Shadow Always Touches the Feet: Implications of Bank Credit Lines to Non-Bank Financial Intermediaries

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Abstract

Using real estate investment trusts (REITs) that invest in commercial real estate (CRE) as a leading example, we study the implications of bank credit lines to non-bank financial intermediaries (NBFIs). While small and mid-size banks hold an economically significant direct exposure in CRE term loans, a significant part of the CRE exposure of large banks is indirect via credit-line provision to REITs. Utilization of credit lines by REITs tends to be substantially higher on average than non-financial corporates and other NBFIs, and reflects the performance of underlying real estate, in normal times and especially during stress. In turn, large banks suffer drawdowns and equity corrections in stress times from extending credit lines to REITs. Ignoring this credit line channel understates the exposure of large banks to CRE risks. We propose a methodology to incorporate this exposure in bank capital stress tests.

JEL classification: G01, G21, G23
Keywords: shadow banks, NBFIs, commercial real estate, CRE, real estate investment trust (REIT), systemic risk, bank capital, stress tests

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1 Introduction

In this paper, we use real estate investment trusts (REITs) – that own a significant portion of commercial real estate (CRE) – as a leading example to study the implications of bank provision of credit lines to nonbank financial intermediaries (NBFIs). Rising interest rates and economic slowdown can exert considerable pressure on the commercial real estate (CRE) sector, as observed post-COVID in the United States, especially but not limited to the urban office-space CRE. Commercial property prices have dropped about 10% since January 2020 and 21% since the Federal Reserve started raising interest rates in March 2022, with the latter correction erasing the property price appreciation over the preceding two years.[1] Considering the vast scale of the CRE market, valued at approximately $21 trillion in 2021[2], which is funded in part through bank loans, disruptions in the CRE sector can directly influence the availability of bank credit to households and businesses. For example, Cole and White (2012) document the impact of CRE investments on bank failures historically (1985-1992 and 2009). Consequently, bank regulators and policymakers have increasingly focused on the risks associated with CRE loans in recent times.

Disruptions in the CRE sector, however, are generally believed to primarily affect smaller banks. Figure 1 illustrates, using data from Federal Deposit Insurance Corporation (FDIC) Call Reports, the on-balance sheet exposure in the form of CRE loans as a proportion of total equity over the past decade for three types of banks: community banks (assets under $10 billion), regional banks (assets between $10 billion and $100 billion), and large banks (assets exceeding $100 billion).[3] The exposure of regional and community banks is approximately 4 and 5 times greater, respectively, than that of large banks. As per this exposure measure, there has been a notable increase over the past decade in CRE loan exposure among regional and, especially, community banks, but not among large

[1] Source - Green Street Commercial Property Price Index https://www.greenstreet.com/insights/CPPI

[2] https://www.reit.com/data-research/research/nareit-research/estimating-size-commercial-real-estate-market-us-2021

[3] To measure banks' direct CRE exposure, we obtain "CRE loans" by summing up call report items Construction 1-4 Family *(BHCKF158)*, Construction: Other/ Land *(BHCKF159)*, Multifamily RE (*BHCK1460*), Nonowner occupied CRE (*BHCKF161*), and Loans to finance CRE (*BHCK2746*).

banks, with CRE loans to equity in 2023Q1 at 189% of equity for regional banks, 270% for community banks, but only 45% for large banks.

In this paper, we contend that it is important to focus not just on this *direct* CRE exposure of banks but also on the provision of liquidity by banks to NBFIs such as CRE REITs in order to get a complete picture of bank exposure to CRE risks. Once the *indirect* exposure of banks via credit lines is accounted for, CRE exposures are concentrated not only in the portfolios of smaller banks but also among the largest U.S. banks. In particular, as credit lines can be drawn intensively by CRE REITs in times of aggregate stress, collateral damage to the largest banks from such drawdowns implies that systemic risk arising from CRE exposures is likely to be considerably greater than implied by direct CRE exposure of banks.

Let us elaborate. REITs are investment entities that typically purchase physical properties (these are equity REITs, which constitute over 90% of the market) or invest in mortgage-backed securities (mREITs).[4] The overwhelming majority of investments by REITs is in commercial real estate. Figure 2 illustrates that including *indirect* exposure to REITs substantially increases the CRE exposure of large banks. In Panel A of Figure 2, we categorize bank exposure into direct CRE exposure, indirect exposure via term loans to REITs, and indirect exposure through credit lines to REITs.[5] For large banks, indirect exposure constitutes about a third of their total exposure, whereas for regional banks, the indirect exposure through REITs is considerably smaller, and for community banks, it is negligible.

Panel B of Figure 2 compares the exposure of each bank group to CRE markets over the last 10 years, contrasting direct CRE loans (left-hand side) with total exposure that includes the indirect components from REITs (right-hand side). This panel demonstrates that for the largest banks in the US, although CRE exposure has been consistently increasing in absolute terms (left-hand side), the total exposure (right-hand side) has expanded even more significantly, widening the dollar gap between large and smaller banks. The

[4]A comprehensive discussion on the institutional details of REITs can be found in section 2.1.
[5]Data as of 2022Q4. Details on the construction of these variables are provided in Section 2.3.

marked increase observed on the right-hand side of the panel is primarily due to a rise in both term loans and credit lines issued by large banks to REITs, particularly after 2020. Therefore, to fully understand the implications of stress in the CRE market on banks and their potential systemic impact, it is crucial to consider the indirect exposure of banks via their credit line exposure to CRE REITs.

Importantly, a significant portion of banks' exposure to REITs involves credit lines - approximately 50% for the largest 50 banks. Banks record term loan exposures on their balance sheet, fund them with capital, and manage potential risks through loan loss provisions. The business of credit lines, on the other hand, is off-balance sheet, and funded with equity capital to a much lesser extent until drawn down. Furthermore, the potential for correlated drawdowns by borrowers during periods of widespread market stress can create sudden encumbrance of bank capital and/or liquidity leading to a diminished capacity for intermediation (as noted respectively in Acharya, Engle, Jager, and Steffen (forthcoming) and Acharya and Mora (2015)), increased reliance on deposits (see, for example, Ippolito, Peydró, Polo, and Sette (2016)), a contraction in the supply of credit and a decline in bank stock returns (Kapan and Minoiu (2021), Acharya et al. (forthcoming), Chodorow-Reich, Darmouni, Luck, and Plosser (2022), and Greenwald, Krainer, and Paul (2023)).

While total credit line commitments of banks have broadly grown along with their balance-sheet lending, credit lines to REITs have grown at a much faster rate than credit lines to other borrowers.[6] Importantly, credit lines to REITs behave differently from typical bank credit lines, and this can have a significant impact on bank balance sheets during periods of stress. In particular, we document that while the average utilization rate for non-financial borrowers is around 22% between 2010 and 2023, this rate is higher at 30% for REITs.[7] A further breakdown of the sample by credit rating reveals that REITs consistently have higher drawdown rates compared to non-financial borrowers across all

[6]According to our calculations based on the LoanConnector dataset, the growth rate of non-REIT credit lines between 2012 and 2022 was 28.5%, while the growth rate over the same period for REIT credit lines was around 86%.

[7]Utilization rates represent the percentage of credit lines drawn down relative to the total amount of credit lines provided by banks.

rating levels. In our regression models, we adjust for time-varying firm-level characteristics, time fixed effects, and crucially, rating fixed effects, to ensure the robustness of these findings. We further establish that during periods of aggregate stress (e.g., the Global Financial Crisis from 2007Q3 to 2009Q2, and COVID-19 outbreak in 2020Q1), while all borrowers tend to increase their drawdowns, the surge is particularly pronounced for REITs. In addition, REIT drawdowns display greater sensitivity to idiosyncratic stress, as indicated by returns of sector-specific stock market indices (e.g., REIT subsector-specific conditions).[8]

Why do REITs draw down on credit lines at higher rates? We use local projection frameworks (Jordà (2005)) around drawdown events to answer this question. We document that REITs increase investments and dividend payouts and reduce cash, on average, in the four quarters after a drawdown. This seems to indicate that they use both their cash and the liquidity from credit lines to acquire properties and pay out dividends. When interacting the drawdown with a crisis dummy, we see that while REITs continue to increase investments, i.e. acquire properties, and pay dividends in bad times, they also start building up cash buffers.[9] Moreover, we provide a case study of the Blackstone REIT, one of the largest REITs in the US which holds assets of more than 100 billion USD. This REIT was faced with large redemption requests starting in 2022 forcing it to increase both the credit line commitments available from banks but also the drawdowns from those credit lines to service the redemptions. We then generalize the example of these redemptions to drawdown dynamics in a regression framework for all the REITs in our sample.[10]

What impact does the more intensive utilization of credit lines by REITs have on

[8]We classify REITs into one of 9 sub-groups - Health Care, Industrial, Lodging/Resorts, Mortgage, Office, Residential, Retail, Diversified, or Commercial- Other to estimate sub-sector specific conditions.

[9]By regulation, REITs are required to pay out at least 90% of their income in the form of dividends, restricting the amount of cash REITs can accumulate. This restriction by the Internal Revenue Service (IRS) and the Securities and Exchange Commission (SEC) enables REITs to receive special tax treatment, whereby unlike a typical corporation, REITs pay no corporate taxes on earnings paid out.

[10]In another recent example, Starwood REIT has experienced significant redemptions (see, Financial Times article on May 16, 2024 - https://www.ft.com/content/1b0ce791-e387-4ea4-852a-14d59b3ced1f).

banks and the aggregate economy? To investigate this, we isolate the relevance of REIT exposures on bank stock returns by categorizing our bank sample in each quarter based on four criteria: whether they have above-median total credit line commitments relative to their balance sheet size, whether their commitments to REIT credit lines are above-median, whether their commitments to REIT term loans are above-median, and whether their direct CRE exposure is above-median.

Our analysis demonstrates that banks with above-median REIT credit line commitments generally experience lower stock returns during crises. When we introduce the variable of above-median general credit line commitments, which in itself is also a significant predictor of lower crisis performance, the coefficient on the REIT credit exposure remains basically unaffected. When we add above-median REIT term loan exposure, we find that term loan exposures to REITs are not significant in explaining bank stock return dynamics nor do they affect the coefficient of above-median REIT credit line exposure. In contrast, direct CRE exposure is a predictor of crises performance for banks that is both statistically and economically significant (consistent with Cole and White (2012)) but leaves, once again, the importance of credit line exposure to REITs unaffected.

This pattern suggests that credit lines extended to REITs present a downside risk to bank stock returns. Notably, this risk does not appear to be compensated by higher returns in stable times. Hence, we apply an existing methodology to assess a bank's systemic risk and demonstrate how to factor in (REIT) credit lines. In particular, we apply an updated version of the augmented *SRISK* methodology from Acharya et al. (forthcoming) to assess how incorporating commitments to REIT credit lines influences the capital requirements for banks in stress test scenarios. We perform a comparative analysis between two incremental *SRISK* calculations: one treating all credit line borrowers as a homogeneous group, and another distinguishing REITs as a unique borrower category with distinct drawdown characteristics. This differentiation is based on the elevated level and sensitivity to stress observed in REITs' drawdown behavior as well as the large negative impact of these drawdowns on bank stock prices in crisis times. We find that the required capital for publicly traded US banks as a whole rises by around 64%, from USD 54 billion

to USD 89 billion, primarily because of the revaluation of bank stock prices from stress-time REIT drawdowns. This significant difference underscores the systemic implications of banks providing credit lines to NBFIs, particularly REITs.

