channel through which some of the gains from new positive-NPV lending accrue to existing senior creditors. Our empirical design does not separately identify these two channels. However, both imply that the contraction in new lending should be concentrated among weakly capitalized banks extending distressed, rather than non-distressed, loans.

Consistent with this prediction, Section 6.1 and Section 6.2 show that banks with higher capital tightness that extend distressed CRE mortgages reduce originations in both the C&I and CRE markets, whereas extensions of non-distressed mortgages have no similar effect. In a counterfactual exercise in Section 6.3, we estimate that this behavior implies a 1.1% contraction in aggregate CRE mortgage origination.

6.1 C&I credit origination

We now show that banks that extend the maturity of their distressed CRE mortgages reduce their origination of new C&I loans. To this end, we collapse our data at the industry-state-bank-quarter level and define the following variables:

$$\text{CRE Distressed Extensions}_{bt} = \frac{\sum_l \text{CRE Loan}_{blt} \times \mathbb{I}(\text{Extension})_{blt} \times \mathbb{I}(\text{Distress})_{blt}}{\text{Total CRE Credit}_{bt}} \tag{3a}$$

$$\text{C\&I New Origination}_{bist} = \frac{\sum_l \text{C\&I Loan}_{blist} \times \mathbb{I}(\text{New Orig})_{blist}}{\text{Total C\&I Credit}_{bist}} \tag{3b}$$

where l is a loan, b is a bank, i is an industry (2-digit NAICS), s is a state, and t is a quarter. The first variable measures the extent to which banks extend distressed CRE maturities nationwide. It is defined as the dollar value of all CRE loans extended to distressed borrowers (using the loan debt yield to define distress as in the previous section) by bank b in quarter t, as a share of total outstanding CRE lending by bank b in quarter t. The second variable captures the composition of bank C&I lending, by industry and state, between new origination and preexisting exposure. It is defined as the dollar value of new credit granted by bank b to industry i in state s in quarter t, as a share of all outstanding C&I credit granted by bank b to industry i in state s as of quarter t.

Using these variables, we estimate the following specification:

$$\begin{aligned} \text{C\&I New Origination}_{bist} = \alpha + \beta_1 \text{CRE Distressed Extensions}_{bt} \times \text{Capital Tightness}_{bt} \\ + \boldsymbol{\omega}' \boldsymbol{Z}_{bt} + \mu_b + \eta_{ist} + \epsilon_{bist} \end{aligned} \tag{4}$$

where we use industry-state-quarter fixed effects (η_{ist}) to capture the time-varying demand for credit in an industry-state pair. The outcome variable is the share of new origination granted by bank b to industry i in state s in quarter t. The variable of interest is the interaction between the share of all CRE loans extended to distressed borrowers (CRE Distressed Extensions$_{bt}$) and bank capital tightness (Capital Tightness$_{bt}$). We also include bank fixed effects (μ_b) and bank time-varying characteristics ($\boldsymbol{Z}_{bt}$). In addition to the uninteracted Capital Tightness$_{bt}$ and Distressed Extensions$_{bt}$ variables, the bank-level controls are bank size (log assets) and the sum of CRE and C&I lending (as a share of total assets), and the interaction of these two variables with the bank-level capital tightness variable. We triple cluster standard errors at the industry, state, and bank levels. Summary statistics are available in Table OA.7.

Our specification addresses two identification concerns. First, by including industry-state-quarter fixed effects, we compare banks with different levels of nationwide distressed CRE maturity extension lending within the same industry and state, thereby controlling for the possibility that banks that engage in maturity extensions to distressed borrowers systematically lend to industry-state pairs with lower credit demand. Second, the inclusion of bank fixed effects and bank time-varying characteristics (vector $\boldsymbol{Z}_{bt}$) controls for the possibility that the bank propensity to extend maturities is driven by bank characteristics correlated with the outcome variable.

The estimation results in Table 6 document a negative effect of banks' extend-and-pretend behavior on C&I origination. Based on column (2), a less-capitalized bank (i.e., p75 of the cross-sectional distribution of Capital Tightness$_{bt}$ as of 2022:Q4) that provides distressed maturity extensions to 1% of its CRE portfolio (median CRE Distressed Extension$_{bt}$ equal to 1%) has a share of new C&I credit around 0.2 percentage points smaller than a better-capitalized bank (i.e., p25 of the cross-sectional distribution of Capital Tightness$_{bt}$ as of 2022:Q4) that engages in a similar CRE distressed maturity extension. This effect is sizable, given a mean share of new C&I credit of 8.2%. The last two columns show, in a placebo test, that the extent of banks' nationwide CRE *non-distressed* maturity extensions is not associated with a reduction in the origination of new C&I credit.

6.2 CRE credit origination

We now show that banks that extend the maturities of their distressed CRE mortgages effectively shift the composition of total outstanding CRE credit away from new origination

	C&I New Origination$_{bist}$			
	(1)	(2)	(3)	(4)
CRE Distressed Extensions$_{bt}$ × Capital Tightness$_{bt}$	−0.198**	−0.109**		
	(0.086)	(0.045)		
CRE Distressed Extensions$_{bt}$	−0.400	−0.036		
	(0.312)	(0.099)		
Capital Tightness$_{bt}$	0.017	0.030	−0.001	0.017
	(0.014)	(0.022)	(0.013)	(0.020)
CRE Non-Distressed Extensions$_{bt}$ × Capital Tightness$_{bt}$			0.033	0.025
			(0.049)	(0.028)
CRE Non-Distressed Extensions$_{bt}$			0.080	0.068
			(0.110)	(0.049)
Bank-Level Controls	✓	✓	✓	✓
Specification	(4)	(4)	Placebo	
Industry-State-Quarter FE	✓	✓	✓	✓
Bank FE		✓		✓
Observations	162,968	162,968	162,968	162,968
R^2	0.182	0.195	0.182	0.195

Table 6: Effect on C&I credit origination. This table shows estimation results from specification (4). CRE Distressed Extensions$_{bt}$, defined in (3a), is the dollar value of all CRE credit extended to distressed borrowers by bank b in quarter t, expressed as a share of total outstanding CRE credit granted by bank b as of quarter t. The dependent variable, defined in (3b), is the dollar value of new C&I credit granted by bank b to industry i in state s in quarter t, expressed as a share of total outstanding C&I credit granted by bank b to industry i in state s as of quarter t. We measure distress using a dummy equal to one if the property's collateral debt yield is below 8%. The Capital Tightness$_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. Bank-level controls uninteracted and interacted with Capital Tightness$_{bt}$ are included in all columns. The bank-level controls are bank size (log of total assets) and the sum of CRE and C&I lending (as a share of total assets). The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors triple-clustered at the bank, industry, and state levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.1.

and toward maturity extensions of distressed CRE loans. To this end, we adapt our empirical strategy to analyze CRE origination and define the following outcome variable at the zip code-bank-quarter level:

$$\text{CRE New Origination}_{bzt} = \frac{\sum_l \text{CRE Loan}_{blzt} \times \mathbb{I}(\text{New Orig})_{blzt}}{\sum_l \text{CRE Loan}_{blzt}} \tag{5}$$

As in the analysis of the C&I market, this variable captures the composition of bank lending between new origination and preexisting exposure within a zip code. Specifically, the variable is defined as the dollar value of new credit granted by bank b to zip code z in quarter t, as a share of all outstanding CRE credit granted by bank b to zip code z as of quarter t.

Using this variable, we estimate the following specification:

$$\text{CRE New Origination}_{bzt} = \alpha + \beta \text{CRE Distressed Extensions}_{bt} \times \text{Capital Tightness}_{bt} \qquad (6)$$
$$+ \boldsymbol{\omega}'\boldsymbol{Z}_{bt} + \mu_b + \eta_{zt} + \epsilon_{bzt}$$

where b is a bank, z is a zip code, and t is a quarter. As discussed, the outcome variable is the share of new origination by bank b in zip code z in quarter t. The independent variable of interest is the interaction between the share of all CRE loans extended to distressed borrowers and the bank capital tightness. We double-cluster standard errors at the zip code and bank level. Table OA.7 shows the summary statistics.