Finally, we do not find evidence that banks price in credit line fees the risk of more intensive utilization by REITs. On the contrary, in regressions analyzing the all-in-spread-drawn on credit lines, REITs pay *less* than non-financial borrowers even after accounting for loan characteristics, firm-level factors including credit ratings, and crucially, lender $\times$ time fixed effects, i.e., we are comparing borrowers with the same rating receiving commitments from the same bank within the same quarter. We also control for contract terms such as maturity, loan volume, or the existence of financial covenants.[11]

In summary, bank credit lines to REITs can contribute meaningfully to the systemic risk of the financial sector. The drawdowns from these commitments substantially weaken banks, with the markets failing to offer a commensurate reward or banks charging adequately in credit line fees. In light of the turmoil in the commercial real estate sector post-COVID and post rate hikes, and given the insufficient focus on the indirect exposures of banks to CRE going through (credit lines) to REITs, the systemic risk implications of bank credit lines to NBFIs are worthy of careful regulatory scrutiny.[12].

1.1 Related Literature

Our study links to three main strands of literature. First, the importance of the credit line business for banks and their performance. Second, the link between banks and non-banks and its systemic implications. Third, the literature on (recent as well as historic) CRE stress episodes and their effect on banks.

The provision of liquidity by banks through credit lines is commonly perceived as the asset-side counterpart to their deposit-taking operations if credit line and deposit

[11] According to established literature on credit line pricing (refer to Berg, Saunders, and Steffen (2016)), these borrowers should be paying *more*, not less. Furthermore, regulatory frameworks such as the Liquidity Coverage Ratio (LCR) and minimum capital requirements already categorize financial borrowers as more costly, thereby implicitly increasing the costs banks incur in providing these credit commitments. However, there is no separate treatment for credit lines to REITs, to the best of our knowledge.

[12] See Acharya, Cetorelli, and Tuckman (2024) for a set of policy recommendations

drawdowns are not highly correlated (Kashyap, Rajan, and Stein (2002)), or if depositors perceive banks to have implicit or explicit backstops (Gatev and Strahan (2006)). However, the business of credit lines can also present a substantial risk for banks due to the potential for correlated drawdowns by borrowers during periods of widespread market stress and affect financial intermediation (Acharya and Mora, 2015; Ippolito, Peydró, Polo, and Sette, 2016; Kapan and Minoiu, 2021; Chodorow-Reich, Darmouni, Luck, and Plosser, 2022; Acharya, Engle, Jager, and Steffen, forthcoming). Acharya, Almeida, and Campello (2013), Berg et al. (2016), and Berg, Saunders, Steffen, and Streitz (2017) provide empirical evidence on how banks deal with these risks in pricing the credit lines they offer to their borrowers. We contribute to these findings by showing that the credit line exposure to REITs is particularly risky for banks as REITs have elevated drawdown levels and cyclicality which translates into additional strain on banks' stock prices and balance sheets in periods of stress. We also document that this elevated risk of REIT credit lines does not seem to be priced by banks.

Second, we relate to the literature on linkages between banks and nonbank financial intermediaries (NBFIs). There is a growing literature documenting the impact of increased post-global financial crisis regulation on substitution from banks to nonbanks in mortgage lending (Buchak, Matvos, Piskorski, and Seru (2018), large corporate lending (Fleckenstein, Gopal, Gutierrez, and Hillenbrand (2023)), middle market lending (Chernenko, Erel, and Prilmeier (2022)), and small business lending (Gopal and Schnabl (2022)). This growth in NBFI market share, however, has come, in part, due to the availability of bank financing, particularly in the form of liquidity insurance. Acharya et al. (2024) show that there are sizeable funding relationships between unaffiliated banks and NBFIs, particularly through credit lines. Jacewitz, Unal, and Wu (2021) show that bank holding companies (BHCs) extend shadow insurance to the money market funds, affecting their expense ratios, and Cetorelli and Prazad (2024) explain the coexistence of commercial banks and NBFIs within BHCs partially through synergies related to liquidity management. Finally, Caglio, Copeland, and Martin (2021) show that access to liquidity through bank holding companies significantly improves broker-dealer performance in the financial crisis. Our

paper documents additional linkages between banks and NBFIs (in, particular, REITs) but focuses on how these linkages can transfer shocks to the CRE sector via NBFIs back to the bank balance sheets, particularly for the largest banks in the economy.

Regarding REITs and risks originating in the CRE sector, there are two relevant sub-strands of literature to consider. The first links real estate exposure to bank risk. Mei and Saunders (1995) document how investment in real estate affects ex-ante risk pricing in bank stocks. Cole and White (2012) show that exposure to commercial real estate is a persistent predictor of bank failure across several crises episodes – a finding confirmed by Altunbas, Manganelli, and Marques-Ibanez (2017). We contribute by showing how indirect exposure of banks to the CRE market, through off-balance sheet credit line exposures to REITs, is an additional risk factor for banks, on top of their direct CRE exposure. Furthermore, in light of recent developments such as work-from-home and rising interest rates, several papers have analyzed the effects on CRE. Gupta, Mittal, and Van Nieuwerburgh (2022) demonstrate how work-from-home policies have caused a massive reduction in office real estate valuations. Jiang, Matvos, Piskorski, and Seru (2023) show how the rising interest rate environment hits banks' balance sheet through their CRE exposure, resulting in severe solvency risk for a large number of smaller banks. Glancy, Kurtzman, Loewenstein, and Nichols (2023) highlight, in contrast, the importance of recourse in structuring CRE loans and the improved resilience it rewards in crisis times.

Our paper adds an important dimension to this debate, which is that indirect exposure to the CRE market through REITs is a crucial element in understanding bank risk, especially for large banks that specialize in credit line provision to NBFIs (including REITs). Importantly, it is a risk that is not easily managed by banks as drawdowns and repayments are at the discretion of borrowers, not banks, and can exaggerate banks' cyclical risks.

2 Institutional Background and Data

2.1 Institutional Background

Our paper focuses on the growth of credit lines from banks to nonbank financial institutions (NBFIs), in particular REITs. NBFIs rely primarily on their bank credit lines to meet their liquidity needs arising from uncertain timing of credit origination, meeting funding or rollover risks, and posting margins on derivatives positions, among others (see Acharya et al. (2024) for a discussion). Over the last decade, banks have significantly increased their overall commitments to NBFIs. In 2010, NBFIs constituted 25% of bank credit commitments. This share has since risen consistently, reaching roughly 33% in 2022. Among the financial institutions, REITs are the largest category by size of credit line commitments. On average, between 2010 and 2022, 22% of all commitments to financial institutions were to REITs, and REITs made up 6.75% of total credit line commitments in 2022. Commitments to REITs have increased cumulatively by about 30% over the last 10 years.

Background on REITs - REITs, or real estate investment trusts, are companies that own or finance real estate. The properties they own comprise offices, apartment buildings, warehouses, retail centers, medical facilities, data centers, cell towers, infrastructure, and hotels. To qualify as a REIT, a company must invest at least 75% of its total assets in real estate and derive at least 75% of its gross income from rents from real property, interest on mortgages financing real property, or from sales of real estate. As of 2023, REITs of all types collectively own more than $4 trillion in gross assets across the U.S., with public REITs owning approximately $2.5 trillion in assets, and U.S. listed REITs having an equity market capitalization of more than $1.3 trillion (Source: National Association of Real Estate Investment Trusts (Nareit)).

There are two main types of REITs – Equity REITs and mREITs (or mortgage REITs). The majority of REITs are publicly traded equity REITs. Income for REITs comes from either leasing out or renting space they own. mREITs provide financing for income-

producing real estate by purchasing or originating mortgages and mortgage-backed securities and earning income from the interest on investments. Over 90% of REIT assets are in equity REITs. Consumers can purchase individual REIT stocks or REIT exchange traded funds (ETFs). REITs are not typically taxed at the entity level, which allows investors to avoid double taxation on dividends. In return, REITs are required by the IRS and SEC to pay out at least 90% of their income in the form of dividends.[13]

2.2 Data and Summary Statistics

To understand the impact of bank credit line commitments to REITs, we combine data from several sources. First, we collect quarterly borrower-level information for financial and non-financial borrowers from CapitalIQ as well as Compustat covering credit line commitments and usage, balance sheet as well as performance metrics. Second, we collect quarterly lender-level information from FR Y-9C filings to the FDIC ('Call Reports') covering balance sheet and performance metrics at the bank holding company (BHC) level. Third, we collect data on the issuance of syndicated loans from Refinitiv Loan Connector (formerly Dealscan). We match these loans to our lender and borrower-level information. Fourth, we obtain stock prices for all borrowers and banks in our sample, as well as the S&P 500 from CRSP. Lastly, we obtain the VIX from WRDS and a REIT index from the National Association of Real Estate Investment Trusts (Nareit).

Panel A of Table 1 gives an overview of the size, capital structure, and rating quality of different borrowers. The comparison shows that NBFIs are, on average, larger than non-financial firms. A greater share of REITs has credit ratings, but REITs have higher leverage, maintain less liquidity relative to assets, have longer debt maturities and are, on average, worse rated. REITs and non-financial firms, however, have similar credit quality

[13]The original REIT legislation, enacted in 1960, was intended to provide a tax-favored vehicle through which individuals could invest in a professionally managed portfolio of real property. Per SEC regulations, *"To qualify as a REIT, a company must have the bulk of its assets and income connected to real estate investment and must distribute at least 90 percent of its taxable income to shareholders annually in the form of dividends. A company that qualifies as a REIT is allowed to deduct from its corporate taxable income all of the dividends that it pays out to its shareholders. Because of this special tax treatment, most REITs pay out at least 100 percent of their taxable income to their shareholders and, therefore, owe no corporate tax."*. Source - https://www.sec.gov/files/reits.pdf

on average.

Panel B of Table 1 shows descriptive statistics for credit line characteristics after matching the loan-level data set with the bank and borrower-level information. On average, NBFIs including REITs have much larger credit lines than non-financial firms, but have a lower spread on their credit lines as well as a somewhat shorter maturity. Covenants, however, are more likely to occur in credit lines to NBFIs. Especially financial covenants, such as maximum leverage ratios and maximum debt to cashflow ratios, occur more often for REITs.

2.3 Total CRE exposure

To measure a bank's *total* CRE exposure, we add up *direct* exposure through commercial mortgages, *indirect* exposure through term loan exposure to REITs, and *indirect* exposure through credit line exposure to REITs.

We obtain direct exposure from the sum of call report items Construction 1-4 Family *(BHCKF158)*, Construction: Other/Land *(BHCKF159)*, Loans secured by owner- occupied nonfarm nonresidential propertie (*BHCKF160*), Loans secured by other nonfarm nonresidential properties (*BHCKF161*), and Loans to finance CRE (*BHCK2746*).

To get the REIT term loan exposure of a given bank we multiply the bank's sum of total C&I loans (*BHCK1763, BHCK1764, BHCKKX56*) and loans to financial institutions (*BHCKJ454, BHCK1292, BHCK1296*) from Call Reports with an estimated REIT share of term loans for the bank. We need to do this estimation as FDIC Call Reports do not separately record term loans (or credit lines) to REITs. The REIT share is estimated by dividing, within all term loans reported in Dealscan, the volume of a bank's loan exposures to REITs by the volume of a bank's total loan exposures.

We then repeat the exercise for credit lines. We take a bank's sum of off-balance sheet commitments in the C&I market (*BHCKJ457*) and to other financial institutions (*BHCKJ458*) and multiply it with an estimated REIT share of credit lines for the bank to obtain each bank's REIT credit line exposure. The REIT share is again estimated by

dividing a bank's volume of REIT credit lines by a bank's volume of total credit lines as reported in Dealscan.

3 Firm drawdown behavior

We documented in Figure 2 that large US banks have sizeable exposures to REITs in the form of term loans and credit lines. In this section, we focus on credit lines and discuss to what extent these exposures can be expected to put a strain on bank balance sheets. For this purpose, we analyze the drawdown behavior of REITs, both on average and under stress, relative to other borrowers. Throughout the paper, we use credit line utilization to refer to the level of credit line drawdown as a share of credit lime commitment.

3.1 Average utilization levels

We first compare the drawdown behavior over time in graphical form. Figure 5 (Appendix Figure A6) depicts the average (median) utilization rates from 2010Q1 to 2022Q4 by company type. There is a large and persistent gap over time with REITs utilizing between 5 and 15 percentage points (ppt) more than non-financial companies, with the gap largest during the COVID-19 outbreak in 2020Q1. Moreover, the utilization rate of REITs appears more volatile than that other borrowers, suggesting that the utilization of credit lines by REITs is very sensitive to market conditions.

These average differences are stark but mask significant heterogeneity across credit ratings. In Panel A of Table 2 we show the average utilization rates for three groups of borrowers – non-financial corporations, REITs, non-REIT financial corporations – as well as split by four different rating categories within the group: all A-rated, BBB-rated, non-investment grade, and unrated borrowers. It is apparent that for all rating categories except unrated, financial corporations draw down significantly more than non-financial borrowers. Only in the unrated group, non-financial borrowers have higher drawdowns. The distinct nature of REITs comes to the fore again in this table. In all categories,

including the unrated one, REITs draw down more than non-financial corporations, and in all rating groups but the best one, REITs draw down more than other financial borrowers by a significant margin.

In Panel B of Table 2, we further split credit line utilization behavior across crisis and normal times. As expected, all firms utilized credit lines more during the GFC (2007Q3-2009Q2) and the COVID-19 (2020Q1) crisis relative to their normal credit line utilization rate. However, the differential is significantly higher for REITs. Taking COVID-19 as an example, we see that A-rated REITS increased their utilization by 17.1 ppt relative to their normal utilization rate compared to an 8.1 ppt increase for non-financial firms. BBB-rated and non-IG REITs increased utilization by 23.9 ppt and 30.8 ppt respectively compared to an increase of 9.5 ppt and 21.4 ppt for non-financial firms during the same period. Overall, it appears that REITs have a higher average utilization rate, and this utilization increases to a much larger extent during crises or stress episodes.

To rule out that these differences in utilization rates are driven by differences in firm characteristics, we move to a regression analysis of utilization rates. We run the following regression:

$$Utilization_{it} = \beta REIT_i + \alpha_t + \alpha_c + \zeta X_{it} + \epsilon_{it}, \tag{1}$$

where α_t is a time fixed effect, α_c is a rating fixed effect either at the rating-notch or rating-group level (all As, BBB, non-IG, unrated), X_{it} is a vector of firm controls (log of total assets, firm leverage (debt to equity), liquidity (measured as cash minus short term debt) over assets, short-term debt ratio (measured as short term over total debt), and new debt issuance to assets. *REIT* takes a value of one for REITs and zero for all other financial and non-financial firms. The standard errors are clustered at the firm level.

The results are shown in Panel A of Table 3. Column (1) runs a simplified version of specification 1 without fixed effects and controls. It is the analytical counterpart to Figure 5. REITs, on average have a utilization rate that is 7.6 percentage points higher than non-financial companies. When controlling for rating-notch fixed effects and firm controls

this difference grows to 8.1 percentage points in Column (2), a point estimate that is not affected by adding time effects in Column (3) or replacing the rating-notch fixed effects by rating-group fixed effects in Column (4). Restricting the sample to the years 2010–2019 to remove the GFC and the Covid-19 episode in Column (5), increases the point estimate to 9.5 percentage points.

In Panel B, we demonstrate this difference across REITs and other borrowers in utilization rates is not driven by higher average utilization of financial firms. In fact, on average, financial firms (apart from REITs) have a lower utilization rate compared to non-financial borrowers. REITs, on the other hand, have a significantly higher utilization rate when compared to non-financial borrowers.

We also study whether the differences in capital structure of REITs relative to other borrowers are driving their credit line utilization patterns. In Table 4, in addition to controlling for leverage, cash levels, short term debt, and new debt issuance, we interact an indicator for REIT with these variables to see if REITs respond differentially to changes in capital structure. We do not find a significant difference, except increases in short-term debt of REITs are correlated with higher utilization rates.

3.2 Cyclicality of utilization

In addition to the permanently elevated levels, Figure 5 and Table 2 also hint at a greater cyclicality or stress-sensitivity of the credit-line utilization of REITs. To formally test the relationship between credit line utilization and market conditions, we estimate the following regressions:

$$\begin{aligned} Utilization_{it} =& \beta \text{REIT}_i + \gamma \text{REIT}_i \times \text{Market Conditions}_{it} + \delta \text{Market Conditions}_{it} \\ &+ \alpha_t + \alpha_c + \zeta X_{it} + \epsilon_{it}, \end{aligned} \tag{2}$$

for firm i in quarter t where REIT takes a value of one for REITs and zero otherwise. Market Conditions are measured by aggregate stock market returns (S&P 500), market volatility (VIX), or stock market performance of comparable firms (Sub-sector return).

The sub-sector return is constructed as a market capitalization-weighted average of public firms in our sample belonging to the same 2-digit SIC for non-REITs; for REITs, we construct the market capitalization-weighted index using a REIT subsector classification. REITs are classified into one of 9 sub-groups: Health Care, Industrial, Lodging/Resorts, Mortgage, Office, Residential, Retail, Diversified, or Commercial-Other. In calculating the sub-sector return, we perform a "leave-one-out" estimate, excluding the firm from its own sub-sector return calculation to prevent any mechanical correlation.

We split REITs into multiple sub-categories as there is a significant amount of heterogeneity in stock market performance within REITs. Specifically, some REITs have seen large growth and market appreciation in recent years (for example, industrial REITs), while others have struggled (a prime example being office REITs post-COVID). Figure 6 plots the performance of all the REIT subsectors during the Covid-19 episode. Here, the under-performance of office REITs (e.g., a drop of 43% from 2021Q4 to 2022Q4) stands out relative to the out-performance of Residential mREITs (e.g., an increase of 124% from 2021Q4 to 2022Q4). Appendix Figure A7 zooms out to study the average stock market performance of the different REIT subgroups over a longer time period from 2005Q1 to 2023Q2.

The results of estimating the specification in Equation 2 are shown in Table 5. Column (1) shows that the sensitivity of REITs to market conditions is much stronger than the sensitivity of non-REITs. A one standard deviation decrease in S&P 500 leads to a 1.54 ppt additional increase in credit line utilization for REITs. In Column (2), we test whether the effect is symmetric across positive and negative market news. Interestingly, we see that REITs only respond to negative market news by increasing their utilization.

Column (3) shows that a one standard deviation increase in VIX leads to an additional 1.99 ppt increase in the utilization of REITs. In Column (4), we see that in crisis times (2007 Q3 to 2009 Q2 for GFC and 2020 Q1 for COVID-19), REITs increase utilization, on average, 4.5 ppt more than other borrowers. In Column (5), in addition to the market returns, we add controls for each firm's own sector performance. We see that the increase in utilization is driven in equal amounts by the firm's own sector performance and aggre-

gate market conditions. One might be concerned that we are picking up general market stress conditions, that is worse sector performance is actually driven by worse aggregate market conditions (see Figure A8). To account for this, when we calculate the sub-sector return, we orthogonalized each sub-sector return with respect to S&P 500, and only include the residual (unexplained) portion of sub-sector return along with aggregate market conditions.

Finally, to compare whether utilization is driven by firm earnings (indicated by worse sub-sector returns) or by financial frictions, in Column (6) and (7), we study how credit supply affects borrower utilization. We measure aggregate credit supply conditions using either the Excess Bond Premium (EBP. see Gilchrist and Zakrajšek (2012)) or the Excess Loan Premium (ELP, see Saunders, Spina, Steffen, and Streitz (Forthcoming)). We see that, in fact, aggregate credit supply does not alter REITs utilization. This suggests that earnings-based constraints have a larger impact on REIT utilization rates. Appendix Table A3 shows that these patterns are similar if we separate non-financial borrowers from non-REIT financial borrowers.

Finally, Figure 7 shows how credit line utilization varies by stock market performance in various quarters in our sample. This figure summarizes our main findings - a) REITs have, on average, a higher utilization rate; b) REITs are more sensitive to market conditions having a slightly steeper slope at -0.259 compared to non-financial firms with a slope of -0.158, and nearly flat relationship between stock market performance and utilization for financial firms once we exclude REITs. Figure 7 also shows the stark contrast in utilization rates across the two groups during the COVID-19 crisis. REITs had a nearly 50% average utilization rate, while non-financial firms utilized about 20% of their credit lines, and financial firms after excluding REITs were even lower at around 12%.

Taken together, REITs, compared to other firms, have permanently higher levels of credit line drawdowns and are more sensitive to worsening sectoral and aggregate market conditions. In light of the turmoil in the CRE market we have observed since COVID-19 and especially since rate hikes in 2022, this sensitivity could potentially have a high impact on banks' balance sheets.

4 Economics of REIT Drawdowns

We finalize our analysis of REITs with three ancillary inquiries that enrich our understanding of bank credit line provision to REITs and what drives their usage and risks.

4.1 Reasons for Drawdowns - Redemptions

What should we expect to be the reaction of REIT investors, if they observe a further deterioration of REITs' performance? And how will this affect banks that lend to REITs? We shed light on this question using the recent redemption run on Blackstone REIT (BREIT) in 2022 and Starwood REIT in May 2024 as brief case studies.