As in the analysis of C&I lending, our specification effectively compares two or more banks lending to the same zip code with different levels of nationwide maturity extension. The estimation results in Table 7 suggest that banks' extend-and-pretend is associated with a decline in new CRE origination. Based on column (2), a less-capitalized bank (i.e., p75 of the cross-sectional distribution of Capital Tightness$_{bt}$ as of 2022:Q4) that provides maturity extensions to a large portion of its distressed CRE portfolio (CRE Distressed Extensions$_{bt}$ equal to 1%) has a share of new CRE credit 0.2 percentage points smaller than a well-capitalized bank (i.e., p25 of the cross-sectional distribution of Capital Tightness$_{bt}$ as of 2022:Q4) that engages in a similar distressed maturity extension. This effect is sizable, given a 4.9% mean share of new CRE credit. The last two columns show, in a placebo test, that the extent of banks' nationwide *non-distressed* maturity extensions is not associated with a reduction in the origination of new CRE credit.

6.3 Aggregate effects of banks' credit reallocation

We now present a partial equilibrium exercise to calculate the effect of banks' reduced credit origination on borrowers' ability to obtain credit, using, as a counterfactual, a scenario where the maturity extensions of distressed mortgages do not lead to a contraction in new credit origination. Crucially, this exercise accounts for borrowers' ability to switch lenders—e.g., borrowing from a well-capitalized bank after being denied a loan by a less-capitalized bank.

First, our empirical strategy gets rid of the bank-level unit of observation, collapsing the

	CRE Origination$_{bzt}$			
	(1)	(2)	(3)	(4)
CRE Distressed Extensions$_{bt}$ × Capital Tightness$_{bt}$	−0.177**	−0.103**		
	(0.074)	(0.048)		
CRE Distressed Extensions$_{bt}$	0.262*	0.016		
	(0.137)	(0.105)		
Capital Tightness$_{bt}$	0.001	0.020	−0.011	0.001
	(0.022)	(0.024)	(0.025)	(0.028)
CRE Non-Distressed Extensions$_{bt}$ × Capital Tightness$_{bt}$			0.006	0.051
			(0.044)	(0.037)
CRE Non-Distressed Extensions$_{bt}$			0.092	0.032
			(0.064)	(0.039)
Bank-Level Controls	✓	✓	✓	✓
Specification	(6)	(6)	Placebo	
Zip Code-Time FE	✓	✓	✓	✓
Bank FE		✓		✓
Observations	282,340	282,340	282,340	282,340
R^2	0.304	0.307	0.304	0.307

Table 7: Decline in CRE credit origination. This table shows estimation results from specification (6). CRE Distressed Extensions$_{bt}$, defined in (3a), is the dollar value of all CRE credit granted to distressed borrowers by bank b in quarter t, expressed as a share of total outstanding CRE credit granted by bank b as of quarter t. The dependent variable, defined in (5), is the dollar value of new CRE credit granted by bank b in zip code z in quarter t, expressed as a share of total outstanding CRE credit granted by bank b in zip code z as of quarter t. We measure distress with a dummy variable equal to one if the property's debt yield is below 8%. The Capital Tightness$_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. Uninteracted bank-level controls are included in columns (2)-(4). Bank-level controls interacted with Capital Tightness$_{bt}$ are included in columns (3)-(4). The bank-level controls are bank size (log of total assets) and the sum of CRE and C&I lending (as a share of total assets). The sample period runs quarterly from 2022:Q1 to 2025:Q2. Standard errors are double clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y9-C, FR Y-14 Schedule H.2.

data at (i) the zip code-quarter level for the CRE analysis and (ii) the industry-state-quarter level for the C&I analysis. We then estimate the following regressions:

$$\text{CRE New Origination}_{zt} = \beta_1 \widetilde{\text{CRE Distressed Extensions}}_{zt} \times \widetilde{\text{Capital Tightness}}_{zt} + \beta_2 \widetilde{\text{CRE Distressed Extensions}}_{zt} + \boldsymbol{\omega'} \boldsymbol{Z}_{zt} + \widehat{\eta_{zt}} + \mu_t + \nu_z + \epsilon_{zt} \tag{7a}$$

$$\text{C\&I New Origination}_{sit} = \beta_1 \widetilde{\text{CRE Distressed Extensions}}_{sit} \times \widetilde{\text{Capital Tightness}}_{sit} + \beta_2 \widetilde{\text{CRE Distressed Extensions}}_{sit} + \boldsymbol{\omega'} \boldsymbol{Z}_{sit} + \widehat{\eta_{sit}} + \mu_t + \nu_{si} + \epsilon_{sit} \tag{7b}$$

where the outcome variables are the share of new CRE (C&I) origination over preexisting CRE

(C&I) exposures within a zip code (within a state-industry). The main independent variables are (i) $\text{CRE Distr}\widetilde{\text{essed Ext}}\text{ensions}_{zt}$ ($\text{CRE Distr}\widetilde{\text{essed Ext}}\text{ensions}_{sit}$), namely the extent of the indirect nationwide distressed CRE maturity extensions by banks operating in quarter t and zip code z (state-industry si); and (ii) $\text{Capital }\widetilde{\text{Tight}}\text{ness}_{zt}$ ($\text{Capital }\widetilde{\text{Tight}}\text{ness}_{sit}$), namely the extent of the indirect capital tightness by banks operating in quarter t and zip code z (state-industry si). Similarly, $\boldsymbol{Z}_{zt}$ and $\boldsymbol{Z}_{sit}$ are the indirect exposures of zip codes (or state-industry pairs) to the bank-level controls.[24] The two specifications also include the fixed effects $\widehat{\eta_{zt}}$ and $\widehat{\eta_{sit}}$ estimated in specifications (6) and (4). These fixed effects control for time-varying heterogeneity at the zip code and state-industry levels, respectively, thereby capturing borrowers' credit demand.

Second, we use the estimated coefficients from (7a) and (7b) to predict the share of new CRE (C&I) origination within a zip code (within a state-industry). We perform two predictions: one prediction using the actual values of the $\text{Capital }\widetilde{\text{Tight}}\text{ness}_{zt}$ ($\text{Capital }\widetilde{\text{Tight}}\text{ness}_{sit}$) variable and one prediction setting the $\text{Capital }\widetilde{\text{Tight}}\text{ness}_{zt} \times \text{Distressed }\widetilde{\text{Ext}}\text{ensions}_{zt}$ ($\text{Capital }\widetilde{\text{Tight}}\text{ness}_{sit} \times \text{Distressed }\widetilde{\text{Ext}}\text{ensions}_{sit}$) interaction term equal to zero whenever $\text{Capital }\widetilde{\text{Tight}}\text{ness}_{zt}$ ($\text{Capital }\widetilde{\text{Tight}}\text{ness}_{sit}$) is strictly greater than zero. We then aggregate these two predictions from the zip code-quarter (industry-state-quarter) level to the quarter level using a weighted average of zip code-level (state-industry-level) new origination shares, where the weights are given by zip code-level (state-industry-level) granted CRE (C&I) credit.

Our results suggest that our sample banks' extend-and-pretend behavior led to a 1.1% reduction in the dollar value of new CRE origination. We do not find a meaningful aggre-

[24] The formal definitions of these variables are as follows. $\text{CRE New Origination}_{zt}$ ($\text{C\&I New Origination}_{zt}$) is the dollar value of new credit granted in zip code z in quarter t (industry-state si in quarter t), expressed as a share of all outstanding CRE loans granted in zip code z as of quarter t (industry-state si in quarter t). $\text{CRE Distr}\widetilde{\text{essed Ext}}\text{ensions}_{zt}$ ($\text{CRE Distr}\widetilde{\text{essed Ext}}\text{ensions}_{sit}$) is the weighted average of the dollar value of all CRE loans extended to distressed borrowers by banks in zip code z in quarter t (industry-state si in quarter t) as a share of total outstanding CRE lending in zip code z in quarter t (industry-state si in quarter t), where the weights are the value of credit granted by bank b in quarter t to zip code z (industry-state si). Similarly, $\text{Capital }\widetilde{\text{Tight}}\text{ness}_{zt}$ ($\text{Capital }\widetilde{\text{Tight}}\text{ness}_{sit}$) is the weighted average of $\text{Capital Tightness}_{bt}$ at the zip code-quarter (industry-state-quarter) level, where the weights are the value of credit granted by bank b in quarter t to zip code z (industry-state si). Finally, this same weighted average applies to the other variables in the vector $\boldsymbol{Z}_{zt}$ ($\boldsymbol{Z}_{sit}$).

gate effect on C&I origination, consistent with corporate borrowers affected by the credit contraction being able to borrow from banks that do not engage in extend-and-pretend. The dichotomy between the CRE and C&I markets suggests that well-capitalized banks may be more willing to lend in the C&I market than in the CRE market, consistent with the high uncertainty surrounding the future prospects of several CRE segments.

7 Regional and community banks

While our main results focus on extend-and-pretend behavior among large banks, a natural question is whether similar practices are also present among smaller banks that are more heavily exposed to CRE. As of 2025:Q4, CRE loans account for 31.1% of total assets at regional banks (defined as assets between \$10 billion and \$100 billion) and 35.6% of total assets at community banks (defined as assets less than \$10 billion).[25] In comparison, CRE loans account for just 8.9% of assets in our main Y-14 sample of large banks.

Although we cannot replicate our loan-level analysis for these smaller institutions due to data limitations, we find suggestive evidence of extend-and-pretend behavior using cross-sectional variation across banks in publicly available Y-9C bank-level data. Specifically, we analyze how loan non-performance reporting varies with banks' capitalization by estimating panel regressions of nonperforming loan (NPL) ratios on our measure of bank capital tightness. We construct a quarterly bank-level sample from 2022:Q1 to 2025:Q4 that includes both the large banks from our main analysis and regional and community banks. We winsorize the top and bottom 1% of both the capital tightness and NPL ratios to mitigate the influence of outliers. We estimate a series of binscatter regressions of the form:

$$\text{NPL}_{bt} = \beta \text{ Capital Tightness}_{bt} + \boldsymbol{\Gamma}' \boldsymbol{X}_{bt} + \delta_t + \epsilon_{bt}, \tag{8}$$

where b is a bank and t is a quarter. In addition, δ_t are time (quarter) fixed effects which

[25]These thresholds are used to define regional and community banks by the Federal Reserve (Board of Governors of the Federal Reserve System, 2024).

allow us to isolate cross-sectional variation across banks within a given quarter. $\boldsymbol{X}_{bt}$ is a set of bank-quarter-level controls, namely bank size (log assets), deposit-to-asset ratio, profitability (ROA), and loan-to-asset ratio. These controls are intended to account for differences in bank funding structure and overall health. We estimate these regressions both on the full sample of banks and separately by size group.

Figure 9 presents our binscatter plots, with the regression line and bin-specific confidence intervals overlaid on the points.[26] Panel A shows results for our main 2022:Q1–2025:Q4 sample period, which is when bank capitalization deteriorated due to monetary tightening. Panel B shows placebo results for the 2020:Q1–2021:Q4 period. Each panel shows the relationship for large, regional, and community banks separately. The horizontal axis plots bank capital tightness, and the vertical axis plots the NPL ratio, both residualized with respect to quarter-fixed effects and the bank-level controls described above.

In Panel A, we find suggestive evidence of extend-and-pretend among large banks and regional banks, while we do not find such evidence for community banks. The magnitude of the relationship between capital tightness and NPLs is particularly strong for large banks relative to regional banks. There are two possible explanations. First, our capital tightness measure adjusts regulatory capital for unrealized losses on securities but not for unrealized losses on loans. Since large banks hold proportionally more securities and fewer loans than smaller banks, the capital tightness measure captures a larger share of their true economic losses, potentially making the relationship between capitalization and NPLs appear stronger for large banks.[27] Consistent with this explanation, the binscatter plots show that the distribution of capital tightness among large banks is shifted substantially to the right (in the direction of lower capital) relative to that of regional and community banks.

Second, unlike our loan-level analysis, this bank-level specification cannot control for the composition of banks' CRE portfolios. Better-capitalized banks may report higher NPL ratios simply because they hold riskier CRE loans—for instance, because they have the capital

[26]We obtain the binscatter estimations and confidence intervals using `binsreg` in R (Cattaneo et al., 2024).

[27]As of 2024:Q4, the ratio of loans-to-assets for regional banks and community banks was 68% and 73%, respectively. For large banks, it was only 49%.

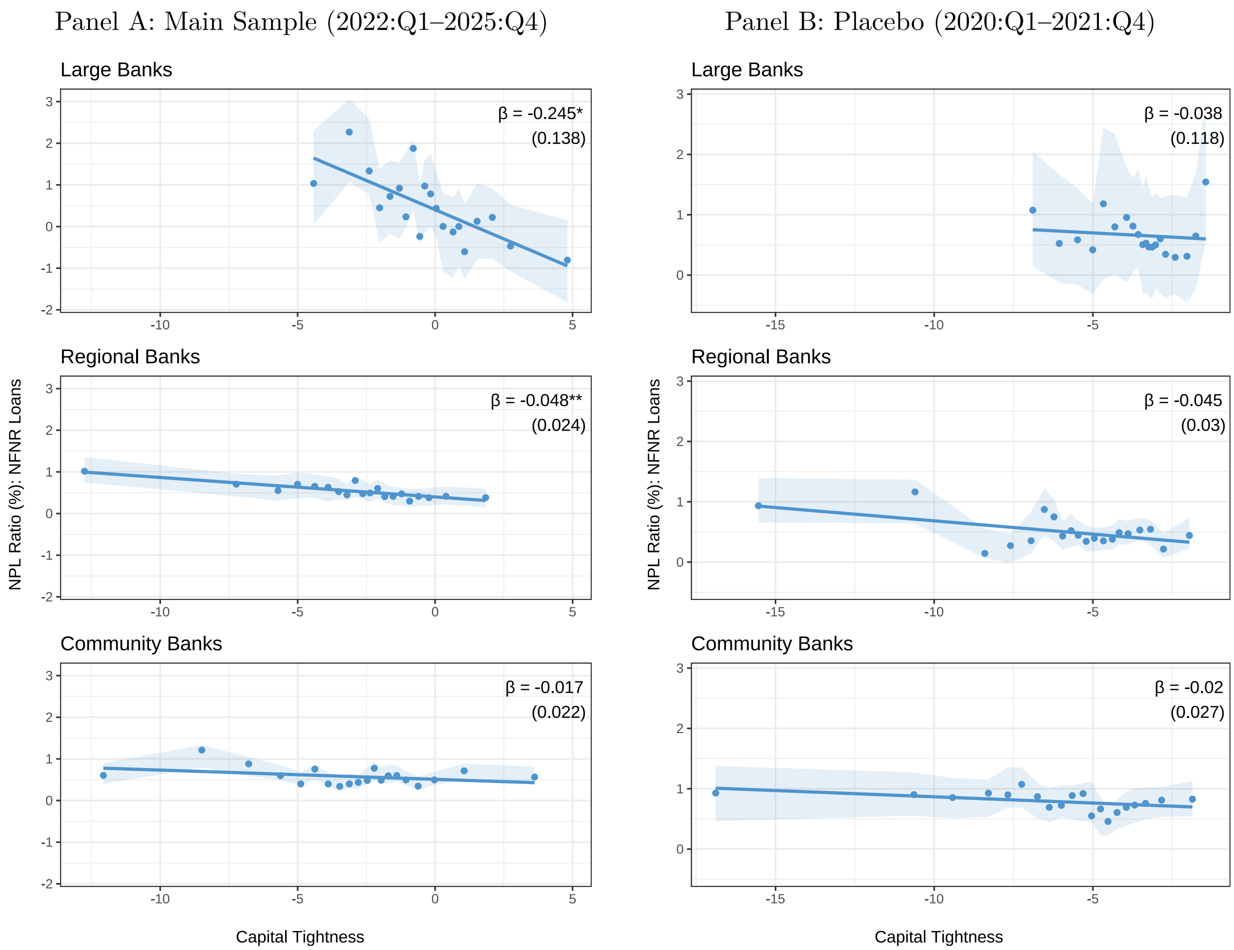

Figure 9: Extend-and-pretend among regional and community banks. This figure shows binscatter plots of bank capital tightness (x-axes) and bank nonperforming loans ratio (y-axes). The figure presents results for large banks (assets greater than $100 billion), regional banks (assets between $10 billion and $100 billion), and community banks (assets less than $10 billion). In 2024:Q4, the sample contains 20 large banks, 90 regional banks, and 147 community banks. Panel A on the left-hand side uses observations from 2022:Q1 to 2025:Q4. Panel B on the right-hand side presents placebo results using observations from 2020:Q1 to 2021:Q4. Bank capital tightness and NPL ratio are residualized with respect to quarter-fixed effects and bank-level controls (size (log assets), deposit-to-asset ratio, profitability (ROA), and loan-to-asset ratio). All observations are at the bank-quarter level. Source: FR Y-9C.