BREIT is one of the largest REITs which was founded in 2017 and holds assets in excess of 100 billion USD. Starting in 2022, spurred by rising interest rates and investors' waning trust in a continued strong performance of real estate investments, BREIT was hit with large redemption requests, especially from Asian investors. As BREIT is not publicly traded, it reserved the right to limit redemptions at 2% of the net asset value (NAV) per month.[14] Starting November 2022, BREIT was making use of this right and curbed redemptions for the following sixteen months. To generate sufficient liquidity for these redemptions, BREIT was forward-looking and negotiated an increase in the volume of committed credit from roughly 7.5 billion USD in 2022Q2 to 12 billion USD in 2022Q4 with Citigroup being the main financier and Bank of America, Deutsche Bank and Wells Fargo being involved in the syndicate. Interestingly, the credit spread that was charged for these additional commitments did not differ from previously arranged credit lines to BREIT by the same banks despite the obviously increased credit and drawdown risks.[15] We will get back to this pricing evidence in a more systematic fashion in Section 5.2. On top of acquiring higher commitments, BREIT increased the volume of credit that they

[14] See, for example, https://www.wsj.com/articles/blackstone-limits-redemptions-from-real-estate-vehicle-stock-sinks-11669920880

[15] Source - 10Q filings of BREIT (https://www.breit.com/stockholders/). BREIT has three forms of credit lines - unsecured credit lines increased from $3.7 billion to $5.6 billion between June and December 2022 with spreads remaining 250 bps over SOFR. Furthermore, their secured credit lines and warehouse lines of credit increased from $3.75 billion to $6.3 billion in the same period, with spreads only changing by 2bps from 175 bps to 177 bps over LIBOR.

drew down from those commitments from 1.1 billion USD in 2022Q1, over 3.8 in 2022Q2 and 5 billion USD in 2022Q3, to 6.3 billion USD in 2022Q4.[16]

Similarly, SREIT, a nontraded trust managed by Starwood Capital with $25 billion in assets was hit with $1.3 billion in withdrawal requests in the first quarter of 2024. SREIT limited redemptions to 0.33% of net assets a month, down from the 2% it had allowed since inception, satisfying less than $500 million of their redemption requests in early 2024.[17] At the same time, SREIT's new fundraising had dwindled to about $15 million a month, down from more than $600 million a month in the first half of 2022. Overall, their liquidity continued dropping, from $2.2 billion at the end of 2022 to $1.1 billion at the end of 2023 and $752 million as of April 2024. To tackle these issues, SREIT relied on its line of credit. In May 2022, SREIT increased the borrowing capacity on a $450 million credit line to $1.55 billion by adding new banks to the contract, at SOFR + 2.5%. SREIT entered 2023 without having tapped its $1.55 billion credit line, but by May 2024, SREIT only had about $225 million of undrawn commitment left to utilize.[18]

This shows how redemptions of fund shares can impact the drawdown behaviour of REITs on bank credit lines. In fact, since public REITs do not have access to using the redemption limit, one would expect the implications for drawdowns to be even stronger. To test this hypothesis in our data, we estimate the following regression:

$$\Delta Drawn\ CL\ Volume_{i,t} = \beta \Delta Book\ Equity_{i,t} + \alpha_t + \alpha_i + \epsilon_{i,t}, \tag{3}$$

where $\Delta Drawn\ CL\ Volume_{i,t}$ is the quarterly log growth in the utilized credit line volume for a REIT i in quarter t, $\Delta Book\ Equity_{i,t}$ is the quarterly log growth in shareholder's equity in a REIT where a positive number indicates further issuance while a negative number indicates redemptions or stock repurchases by the issuer, and $\alpha_{i/t}$ are REIT and

[16]To further secure the necessary cash, Blackstone negotiated a strategic partnership with the University of California. The university's investment fund provided 4 billion USD in cash for which BREIT promises an 11.25% return – a promise that is backstopped by 1 billion USD of BREIT shares.

[17]Source - Wall Street Journal, https://www.wsj.com/real-estate/commercial/starwood-capital-group-real-estate-fund-cash-crunch-409f56d5

[18]Soruce - SREIT 10Q Filings - https://www.starwoodnav.reit/sec-filings/filings-type/all/date/All/sort/DESC/page/1/

time fixed effect, respectively.

The results can be found in Table 6. Between Columns (1) and (4), the specifications get increasingly stricter by adding fixed effects and control variables. We see that the main coefficient of interest is largely unaffected by these changes and remains statistically significant. Moreover, the value is economically meaningful. For a one percent increase in redemptions, the REITs increase their drawdowns by 0.44 percent. In case of BREIT, as an example, the redemption requests grew by more than 100% in the fall of 2022 thus leading to a 44% increase in drawdowns according to our estimates. Given the baseline utilization level of REITs being already around 25-30%, this would equal a further 10-12 percentage points of utilization. Column 4 also shows that redemptions seem to be the main driver of credit line drawdowns by REITs, with other factors playing a limited role in their drawdown behavior.

Finally, while redemptions are a common concern for many types of funds, REIT drawdown behavior appears special. For example, open-end mutual funds and exchange-traded funds offer daily redemptions to investors. While nearly 50% of open-end funds have access to credit lines, on average only 20% of funds have a positive credit line utilization (Cai, Chuan, Henry, Shin, and Tuzun (2023)). At the start of COVID-19, many funds experienced heavy investor redemptions. Funds, in turn, increased their credit line utilization. However, the percentage of used credit lines increased from only 11% to 17%, significantly lower than the average non-crisis time utilization levels of REITs (Cai and Shin (2021)). The higher utilization of REITs is potentially linked to lower levels of liquidity on hand. Recall that due to the dividend payout restriction mentioned in Section 2.1 forcing REITs to pay out 90% of their income, they have almost no retained earnings to build up cash buffers. That is, credit lines more so than for other large publicly traded firms serve as a primary source of short-term liquidity for REITs.

Taken together, further stress in the CRE market could result in larger drawdowns with associated effects on banks documented in Sections 5 and 6.

4.2 How do REITs use Credit Lines?

For which purposes do REITs need cash? Hardin and Hill (2011) established in data up to 2009 that REITs do not use credit lines to pay out dividends. Instead, acquiring new properties which requires large sums of cash as well as hedging against worsening market conditions seemed to be the main motives. Moreover, we had found in Table 4, that the short-term debt ratio of REITs, as a measure of their rollover risk, seems to be linked to their credit line utilization. We investigate which of these four motives dominate by analyzing in a local projection framework, along the lines of Jordà (2005), the development of investments (i.e., properties), dividends per share, cash (i.e., precautionary savings), and short-term debt ratio around elevated drawdown activity of REITs. We further explore whether the drawdowns are independent of the market conditions that the REIT is facing. In other words, are REITs drawing on their credit lines for the same reasons in normal times and crisis times?

We estimate the following local projection framework with an interaction between drawdowns and a crisis dummy which captures the GFC and the Covid-19 episode, with the results reported in Table 7:

$$Y_{i,t+h} - Y_{i,t-1} = \alpha \text{Drawdown/Assets}_{i,t} + \beta \text{Drawdown/Assets}_{i,t} * \text{Crisis}_t + \alpha_t + \alpha_i + \epsilon_{i,t}, \tag{4}$$

where Y is either the natural logarithm of investments, the natural logarithm of total cash, dividends per share, or short-term debt ratio ; $\text{Drawdown/Assets}_{i,t}$ is the standardized change in the drawn dollar amount of firm i at time t scaled by previous quarter total assets; $Crisis_t$ takes a value of one during GFC and COVID-19; α_t is a time fixed effect; and, α_i is a firm fixed effect. h ranges from 0 to 4 to capture contemporaneous as well as forward-looking effects that may reflect the intended usage better.

Panel A of Table 7 shows that as soon as REITs draw down, their investments increase. Cash, however, as reported in Panel B falls as soon as there is a drawdown. That is, REITs use the liquidity from the credit line together with the cash they previously built up, to

acquire new properties. Panel C shows the results for dividend per share and indicates that, on average, drawdowns are also linked to higher dividend payouts. It appears in Panel D that REITs are also increasing their short-term debt contemporaneously. Thus, REITs seem to be increasing their borrowing through both additional short term debt as well as increased drawdowns on credit lines.

Furthermore, in Panel A we see that the crisis interaction is insignificant implying that REITs continue to acquire properties even in crisis times, as perhaps they try to make use of depressed prices and/or gamble for a resurrection of the economy. Second, and more importantly, in Panel B, we see that in crisis times, REITs hoard cash as the interaction coefficients are of opposite sign and significantly larger in size than the standalone coefficients. Therefore, while REITs acquire properties with drawdowns independent of market conditions, their precautionary savings motive only materializes in crisis times. In Panel C and D, we see that the interaction coefficient for dividends and short-term debt is insignificant, suggesting that REITs dividend payout and debt accumulation is not changing during crises. In light of the recent stress (especially 2022 onwards) on CRE markets it therefore seems that REITs likely have high incentives to draw down, either (i) to acquire cheap properties, (ii) to build a buffer against potential cash flow shocks or a further rising of interest rates which could worsen rollover conditions for their debt, or (iii) to pay out dividends due from pre-crisis profits. And this appears to happen in tandem with other borrowings.

5 Impact on Banks

We now turn to addressing how the elevated drawdown behavior of REITs affects the banks that lend to them. First, we look at the impact of high REIT drawdowns on bank stock returns.

5.1 Impact on Bank Stock Returns

It is not obvious that higher REIT drawdowns should lead to worse returns for banks. If banks are diversified in their credit line exposure, such that in periods when REITs draw down more, either their other borrowers reduce their drawdowns or if banks benefit from flight to quality of deposits, then such imperfect or negative correlation of drawdown incidence can help banks hedge their liquidity risk. We directly test this in the data.

For this purpose, we run the following regression

$$\begin{aligned} BankStockReturn_{it} = &\beta_1 \text{REIT CL Exposure}_i + \beta_2 Crisis_t + \\ &\beta_3 \text{REIT CL Exposure}_i \times Crisis_t + \\ &X_{it} + \epsilon_{it}, \end{aligned} \tag{5}$$

for bank i at time t where *REIT CL Exposure* measures the amount of credit lines committed to REITs, as used in Figure 2 and described in Section 2, scaled by total assets. $Crisis_t$ is one for the GFC and COVID-19 periods. X_{it} summarizes bank-level controls: 3-factor Fama-French, logarithm of total assets, capital-to-assets ratio, loans-to-assets ratio, income diversity, non-interest income, dummy for being a current primary dealer, derivatives-to-assets ratio, deposits-to-loans ratio, deposits-to-assets ratio, consumer loans-to-assets ratio, return on assets, and logarithm of the Z-score.[19]

Table 8 presents the results. Column (1) first estimates specification 5 with total credit line commitments of banks scaled by total assets as the main explanatory variable. There is a negative association with bank stock returns which amplifies in crises periods albeit this interaction term is not statistically significant. Column (2) then zooms into the credit line exposures to REITs, and highlights a highly statistically significant negative effect in crises periods. The effect is economically sizeable with one standard deviation of additional REIT CL exposure reducing bank stock returns by 1.46 percentage points. In stricter specifications (Columns 3 to 6), the effect stays quantitatively and qualitatively

[19]For the calculation of the bank-level Z-Score, see https://databank.worldbank.org/metadataglossary/global-financial-development/series/GFDD.SI.01

unaffected. In Column (3), we control for banks' overall credit line commitments and their interaction with the crisis indicator. In Column (4), we control for banks' exposure to REITs through the term loan market. It could be that exposure to REITs harms banks' stock return in crisis periods regardless of the channel of exposure being via term loans or via credit lines. This seems not to be the case, as the term loan exposure to REITs is no significant predictor of bank stock returns. In Column (5), we control for banks' on-balance sheet CRE exposure. It could be that high credit line exposure to REITs indicates that banks have a CRE-oriented business model via its direct CRE term loan exposure. While high CRE exposure pulls down the stock return significantly in times of crises (by 2.4 percentage points for each standard deviation increase of CRE exposure), again consistent with the result of Cole and White (2012) that CRE exposures help predict bank distress, the main coefficient of interest remains virtually unaffected. All of these results can be generalized to more continuous measures of market stress, such as the S&P 500 return or the VIX or to a setup where we split the banking sector into above and below median exposure banks (see Appendix Tables A4, A5, and A6). Moreover, Table A7 in the Appendix shows the results from adding a split into large banks (banks with more than $100 billion in assets) and other bank size categories. These results reveal that there is no differential effect of REIT credit line exposure between large and smaller banks in our sample. That is, even though extending credit lines to REITs is a business for larger banks only, once banks are engaging in it, there is no longer a size gradient in the effect on their stock return.

Overall, our results suggest that banks with higher exposure to REITs through their credit lines face higher drawdowns, particularly in crises. This, in turn, leads to worse bank stock performance which goes beyond the general aggregate drawdown risk on credit lines during that period. However, this risk does not seem to provide higher returns outside of crises as banks with more REIT exposure through credit lines do not, on average, have better stock performance.

To zoom in more closely on the crisis periods, we compare the stock market performance of banks with above or below-median exposure to REITs through credit lines during

the GFC and COVID-19 episodes separately, allowing coefficients in specification 5 to vary each quarter. Figure 8, which plots the coefficients on the interactions, shows that banks with an above-median exposure to REITs have worse stock performance in crisis episodes, though they also recover faster, perhaps as they were bigger beneficiaries of public and Fed backstop measures (especially in 2020 Q1). In terms of economic magnitude, banks with a high REIT credit line share experienced a 8 ppt lower return in the first quarter of 2020 (COVID-19), and a 20 ppt lower return (cumulatively) during the Global Financial Crisis (GFC).

5.2 Impact on Credit Line Pricing

Our results above suggest a higher drawdown risk from originating credit lines to REITs, and, hence, we would expect banks to price this into credit line fees. Thus, we now look at the pricing terms of credit lines issued to REITs. We focus on the all-in-drawn spread for each credit line facility, controlling for loan characteristics and borrower characteristics.

Table 9 presents the results. Column (1) shows that REITs have a 51 bps lower spread than non-financial firms on their credit lines. After adding controls for borrower rating (Column 2) as well as rating and lender-time fixed effects (Column 3), and loan controls (Column 4), there is still a significant difference in pricing – REITs, on average, pay 11.38 bps less for their credit lines compared to similar non-financial firms. Interacting loan-level controls in Column (5) with a REIT indicator enlarges the effect again to 33.37bps. Adding borrower characteristics in Column (6) – which reduces the sample by 30% – reduces the effect to 18.13bps. Cooperman, Duffie, Luck, Wang, and Yang (2023) show that borrowers are more likely to draw down on the credit line if it is linked to SOFR instead of LIBOR as this reference rate is not risk-sensitive thereby effectively lowering the cost in times of market stress. To control for the potential effect of this on banks' pricing decision, we add an indicator for whether the spread is linked to SOFR in Column (7) together with its interaction with the REIT indicator. The SOFR nor the interaction coefficient are statistically significant and there is no effect on our main coefficient of interest.

To find that REITs obtain cheaper credit lines is surprising given that REITs have consistently and systematically higher drawdowns than non-financial firms. That they are offered a discount makes banks' pricing behavior appear somewhat puzzling and not in line with findings from the previous literature (Berg et al. (2016)). One possibility is that banks include tighter covenants with lower fees in credit lines to REITs but prima facie this is at odds with our primary finding that REIT utilization is higher on average and elevated during market-wide and sectoral stress.

A further possible explanation is one stemming from regulatory forces. Table A6 in the Appendix summarizes the treatment of different exposure types – term loans vs. credit lines – to REITs vs. other borrower classes in the credit risk and liquidity risk regulation for banks. While REITs are more expensive in liquidity risk regulation (see also the discussion in Yankov (2020) about credit lines to NBFIs) they are cheaper than other borrower types for credit risk regulation. That is, because banks that use internal models to calculate risk weights for each borrower, utilize historical default data as inputs to their models.[20] These data indicate, over the last 40 years, a much lower average default rate for REITs and other non-bank financial borrowers (roughly 1%) than non-financial borrowers (roughly 2%). It is therefore likely that credit lines to REITs are associated with a lower regulatory capital charge, at least, partially explaining the cheaper pricing terms.

6 Systemic implications

Thus far we have established that banks' credit line exposures to REITs are large, that REITs' differential drawdown behavior poses a greater risk to banks than other credit line borrowers, and that this elevated risk of REIT credit line exposure affects banks' stock returns in crises. In this section, we ask quantitatively how systemic the nature of REIT exposures is for the largest publicly traded US banks individually and for the US banking

[20]See Behn, Haselmann, and Vig (2022) and Plosser and Santos (2018), who also show how banks that use internal models downward bias the risk they report to supervisors.

sector as a whole in terms of their capital shortfall under market-wide stress.

6.1 SRISK

Building on the work of Acharya, Engle, and Richardson (2012), Brownlees and Engle (2017) and Acharya et al. (forthcoming), we calculate the expected capital shortfall in a systemic crisis ($SRISK$) for banks. We first compute the $SRISK$ values using their methodology:

$$\begin{aligned} SRISK_{i,t} &= E[K(Debt + Equity) - Equity | Crisis] \\ &= KDebt_{i,t} - (1-K)(1 - LRMES_{i,t})Equity_{i,t} \end{aligned} \tag{6}$$

where $Debt_{i,t}$ is the nominal on-balance-sheet debt of bank i's liabilities, assumed to be constant between time t and Crisis time; $Equity_{i,t}$ is bank i's market value of equity at time t; $LRMES_{i,t}$ is the Long Run Marginal Expected Shortfall if bank i at time t, approximated in Acharya et al. (2012) as $1 - e^{-18 \cdot MES}$, where MES is the one-day loss expected in bank i's return if market return is below -2%; $Crisis$ is taken to be a scenario where the S&P 500 falls by 40% over the next six months; and K is an assumed required market-value of equity to quasi-market-assets capital ratio of 8%, where quasi-market-assets is the sum of book debt and market value of equity. Effectively, the market value of equity in a crisis is estimated as $(1 - LRMES_{i,t})Equity_{i,t}$ which is today's market value adjusted for stress-time loss.

To account for off-balance-sheet liabilities, and in particular the differential impact of credit line commitments to non-REIT borrowers and REIT borrowers, the necessary adjustments to $SRISK$ can be broken down into two components. First, off-balance-sheet (contingent) liabilities such as bank credit lines enter banks' balance sheets as loans once they are drawn and need to be funded with capital. Second, we also have to account for the effects of unexpected drawdown risk on stock returns conditional on stress as demonstrated

in our results in Section 5.1. For the first component, we add to *SRISK* in increment:

$$IncrementalSRISK_{i,t}^{CL} = K \times E[Utilization^{REIT}|Crisis] \times UnusedCommitments_{i,t}^{REIT}$$
$$+ K \times E[Utilization^{Non-REIT}|Crisis] \times UnusedCommitments_{i,t}^{Non-REIT} \quad (7)$$

This is the additional capital needed due to drawdown in crises periods. As documented in Section 3, these utilization rates differ significantly between REITs ($REIT$) and non-REIT companies ($Non-REIT$). Moreover, the respective utilization rates have to be multiplied by the commitments that bank i has to REIT or non-REIT borrowers. We estimate the REIT commitments by multiplying the overall outstanding commitments of bank i from the call report data with the share of REIT commitments in bank i's commitments reported in the Loan Connector database and analogously for non-REIT commitments. We use the estimate of the drawdown function obtained in Section 3.2 and impute a utilization rate for a return of the S&P 500 index of -40% to indicate a crisis period.

For the second component, we add to SRISK:

$$IncrementalSRISK_{i,t}^{LRMES^C} = (1-K) \times Equity_{i,t} \times$$
$$- 0.4 \times [\gamma^{REIT} \times REIT\ CL\ Share_{i,t} + \gamma^{Non-REIT} \times Non-REIT\ Commitments_{i,t}] \quad (8)$$

This is the additional equity market value loss due to high drawdowns in stress periods, again defined as a 40% decline in the S&P 500 index. γ^k is the estimated episodic effect of unused commitments to borrower type k on bank stock returns as in Section 5.1, i.e., the effect that is not built into MES that is estimated based on "small" (-2%) market shocks, for $k = REIT, Non-REIT$.

We estimate two versions of each of the incremental SRISK components: First, leveraging the heterogeneity in borrower composition (REITs vs. non-REITs) and, second, a simplified version, reminiscent of Acharya et al. (forthcoming), only taking into account

overall credit line commitments as a single category ignoring borrower types. The difference highlights the effect of more intensive credit line utilization by REITs. As a third exercise, we estimate the $IncrementalSRISK_{i,t}^{LRMES^C}$ stemming from CRE exposures by applying the analogous crisis episodic effect estimated in columns (5) of the tables presented in Section 5.1.

The results are summarized in Table 10 for data inputs as of 2022Q4. In Panel A we report the estimated parameters that are inputs for the formulae 7 and 8 above. For $E[Utilization^k|Crisis]$ we estimate a quarterly regression for the respective firm type of the utilization rate on the S&P 500 return (in the spirit of Figure 7) and predict the fitted value for a 40% market downturn. For γ^k, we take the coefficients from Table A4. For REITs, we find a $E[Utilization^k|Crisis]$ of 0.448 with the same number for non-REITs being 0.294. That is, in a downturn REITs' utilization rate is 15 percentage points higher than the one of non-REITs. When we lump all borrowers together the stressed utilization rate becomes 0.301, almost indistinguishable from the one of non-REITs. Regarding γ^k, we find that the stock market punishes banks for higher credit commitments to REITs by more than for overall credit commitments and/or CRE exposure. In Panel B we display the results when ignoring heterogeneity between REIT and non-REIT borrowers. In Panel C we show the results when considering heterogeneity, as in equations 7 and 8. Panels D and E then compare the effect from market revaluation between the exercise with no heterogeneity, the exercise with REIT heterogeneity, and the exercise with CRE exposure in absolute numbers and percent relative to baseline SRISK from VLab, respectively. Panel F then depicts a histogram of the incremental SRISK values stemming from the market revaluation effects.