buffer to take on riskier exposures. Recent evidence suggests that the credit quality of CRE portfolios at smaller banks may in fact be stronger than at larger banks, reflecting their greater exposure to better-performing markets rather than tighter lending standards (Glancy and Kurtzman, 2024; Hinzen et al., 2026). If this sorting is stable over time, however, it should also be present in the pre-2022 period. Panel B provides a direct test of this concern by estimating the same specification in the 2020:Q1 to 2021:Q4 period, before monetary tightening eroded bank capital. The relationship between capital tightness and NPL ratios is statistically insignificant in this period across all bank size categories, suggesting that the patterns in Panel A are not driven by time-invariant differences in portfolio composition. Rather, the relationship between capitalization and loss recognition appears to have emerged specifically during the period when rising interest rates put pressure on bank balance sheets—consistent with the extend-and-pretend mechanism documented in our loan-level analysis and with independent evidence that regional banks offer more lenient refinancing terms to distressed borrowers (Hinzen et al., 2026).

8 Conclusion

Commercial real estate (CRE) is one of the largest and most cyclical sources of credit risk on banks' balance sheets. This risk is amplified by the maturity structure of CRE credit: loans are typically originated with substantial leverage and amortize over horizons that exceed their contractual maturities. Borrowers, therefore, often face large balloon payments and must refinance a substantial share of the original principal at maturity. This maturity structure complicates the resolution of distressed CRE loans and creates incentives for lenders to delay loss recognition as borrowers' repayment capacity deteriorates. We study this incentive in the post-pandemic U.S. CRE market, where declining property valuations and rising interest rates put simultaneous pressure on borrowers and on banks' marked-to-market capital.

Using detailed supervisory data, we show that weakly capitalized banks are more likely to extend distressed CRE loans and grant payment relief rather than recognize losses—a pattern commonly described as extend-and-pretend. These extensions push distressed loans into the near future, causing maturities to accumulate on the balance sheets of weakly capitalized banks and creating a maturity wall that concentrates loss-realization risk. We also show that banks engaging in extend-and-pretend reduce their supply of new credit, including both CRE and commercial and industrial lending, suggesting that scarce capital is diverted toward preserving legacy exposures rather than financing new lending opportunities.

The effects of this behavior open several research avenues. On the one hand, maturity extensions may prevent a sudden wave of defaults and avoid inefficient liquidation when borrower distress is temporary. On the other hand, the resulting decline in new credit provision may slow the efficient reallocation of CRE credit, potentially hindering the downsizing of office districts in urban areas and affecting cities' tax revenues. Maturity extensions also mechanically fuel a rising wave of potentially distressed loans. Whether this financial fragility materializes depends on whether banks can manage rising defaults in an orderly fashion or whether widespread defaults lead to sudden and extensive losses.

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Online Appendix

This appendix is structured as follows. Appendix A presents additional figures. Appendix B presents additional tables.

A Additional figures

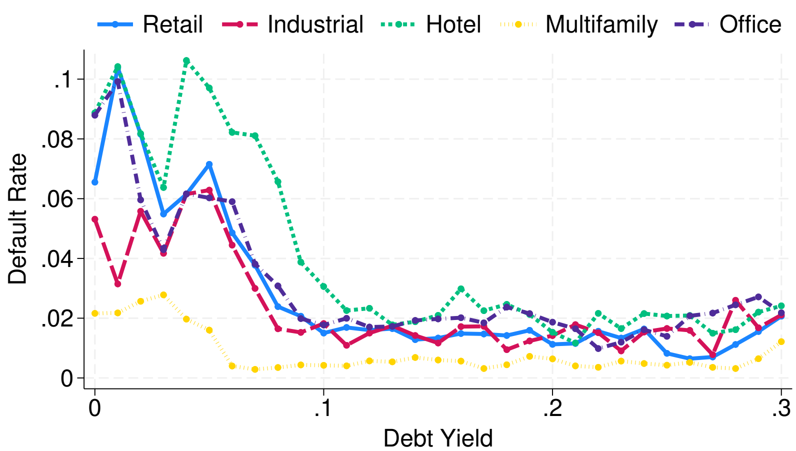

Figure OA.1: Debt yields predict future default rates. This figure shows the future default rates of retail, industrial, hotel, multifamily, and office CRE mortgages as a function of contemporaneous debt yields. The data runs from 2013:Q1 to 2019:Q4 to avoid the pandemic period. Each point shows the cumulative default rate in quarters $[t+1, t+4]$ (y-axis) based on the debt yield of the mortgage in quarter t (x-axis). Source: FR Y-14 Schedule H.2.

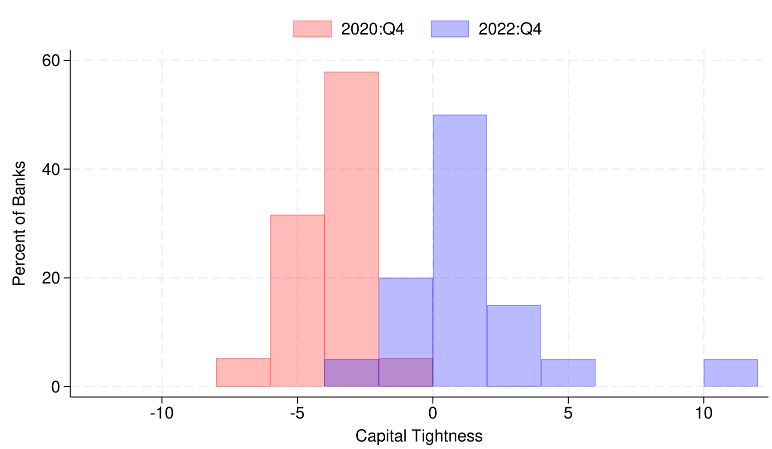

Figure OA.2: Weaker banks' capitalization in 2022. This figure shows the cross-sectional distribution of the capital tightness variable (defined in Section 2.2). The red bars illustrate the distribution of the capital tightness as of 2020:Q4. The blue bars illustrate the distribution of the capital tightness as of 2022:Q4. The sample includes the 22 large domestic banks used in our loan-level empirical analysis. Source: FR Y-9C.