Firstly, starting with Panel B, we see that taking into account off-balance sheet commitments without distinguishing between borrower types increases the expected capital shortfall by $7.2 billion for JP Morgan – the largest bank in our sample – and by $51 billion when adding up all of the publicly traded banks in our sample. Similarly, the off-balance sheet commitments result in a revaluation of JP Morgan's equity by $16.2 billion and $97.3 billion for the banking sector as a whole. In sum, JP Morgan therefore needs

an additional capital under market-wide stock market correction of 40% of $23.4 billion, and the banking sector an additional $148.3 billion, due to contingent off-balance sheet liabilities being drawn down and manifesting as on-balance sheet loans with attendant equity reduction effects.

How important is borrower heterogeneity (REIT vs. Non-REIT)? In Panel C, we take into account that REIT borrowers draw down at higher rates and that the market corrects bank stock valuations more strongly when they have exposure to REITs (as documented in Panel A and Section 5.1). That is, we estimate the SRISK components using equations (7) and (8). While the contingent capital is almost unaffected, the impact from market revaluation is substantially higher. For example, this impact is $27.7 billion for JP Morgan instead of $16.2 billion in Panel B.

Panel D then summarizes the market impact from Panels B and C as well as from CRE exposure in absolute values. Panel E provides the same comparison, relative to the baseline SRISK, in percent. Focusing on the percentage numbers in Panel E, we find that for all publicly traded banks in our sample, the market impact of overall credit line business is 21% of baseline SRISK, the market impact of considering REIT as their own borrower class is 38.7% of baseline SRISK and the market impact of CRE exposure is 5.2% of baseline SRISK. Those results produce two important insights. First, ignoring that REITs are special as credit line borrowers significantly underestimates systemic risk in the banking sector. Second, the credit line business, both in general and specifically with REIT borrowers, is several times more important than CRE exposure for large publicly traded banks that are part of the SRISK sample. The bank-level distribution depicted in Panel F underscores these findings.

7 Conclusion

Our paper sheds light on the implications of bank credit lines to non-bank financial intermediaries (NBFIs). Using real estate investment trusts (REITs) that invest in commercial real estate (CRE) as a leading example, we document that a big portion of large banks'

CRE exposure is through the provision of credit lines to REITs. Ignoring these exposures could lead to an underestimation of the risks in banks' portfolios, especially under stress. This notion generalizes to the provision of credit lines to other NBFIs, which exposes banks both to the risks of NBFI's idiosyncratic asset and liability choices as well as risks of systemic shortages of liquidity in the financial sector.

For REITs in particular, we document that they feature higher average credit line utilization rates than non-financial borrowers both in normal times and in times of systemic as well as sector-specific stress. We show how these higher drawdowns and the associated capital encumbrance for banks lead to a reduction in stock returns in crisis times for banks with higher credit line exposure to REITs. We incorporate these findings into calculations of expected capital shortfall under stress (SRISK) to quantify the systemic importance of extending credit lines to REITs. We find that ignoring the unique properties of REITs as a borrower class could underestimate the capital needed in the US banking system by a substantial 37%.

Finally, we provide evidence that banks do offer credit lines at cheaper rates to REITs than to other borrowers - at odds with intuition based on our findings of greater (idiosyncratic and systematic) drawdown risk on REIT credit lines compared to other bank borrowers. This calls for further research analyzing the complex structure of credit line contracts being issued to REITs and other NBFIs, e.g. along the lines of covenants and their state-contingent invocation. Moreover, the risks flowing back from the NBFI sector to the banking sector, in particular through the channel of contingent liquidity provision in the form of credit lines, also deserves further attention in terms of efficient policy responses to contain systemic risk implications.

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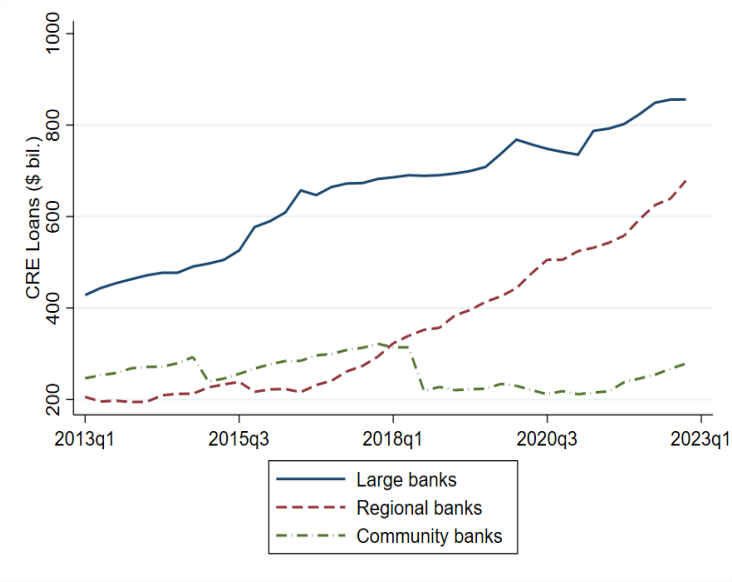
Figures

Figure 1: Commercial Real Estate (CRE) loans by bank types

This figure shows the total reported on-balance sheet exposure to the commercial real estate market (CRE, Panel A) and CRE exposure scaled by the total book value of equity of the bank (Panel B). Data is from the FR Y-C (FDIC Call Reports) at the quarterly frequency from 2013Q1 to 2023Q2. We split banks into three types: community banks (assets $<$ 10$ billion), regional banks (assets between 10$ and 100$ billion), and large banks (assets over 100$ billion).

Panel A - Total CRE Exposure - by Bank Size



Panel B - CRE Exposure Scaled By Equity - by Bank Size

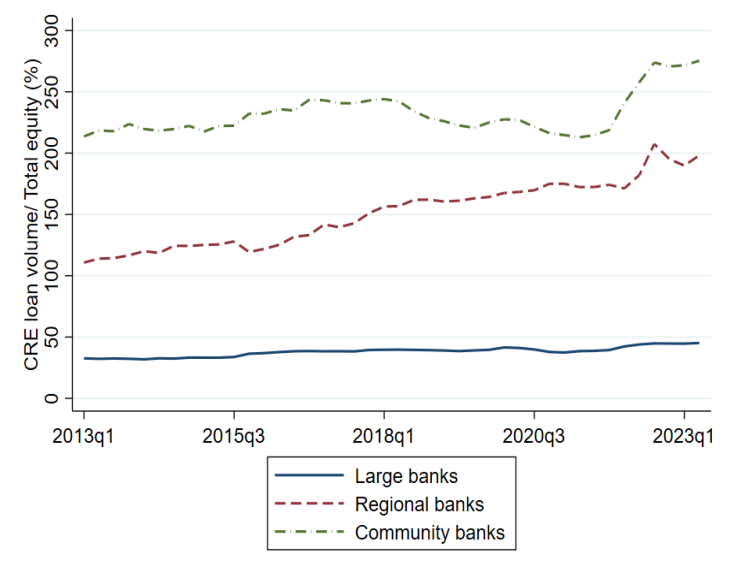


Figure 2: Banks' Exposure to Commercial Real Estate (CRE) by Bank Type

This figure shows the total exposure of banks to commercial real estate (CRE) by stacking their direct exposure through on-balance sheet CRE loans and indirect exposure through banks' term loans and credit lines to Real Estate Investment Trusts (REITs). Banks are classified as follows: community banks (assets $<$ 10\$ billion), regional banks (assets between 10\$ and 100\$ billion), and large banks (assets over 100\$ billion). Data is from DealScan, FR-Y9C filings, and Capital IQ.

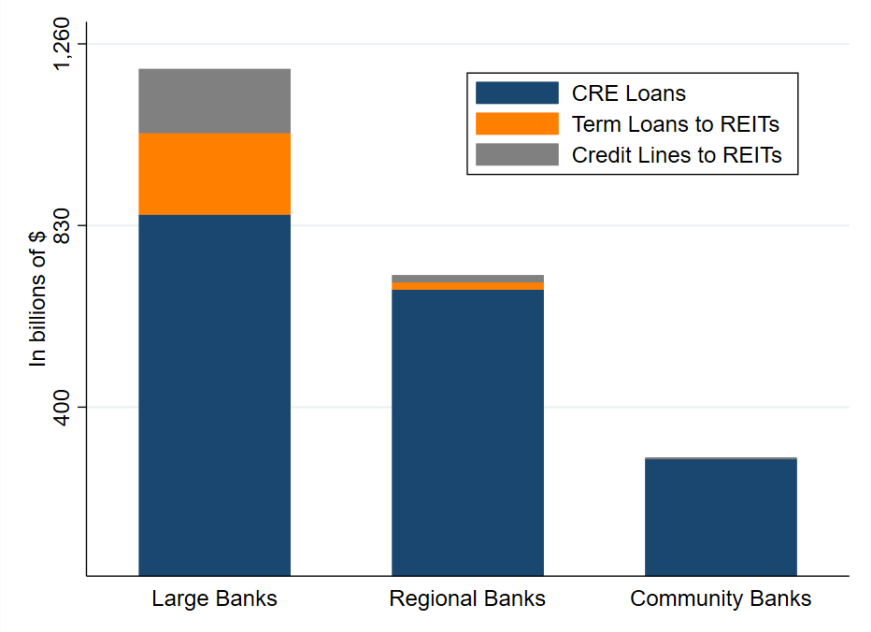
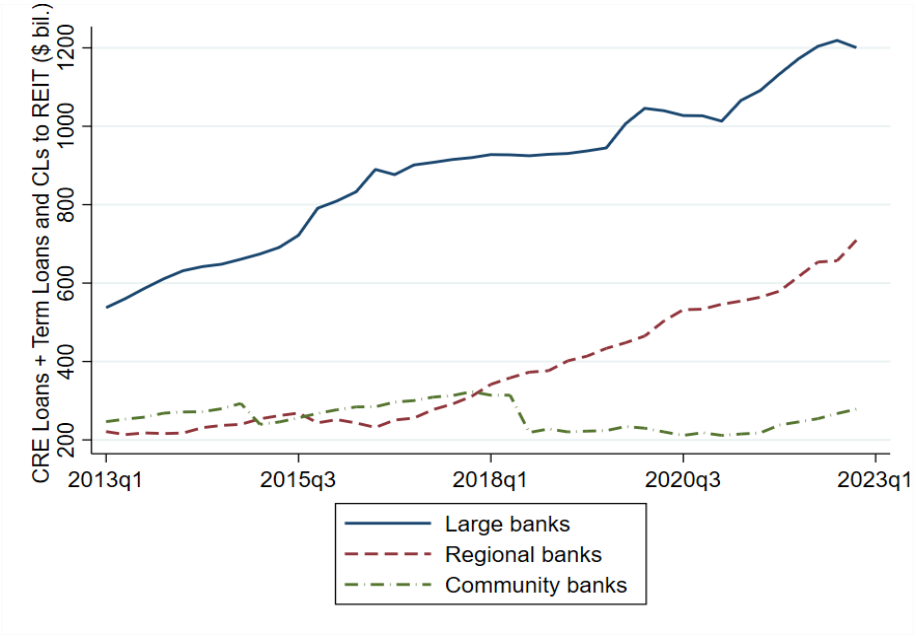


Figure 3: Banks' Exposure to Commercial Real Estate (CRE) by Bank Type

Panel A shows the total exposure of banks to commercial real estate (CRE) including their direct exposure through on-balance sheet CRE loans and indirect exposure through banks' term loans and credit lines to Real Estate Investment Trusts (REITs). Banks are classified as follows: community banks (assets < 10$ billion), regional banks (assets between 10$ and 100$ billion), and large banks (assets over 100$ billion). In Panel B, we document the direct CRE exposure as well as total CRE exposure (direct CRE + REIT CL and TL exposure) for large banks. Data is from DealScan, FR-Y9C filings, and Capital IQ.