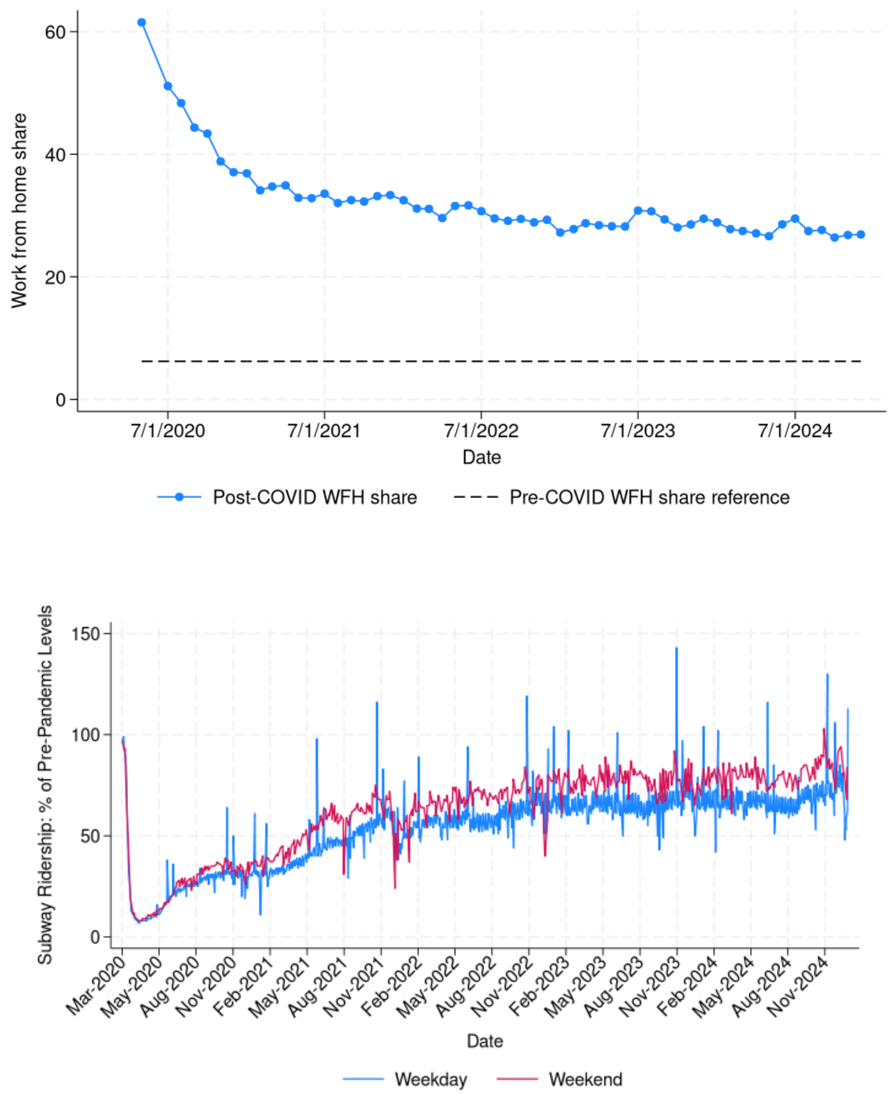

Figure OA.3: Work from home and NYC subway ridership since March 2020. This figure shows the sharp changes and subsequent plateau of the share of work provided from home and MTA subway ridership starting in March 2020. The post-COVID work-from-home data is taken from the U.S. Survey of Working Arrangements and Attitudes (SWAA) which is at a monthly frequency. The grey dotted line is the average of the 2018 and 2019 American Time Use Survey work-from-home share as calculated in the SWAA data file. Subway ridership is reported by the New York City Metropolitan Transportation Authority (MTA) at a daily frequency as a percentage of ridership on a comparable pre-COVID day. Sources: U.S. Survey of Working Arrangements and Attitudes (SWAA), New York City Metropolitan Transportation Authority (MTA).

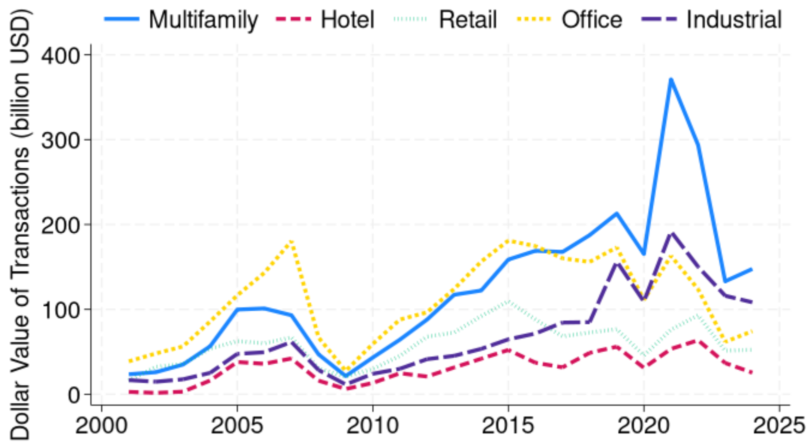

Figure OA.4: Decline in CRE transaction volume in 2020–2023. This figure shows the dollar volume of transactions (billion USD) by CRE market segment (multifamily, hotel, retail, office, industrial) from 2001 to 2024. Source: MSCI Real Capital Analytics.

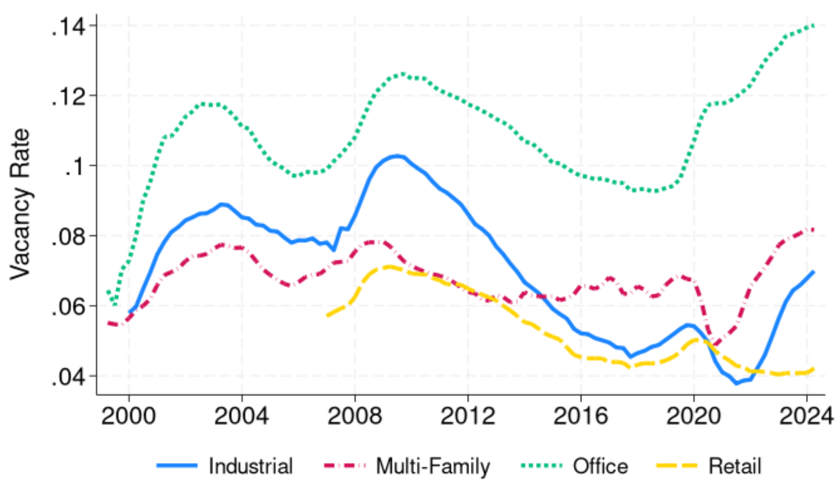

Figure OA.5: High and increasing vacancy rates. This figure shows vacancy rates by CRE segment from 2000 to 2025. Source: CoStar.

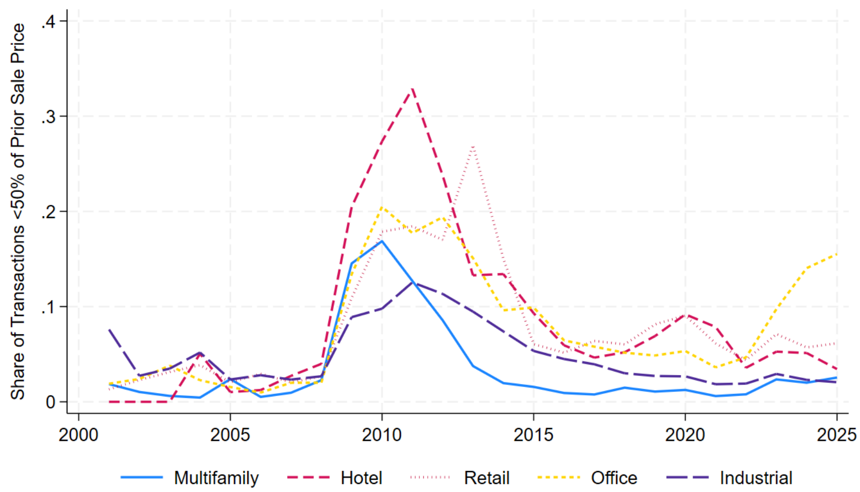

Figure OA.6: Share of transactions with price below 50% of original transaction price. This figure shows the share of transactions at a price below 50% of the original transaction price from 2001 to 2025 by CRE market (multifamily, hotel, retail, office, industrial). Source: MSCI Real Capital Analytics.

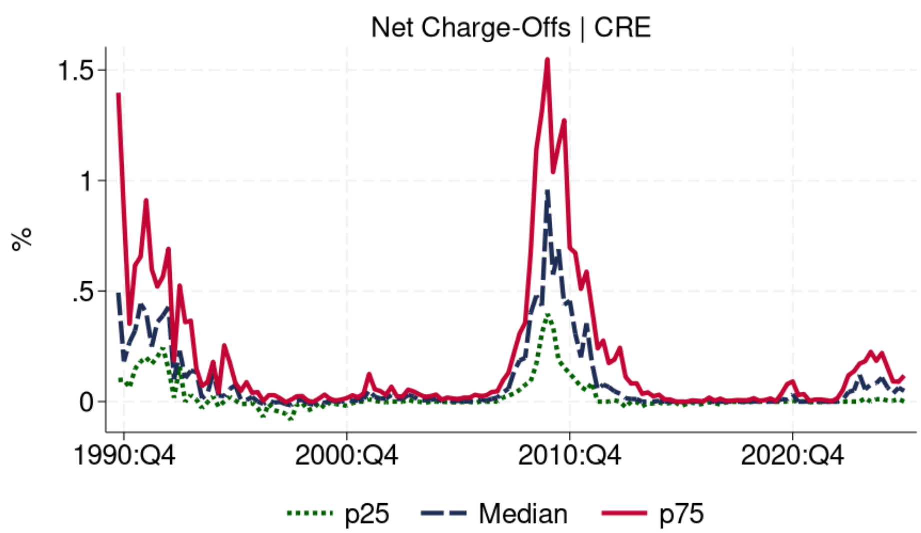

Figure OA.7: Net charge-offs. This figure shows the time-series evolution of the CRE net charge-off ratio. The solid line, long dash line, and short dash line indicate the third quartile, the median, and the first quartile at any given point in time in the cross-section of our sample banks. The data are quarterly from 1990:Q3 to 2025:Q4. Source: FR Y-9C.