Panel A - Direct and indirect exposure to CRE by bank type from 2013Q1 to 2023Q2



Panel B - Incremental CRE Exposure from REITs for Large Banks from 2013Q1 to 2023Q2

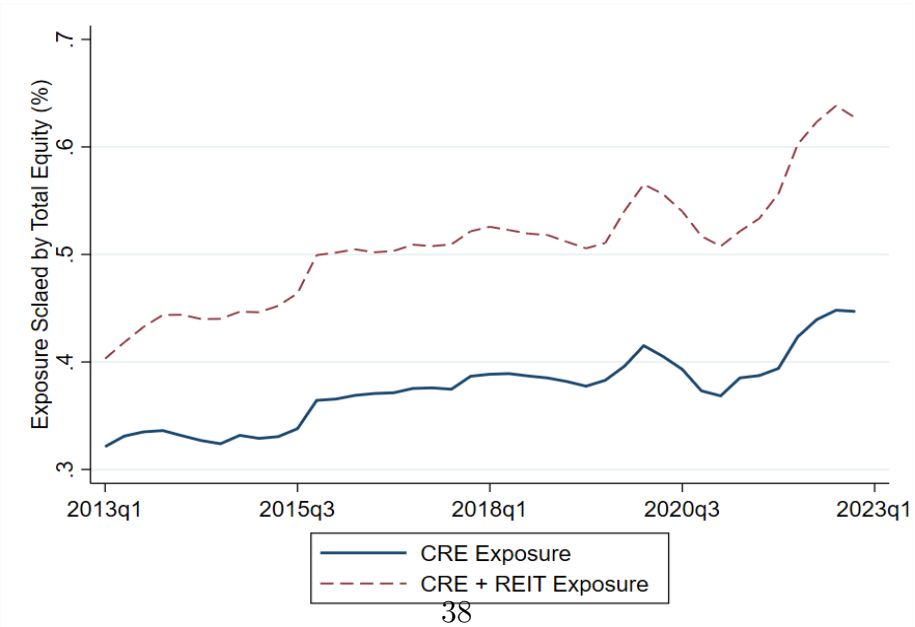
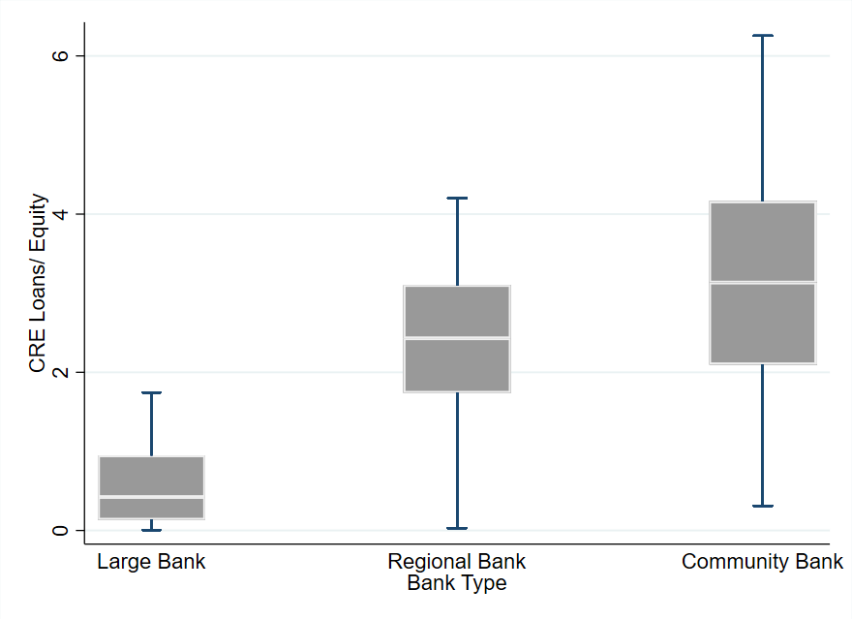
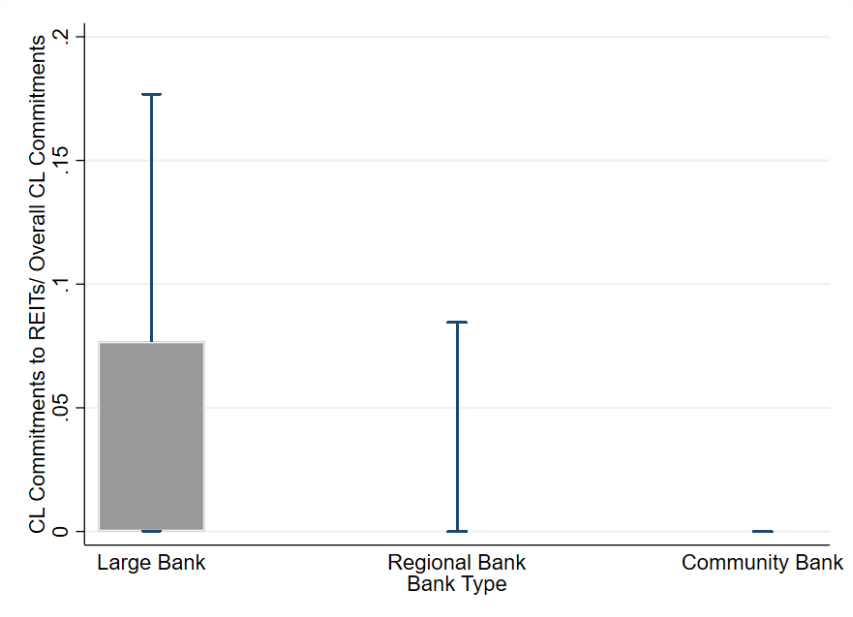


Figure 4: Comparing Across Bank Size Groups

This figure compares the distribution of REIT and non-REIT financial characteristics. The box plots the 25th, median, and 75th percentile, while the caps denote the 5th and 95th percentile of the distribution. The distribution is based on bank call report data as of 2022 Q4.



(a) CRE Loans/ Equity

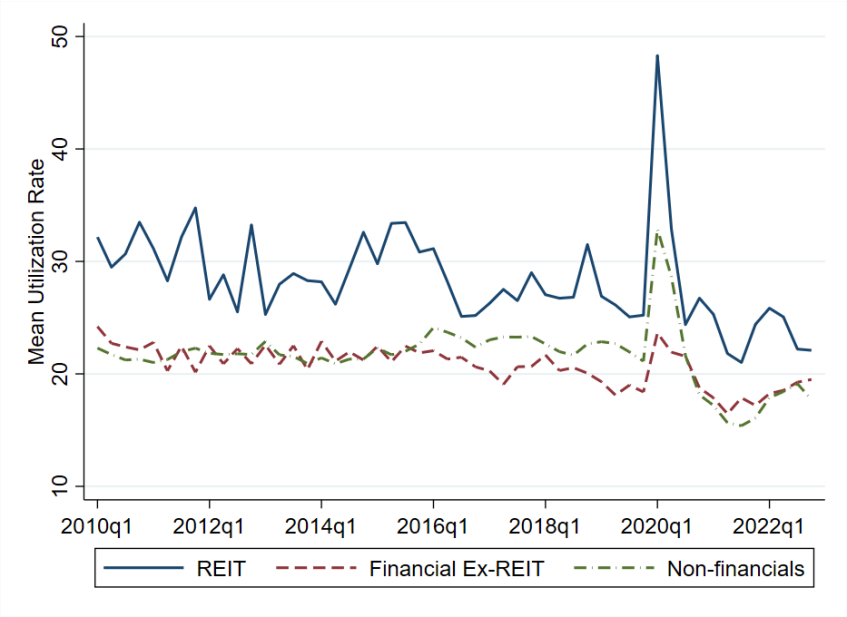


(b) Credit Lines to REITs/ Total Credit Lines

Figure 5: Credit line utilization rates by borrower category

This figure plots the average credit line utilization rate by borrowers in each quarter. We define the utilization rate as the drawn portion of total credit line commitments. We plot the equal-weighted average in Panel A and value-weighted average (weighted by total balance of each borrower) in Panel B. We separate borrowers into three groups - REITs, financials excluding REITs, and non-financial firms. Data is from 2010Q1 to 2022Q4 and is obtained from Capital IQ.

Panel A - Equal-Weighted Average Utilization Rate



Panel B - Value-Weighted Average Utilization Rate

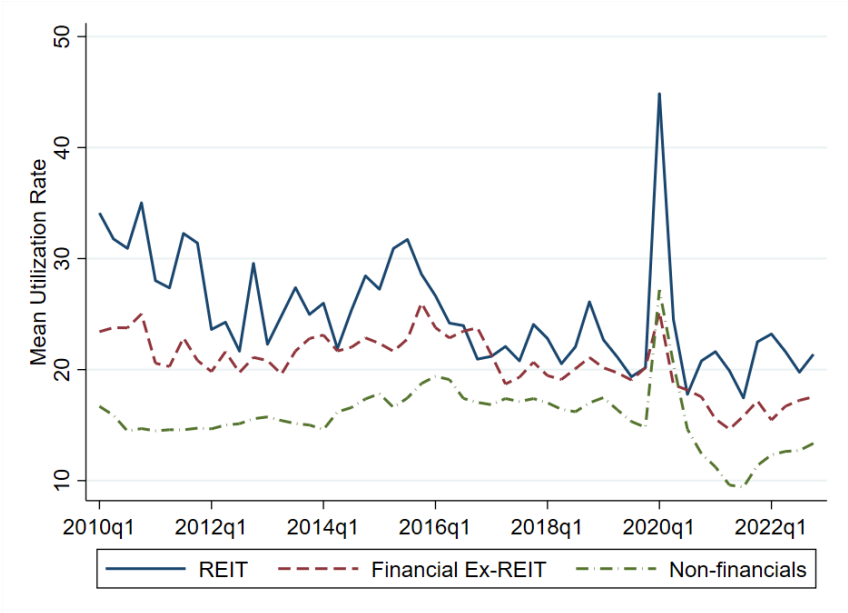


Figure 6: REIT Covid stock market performance by subsector

This figure plots the quarterly stock market returns of various REIT subsectors from 2019Q1 to 2022Q4. All stock prices are scaled by values in 2019Q4, before the onset of the COVID-19 pandemic. Indices are created as a weighted average of individual REIT prices, with the weights corresponding to the market capitalization of each REIT in 2019Q4. Stock price data is from CRSP.