B Additional tables

IDRSSD	Name	Period	AC/NC	CET1 Threshold
1031449	SVB FNCL GRP	2022:Q1–2022:Q4	NC	7.00
1037003	M&T BK CORP	2022:Q1–2025:Q4	NC	8.26
1039502	JPMORGAN CHASE & CO	2022:Q1–2025:Q4	AC	11.93
1068025	KEYCORP	2022:Q1–2025:Q4	NC	7.19
1068191	HUNTINGTON BSHRS	2022:Q1–2025:Q4	NC	7.38
1069778	PNC FNCL SVC GROUP	2022:Q1–2025:Q4	NC	7.10
1070345	FIFTH THIRD BC	2022:Q1–2025:Q4	NC	7.22
1073757	BANK OF AMER CORP	2022:Q1–2025:Q4	AC	10.15
1074156	BB&T CORP	2022:Q1–2025:Q4	NC	7.18
1075612	FIRST CITIZENS BSHRS	2023:Q1–2025:Q4	NC	7.00
1111435	STATE STREET CORP	2022:Q1–2025:Q4	AC	8.00
1120754	WELLS FARGO & CO	2022:Q1–2025:Q4	AC	9.20
1132449	CITIZENS FNCL GRP	2022:Q1–2025:Q4	NC	8.39
1199611	NORTHERN TR CORP	2022:Q1–2025:Q4	AC	7.00
1562859	ALLY FNCL	2022:Q1–2025:Q4	NC	7.22
1951350	CITIGROUP	2022:Q1–2025:Q4	AC	11.76
2132932	NEW YORK CMNTY BC	2023:Q4–2025:Q3	NC	7.00
2162966	MORGAN STANLEY	2022:Q1–2025:Q4	AC	13.14
2277860	CAPITAL ONE FC	2022:Q1–2025:Q4	NC	8.60
2380443	GOLDMAN SACHS GROUP THE	2022:Q1–2025:Q4	AC	13.28
3242838	REGIONS FC	2022:Q1–2025:Q4	NC	7.00
3587146	BANK OF NY MELLON CORP	2022:Q1–2025:Q4	AC	8.50

Table OA.1: Sample banks. This table reports the sample of 22 domestic banks in our CRE loan-level analysis during our core sample period, namely 2022:Q1–2025:Q4. The table displays the bank identifier (IDRSSD), the bank name, the period during which loans by each bank are populated in the Y-14 Schedule H.2 data, whether the bank is an AOCI Capital (AC) bank or a non-AOCI Capital (NC) bank, and the mean regulatory CET1 capital ratio threshold during our sample period. AC banks need to include unrealized gains and losses on available-for-sale (AFS) securities in their Tier 1 capital. NC banks do not need to make such an adjustment. See Greenwald et al. (2024) for a detailed discussion of this different regulatory capital treatment. Source: FR Y-9C, FR Y-14 Schedule H.2.

Unit of obs.: loan-quarter level | No. of obs.: 745,077 | Source: Y-14 CRE | Period: 2022:Q1–2025:Q4							
Panel A: Less-capitalized banks	mean	St.dev	p10	p25	p50	p75	p90
Probability of Default (PD)	1.73	7.52	0.17	0.17	0.30	0.65	1.87
Default (dummy)	0.53	7.25	0.00	0.00	0.00	0.00	0.00
Extension (dummy)	2.08	14.26	0.00	0.00	0.00	0.00	0.00
Net Operating Income (M$)	0.86	4.55	0.11	0.16	0.28	0.60	1.57
Distress (dummy)	0.22	0.41	0.00	0.00	0.00	0.00	1.00
Amount Outstanding (M$)	7.84	20.62	1.11	1.45	2.46	5.40	15.88
Interest Rate	4.75	1.65	3.10	3.42	4.15	6.20	7.22
Time to Maturity (quarters)	57.67	45.37	6.00	15.00	37.00	107.00	115.00

Unit of obs.: loan-quarter level | No. obs.: 202,114 | Source: Y-14 CRE | Period: 2022:Q1–2025:Q4							
Panel B: Better-capitalized banks	mean	St.dev	p10	p25	p50	p75	p90
Probability of Default (PD)	4.32	13.52	0.11	0.35	1.00	2.37	9.00
Default (dummy)	1.93	13.77	0.00	0.00	0.00	0.00	0.00
Extension (dummy)	5.64	23.08	0.00	0.00	0.00	0.00	0.00
Net Operating Income (M$)	1.60	4.31	0.13	0.25	0.59	1.71	3.91
Distress (dummy)	0.17	0.38	0.00	0.00	0.00	0.00	1.00
Amount Outstanding (M$)	13.48	24.74	1.06	1.82	4.50	14.83	37.20
Interest Rate	5.41	1.94	3.07	3.75	5.59	6.95	7.72
Time to Maturity (quarters)	24.59	28.92	3.00	6.00	14.00	29.00	65.00

Table OA.2: Summary statistics, loan-quarter level, by bank capital tightness. This table shows summary statistics of selected variables used in our analysis. Banks are split in two groups, well-capitalized and weakly capitalized, based on whether their Capital Tightness$_{bt}$ variable is above median (weakly capitalized) or below median (well capitalized) in 2022:Q4. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Summary statistics are at the loan-quarter level, based on Y-14 Schedule H.2 (CRE) data. The variables are defined as follows. The probability of default is assigned by banks to each loan. The extension and default dummies take the value of one if the loan maturity is extended in quarter t or if the loan enters default in quarter t, respectively. The net operating income is the gross rental income of the property used as collateral minus operating expenses. The distress dummy equals one if the property's debt yield (net operating income divided by loan balance) is less than 8%. Source: FR Y-9C, FR Y-14 Schedule H.2.

Unit of obs.: bank-quarter level | No. of obs.: 148 | Source: Y-9C | Period: 2022:Q1–2025:Q4							
Panel A: Less-capitalized banks	mean	St.dev	p10	p25	p50	p75	p90
Total Assets (T$)	1.20	1.41	0.19	0.20	0.43	1.95	3.74
Capital Ratio	10.93	1.51	9.27	9.82	10.61	11.71	12.17
MTM Capital Ratio	7.39	2.77	4.77	5.91	7.48	8.45	10.64
Capital Tightness	−1.01	2.28	−1.49	−0.52	0.77	2.09	3.96
Deposits (%Assets)	72.67	7.65	59.77	68.19	74.51	78.73	80.02
CRE Lending (%Assets)	0.06	0.03	0.01	0.03	0.07	0.09	0.10
C&I Lending (%Assets)	0.13	0.07	0.01	0.09	0.14	0.18	0.22
Nonfarm Nonresidential Lending (%Assets)	0.04	0.02	0.01	0.02	0.04	0.05	0.07
Nonperforming Loans CRE (%)	1.08	1.02	0.15	0.34	0.75	1.43	2.91
Nonperforming Loans Nonfarm Nonresidential (%)	1.56	1.72	0.15	0.43	0.96	1.69	4.37
Nonperforming Loans Multifamily (%)	0.36	0.85	0.00	0.00	0.04	0.28	0.96
Nonperforming Loans C&I (%)	0.59	0.32	0.00	0.41	0.55	0.81	1.01
Net Charge-Offs CRE (%)	0.06	0.10	-0.01	0.00	0.02	0.09	0.17
Net Charge-Offs Nonfarm Nonresidential (%)	0.09	0.18	-0.01	0.00	0.03	0.14	0.23
Net Charge-Offs Multifamily (%)	0.02	0.09	-0.00	0.00	0.00	0.00	0.05
Net Charge-Offs C&I (%)	0.08	0.07	0.00	0.04	0.07	0.12	0.18

Unit of obs.: bank-quarter level | No. obs.: 160 | Source: Y-9C | Period: 2022:Q1–2025:Q4							
Panel B: Better-capitalized banks	mean	St.dev	p10	p25	p50	p75	p90
Total Assets (T$)	0.75	0.75	0.16	0.21	0.41	1.21	2.08
Capital Ratio	12.10	1.84	9.92	10.63	11.61	13.58	14.93
MTM Capital Ratio	10.27	2.39	7.25	8.59	10.02	12.08	13.80
Capital Tightness	1.01	1.47	−3.10	−2.08	−0.77	−0.01	0.71
Deposits (%Assets)	65.63	20.60	28.17	54.10	75.37	79.75	82.26
CRE Lending (%Assets)	0.06	0.06	0.01	0.01	0.04	0.10	0.15
C&I Lending (%Assets)	0.10	0.08	0.01	0.02	0.07	0.17	0.22
Nonfarm Nonresidential Lending (%Assets)	0.04	0.04	0.00	0.01	0.03	0.06	0.10
Nonperforming Loans CRE (%)	2.68	2.43	0.33	0.97	2.29	3.37	5.45
Nonperforming Loans Nonfarm Nonresidential (%)	3.42	3.10	0.50	1.41	2.99	4.22	7.03
Nonperforming Loans Multifamily (%)	1.59	2.95	0.00	0.00	0.43	1.82	3.53
Nonperforming Loans C&I (%)	1.50	1.84	0.12	0.44	0.86	1.60	4.59
Net Charge-Offs CRE (%)	0.10	0.17	0.00	0.00	0.03	0.14	0.24
Net Charge-Offs Nonfarm Nonresidential (%)	0.15	0.27	0.00	0.00	0.03	0.23	0.45
Net Charge-Offs Multifamily (%)	0.04	0.23	-0.00	0.00	0.00	0.00	0.08
Net Charge-Offs C&I (%)	0.09	0.09	-0.00	0.01	0.06	0.14	0.23

Table OA.3: Summary statistics, bank-quarter level, by bank capital tightness. This table shows summary statistics of selected variables used in our analysis. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Summary statistics are at the bank-quarter level, based on Y-9C data. Banks are split in two groups, well-capitalized and weakly capitalized, based on whether their Capital Tightness$_{bt}$ variable is above median (weakly capitalized) or below median (well capitalized) in 2022:Q4. The variables are defined as follows. Capital ratio is the common equity tier 1 capital divided by risk-weighted assets. MTM Capital ratio is the common equity tier 1 capital divided by risk-weighted assets, adjusted for changes in the market value of securities held in the HTM and AFS portfolios. The Capital Tightness variable, defined in Section 2.2, is the time-varying difference between bank-level MTM Capital ratio and the contemporaneous bank-specific regulatory threshold. Nonperforming loans and net charge-offs are expressed as a share of total lending (for each category of lending). Source: FR Y-9C, FR Y-14 Schedule H.2.

$Extensions_{lt}$	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	0.145***	0.167***	0.117***	0.113***
	(0.047)	(0.043)	(0.036)	(0.036)
$\text{Capital Tightness}_{bt}$	0.033	−0.104	0.038	
	(0.095)	(0.111)	(0.338)	
Distress_{lt}	0.013	0.300***	0.235**	0.229**
	(0.089)	(0.094)	(0.090)	(0.083)
$\text{Interest Rate}_{lt-1}$		0.486***	0.426***	0.436***
		(0.047)	(0.047)	(0.045)
$\text{Time to Maturity}_{lt-1}$		−0.022**	−0.020*	−0.020*
		(0.008)	(0.010)	(0.010)
$\text{Outstanding Balance}_{lt-1}$		−0.115**	−0.129***	−0.132***
		(0.047)	(0.045)	(0.045)
$\text{NOI at Origination}_{l}$		0.464***	0.390***	0.395***
		(0.055)	(0.048)	(0.047)
Observations	852,818	622,343	622,343	622,343
R^2	0.325	0.319	0.322	0.330
$\text{Relief}_{lt} \mid \text{Extension}_{lt} = 1$	(1)	(2)	(3)	(4)
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	3.020**	4.764***	4.142***	4.509***
	(1.073)	(1.404)	(1.218)	(0.982)
$\text{Capital Tightness}_{bt}$	−2.587***	−2.104	−1.412	
	(0.871)	(1.468)	(2.447)	
Distress_{lt}	5.074**	2.614	2.659	3.838
	(1.999)	(2.460)	(2.814)	(2.666)
$\text{Interest Rate}_{lt-1}$		3.550	3.425	3.246
		(2.700)	(2.689)	(3.020)
$\text{Time to Maturity}_{lt-1}$		0.227***	0.183***	0.173***
		(0.048)	(0.029)	(0.031)
$\text{Outstanding Balance}_{lt-1}$		0.336	0.442	0.414
		(0.276)	(0.280)	(0.308)
$\text{NOI at Origination}_{l}$		0.254	0.336	0.811
		(1.424)	(1.416)	(1.782)
Observations	9,638	3,986	3,986	3,930
R^2	0.664	0.682	0.697	0.722
Zip Code-Property Type-Quarter FE	✓	✓	✓	✓
Bank FE			✓	
Bank-Quarter FE				✓

Table OA.4: Extending-and-pretending CRE credit since 2022, maturity extensions and payment relief, full specification. This table shows estimation results from specification (1). The dependent variable is (i) a dummy equal to one if the maturity of loan l is extended at time t in the top panel and (ii) a dummy equal to one if loan l receives payment relief at time t, i.e., a reduction in interest rate or a transition into an interest-only amortization schedule in the bottom panel. The bottom panel is estimated in the subsample of observations where $\text{Extension}_{lt} = 1$. Distress_{lt} is a dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%. The $\text{Capital Tightness}_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. The loan-level controls are $\text{Interest Rate}_{lt-1}$, the interest rate on the loan at time $t-1$, $\text{Time to Maturity}_{lt-1}$, the time to maturity (in quarters) of loan l at time $t-1$, $\text{Outstanding Balance}_{lt}$, the log of the outstanding amount on loan l at time $t-1$, and $\text{NOI at Origination}_{l}$, the log of the NOI of loan l at origination. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors double-clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

LHS: $Default_{lt}$	(1)	(2)	(3)	(4)
Capital $Tightness_{bt}$ × $Distress_{lt}$	−0.408*	−0.566**	−0.441*	−0.415*
	(0.212)	(0.270)	(0.233)	(0.228)
Capital $Tightness_{bt}$	−0.059	−0.244	−0.264	
	(0.085)	(0.173)	(0.347)	
$Distress_{lt}$	0.953*	0.949	0.842	0.855
	(0.544)	(0.588)	(0.562)	(0.562)
Interest $Rate_{lt-1}$		0.706**	0.725*	0.711*
		(0.325)	(0.368)	(0.366)
Time to $Maturity_{lt-1}$		−0.017**	−0.007*	−0.007*
		(0.006)	(0.004)	(0.004)
Outstanding $Balance_{lt}$		0.146***	0.124***	0.119***
		(0.041)	(0.032)	(0.031)
NOI at $Origination_{l}$		0.007	−0.028	−0.021
		(0.101)	(0.099)	(0.099)
Observations	852,818	622,343	622,343	622,343
R^2	0.274	0.275	0.284	0.290

LHS: Probability of Default (PD_{lt})	(1)	(2)	(3)	(4)
Capital $Tightness_{bt}$ × $Distress_{lt}$	−0.420*	−0.633**	−0.620**	−0.629**
	(0.217)	(0.238)	(0.221)	(0.226)
Capital $Tightness_{bt}$	0.087	−0.013	0.226	
	(0.086)	(0.113)	(0.155)	
$Distress_{lt}$	2.755***	2.896***	2.855***	2.858***
	(0.581)	(0.606)	(0.592)	(0.595)
Interest $Rate_{lt-1}$		0.799***	0.824***	0.847***
		(0.099)	(0.096)	(0.098)
Time to $Maturity_{lt-1}$		−0.020***	−0.015***	−0.015***
		(0.006)	(0.003)	(0.003)
Outstanding $Balance_{lt-1}$		0.071*	0.061	0.061
		(0.037)	(0.036)	(0.037)
NOI at $Origination_{l}$		0.010	−0.028	−0.026
		(0.131)	(0.144)	(0.144)
Observations	682,271	523,192	523,192	523,192
R^2	0.337	0.344	0.350	0.352

Zip Code-Property Type-Quarter FE	✓	✓	✓	✓
Bank FE			✓	
Bank-Quarter FE				✓

Table OA.5: Extending-and-pretending CRE credit since 2022, realized defaults and bank-assigned probability of default, full specification. This table shows estimation results from specification (1). The dependent variable is (i) a dummy equal to one if loan l is in default at time t in the top panel and (ii) the probability of default assigned by bank b to loan l at time t in the bottom panel. $Distress_{lt}$ is a dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%. The Capital $Tightness_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. The loan-level controls are Interest $Rate_{lt-1}$, the interest rate on the loan at time $t-1$, Time to $Maturity_{lt-1}$, the time to maturity (in quarters) of loan l at time $t-1$, Outstanding $Balance_{lt}$ is the log of the outstanding amount on loan l at time $t-1$, and NOI at $Origination_{l}$, the log of the NOI of loan l at origination. The sample period runs quarterly from 2022:Q1 to 2025:Q4. Standard errors double-clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

Period 2020:Q1–2021:Q4	Extensions_{lt}	Relief_{lt}	Default_{lt}	PD_{lt}
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	0.553***	2.870***	−0.254**	−0.602
	(0.158)	(0.924)	(0.095)	(0.371)
Distress_{lt}	3.625***	5.370**	−0.365*	−0.344
	(0.337)	(1.867)	(0.191)	(0.712)
Observations	271,610	2,653	271,610	258,715
R^2	0.309	0.840	0.340	0.367

Period 2017:Q1–2019:Q4	Extensions_{lt}	Relief_{lt}	Default_{lt}	PD_{lt}
$\text{Capital Tightness}_{bt} \times \text{Distress}_{lt}$	−0.085	0.590	−0.057	−0.050
	(0.123)	(1.289)	(0.035)	(0.040)
Distress_{lt}	1.474***	1.852	0.012	0.423*
	(0.395)	(6.201)	(0.114)	(0.223)
Observations	412,042	3,427	412,042	390,039
R^2	0.409	0.728	0.389	0.358

Zip Code-Property Type-Quarter FE	✓	✓	✓	✓
Loan-Level Controls	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
Bank-Quarter FE	✓	✓	✓	✓

Table OA.6: Extending-and-pretending CRE credit, pre-2022 periods. This table shows estimation results from specification (1). The dependent variables are (i) a dummy equal to one if the maturity of loan l is extended at time t, (ii) a dummy equal to one if loan l receives payment relief upon extension at time t, i.e., a reduction in interest rate or a transition into an interest-only amortization schedule, (iii) a dummy equal to one if loan l is in default at time t, and (iv) the probability of default assigned by bank b to loan l at time t. Distress_{lt} is a dummy equal to one if the debt yield generated by the property serving as collateral is less than 8%. The $\text{Capital Tightness}_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level regulatory capital (once marked-to-market gains and losses on securities held are taken into account) and the bank-specific regulatory threshold. The loan-level controls are $\text{Interest Rate}_{lt-1}$, the interest rate on the loan at time $t-1$, $\text{Time to Maturity}_{lt-1}$, the time to maturity (in quarters) of loan l at time $t-1$, $\text{Outstanding Balance}_{lt}$ is the log of the outstanding amount on loan l at time $t-1$, and $\text{NOI at Origination}_{l}$, the log of the NOI of loan l at origination. Loan-level controls are omitted for brevity. The sample period runs quarterly from 2020:Q1 to 2021:Q4 in the top panel and from 2017:Q1 to 2019:Q4 in the bottom panel. Standard errors double-clustered at the bank and zip code level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: FR Y-9C, FR Y-14 Schedule H.2.

Unit obs.: loan-quarter level | Source: Y-14 C&I | 2020:Q1–2025:Q4							
Panel A: REITs	Mean	St.dev	p10	p25	p50	p75	p90
Probability of Default	0.84	2.53	0.07	0.11	0.18	0.44	1.48
Distress	−0.33	0.73	−1.13	−0.64	−0.18	0.13	0.39
Outstanding Amount (M$)	62.77	59.61	10.04	24.00	48.51	84.00	125.00
Interest Rate	5.02	2.30	1.43	3.50	5.61	6.49	7.50
Time to Maturity (quarter)	10.77	5.06	4.00	7.00	11.00	15.00	18.00

Unit obs.: zip code-bank-quarter level | Source: Y-14 CRE | 2020:Q1–2025:Q4							
Panel B: CRE Credit Origination	Mean	St.dev	p10	p25	p50	p75	p90
CRE New Origination	0.05	0.20	0.00	0.00	0.00	0.00	0.00

Unit obs.: bank-quarter level | Source: Y-14 CRE | 2020:Q1–2025:Q4							
Panel C: CRE Credit Origination	Mean	St.dev	p10	p25	p50	p75	p90
Distressed Extensions	0.01	0.01	0.00	0.00	0.01	0.02	0.03
Non-distressed Extensions	0.04	0.03	0.01	0.02	0.03	0.05	0.07

Unit obs.: bank-industry-state-quarter level | Source: Y-14 C&I | 2020:Q1–2025:Q4							
Panel D: C&I Credit Origination	Mean	St.dev	p10	p25	p50	p75	p90
C&I New Origination	0.08	0.20	0.00	0.00	0.00	0.04	0.26

Table OA.7: Additional summary statistics. This table presents additional summary statistics. Panel A shows summary statistics at the loan-quarter level for our analysis of banks lending to distressed REITs. Panel B and Panel C show summary statistics for our analysis of crowding out of CRE origination at the zip code-bank-quarter level and bank-quarter level, respectively. Panel D shows summary statistics at the bank-industry-state-quarter level for our analysis of crowding out of C&I origination. Source: FR Y-9C, FR Y-14 Schedule H.1, FR Y-14 Schedule H.2.

	Maturity Extension$_{lbjt}$			Probability of Default (PD$_{lbjt}$)		
Capital Tightness$_{bt}$ × Distress$_{jt}$	0.174	0.306	0.312	2.046*	0.392	0.303
	(0.342)	(0.404)	(0.466)	(0.999)	(0.596)	(0.599)
Capital Tightness$_{bt}$	0.123			1.041		
	(0.140)			(0.599)		
Outstanding Balance$_{lt-1}$			0.015			−0.057
			(0.049)			(0.670)
Interest Rate$_{lt-1}$			−0.001			−0.357
			(0.065)			(0.399)
Time to Maturity$_{lt-1}$			−0.000			−0.000
			(0.000)			(0.000)
Time from Origination$_{lt-1}$			0.006			0.132*
			(0.009)			(0.067)
Floating Rate$_{lt-1}$			0.129			−2.633*
			(0.241)			(1.423)
Borrower-Quarter FE	✓	✓	✓	✓	✓	✓
Bank-Quarter FE		✓	✓		✓	✓
Observations	5,959	5,938	4,537	6,394	6,373	4,876
R^2	0.546	0.635	0.634	0.234	0.334	0.342

Table OA.8: Extending-and-pretending, placebo evidence from REITs in 2020–2021. This table shows estimation results from specification (2). The sample period is 2020:Q1–2021:Q4. The dependent variables are a dummy equal to one if the maturity of the loan l is extended at time t (columns (1)-(3)) and the probability of default assigned by bank b to REIT j at time t (columns (4)-(6)). Distress$_{jt}$ is the change in market capitalization of REIT j from 2020:Q1 to quarter t (positive values indicate a drop in market capitalization). The Capital Tightness$_{bt}$ variable, defined in Section 2.2, is the time-varying difference between bank-level MTM common equity tier 1 capital and the bank-specific regulatory threshold. Outstanding Balance$_{lt-1}$ is the log of the outstanding amount on loan l at time $t-1$. Interest Rate$_{lt-1}$ is the interest rate on the loan at time $t-1$. Time to Maturity$_{lt-1}$ is the time to maturity (in quarters) of loan l at time $t-1$. Time from Origination$_{lt-1}$ is the time from origination (in quarters) of loan l at time $t-1$. Floating Rate$_{lt-1}$ is a dummy equal to one if loan l has a floating rate at time $t-1$. The sample period runs quarterly from 2020:Q1 to 2021:Q4. Standard errors clustered at the bank level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: CRSP, Capital IQ, FR Y-9C, FR Y-14 Schedule H.1.