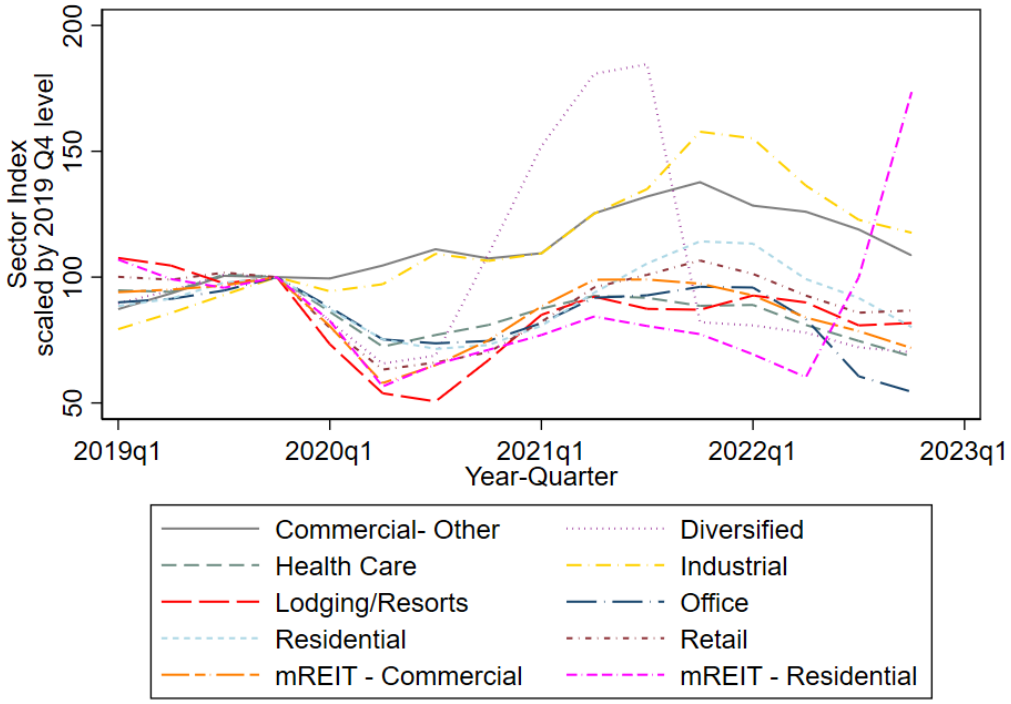


Figure 7: Utilization rates of REITs vs non-financials in crises as a function of aggregate market performance

This figure plots the average credit line utilization rate by two groups of borrowers – REITs and non-financial companies – in crisis quarters vs. the performance of the S&P 500 in the same quarter measured as the return between the lowest price during that quarter compared to the end of the previous quarter. Crisis is defined as the period of the Global Financial Crisis (GFC) between 2007Q3 to 2009Q2 as well as the COVID outbreak in 2020Q1. Each dot indicates the utilization rate in one of these quarters. The dot for 2020Q1 is labeled to separate it from the GFC quarters. The solid blue line indicates the slope of a regression of these utilization rates onto the S&P 500 return for REITs, the green dotted line and the dashed red line indicate the respective slope of the same regression for non-financial companies and financial companies excluding REITs. Data is obtained from Capital IQ and CRSP.

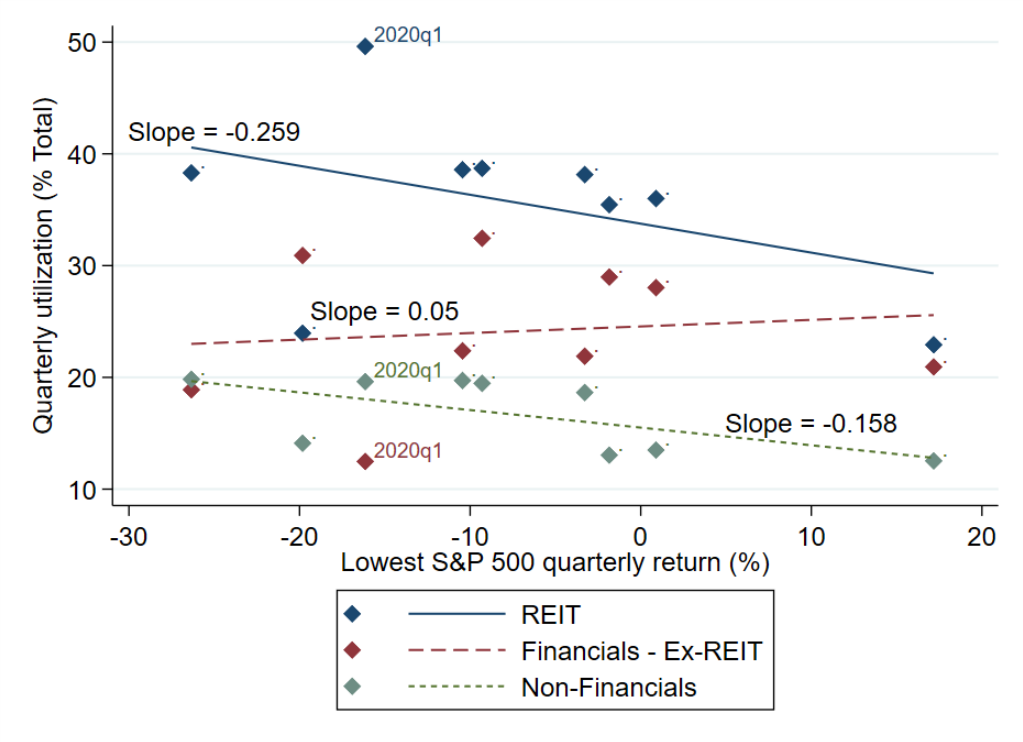


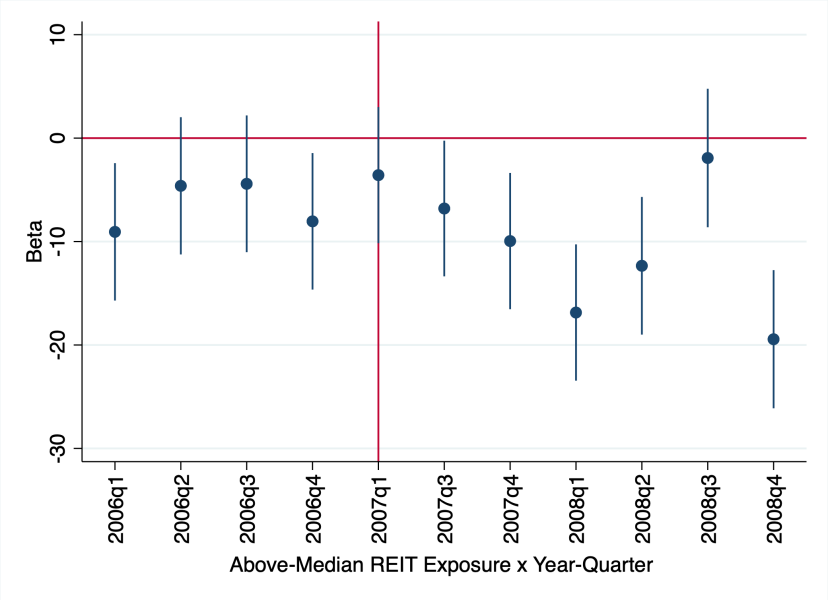
Figure 8: Bank stock market performance by REIT exposure

The figure plots the regression coefficients from the following regression

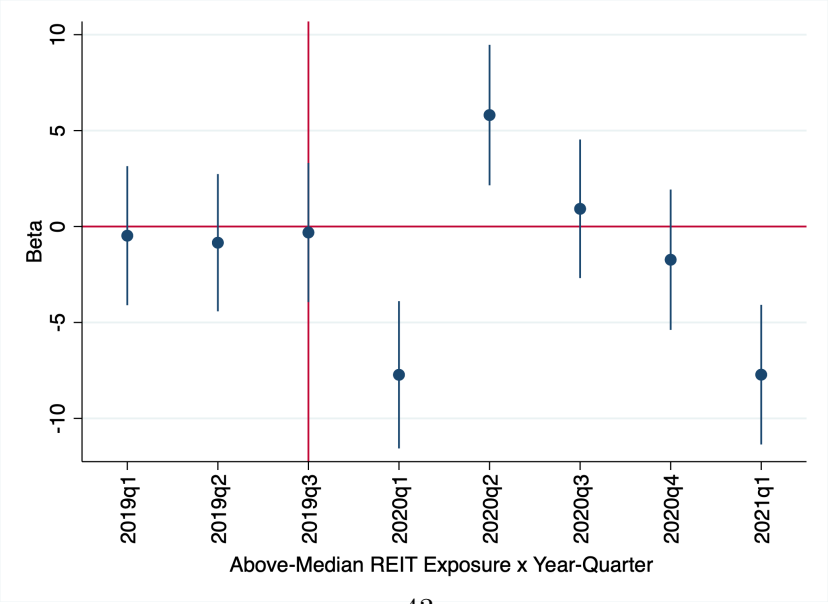
$$\text{BankStockReturn}_{it} = \beta_{it}\text{High REIT CL Commitments}_i \times \mathbf{1}_t + X_{it} + \alpha_i + \gamma_t + \epsilon_{it},$$

for bank i in quarter t. *High REIT Commitments* is an indicator that takes a value of one if the share of total bank credit lines originated to REITs to total assets is above the median. Control variables are the same as in Table 8 which includes Fama-French 3 factors, term loan exposure to REITs and direct CRE exposure. Standard errors are clustered at the bank-level. Data is from Capital IQ and CRSP.

Panel A - GFC



Panel B - COVID-19



Tables

Table 1: Summary Statistics - Borrower and Loan Characteristics

This table displays descriptive statistics of our dataset. Panel A shows descriptive statistics at the borrower-quarter level taken from Capital IQ and Compustat. Numbers are averages over the 2005–2022 period. Panel B shows descriptive statistics on the credit line contract terms from DealScan. We split borrowers into three groups: REITs (SIC Code 6798), other financial companies (SIC Code 60-67), and non-financial companies.

Panel A - Firm Characteristics

Log(Assets in mil.) measures firm size, *Debt/Equity* measures firm leverage. *Liquidity/Assets* measures the amount of liquidity available to the firm as cash and cash equivalents minus debt in current liabilities, *Short Term Debt Ratio* measures the share of short term (maturity of less than 1 year) debt to total debt of the firm, and *Bond Issuance/Assets* measures the average size of a firm's bond issuance. These variables are winsorized at the 1% and 99% level. *Share Unrated* is the share of firms without a credit rating. *Average Rating* is the average rating of the firm after converting credit ratings to a numerical scale with 1 for AAA, 2 for AA, and so on. Unrated firms are given a rating value of 10.

	Equal-Weighted			Value-Weighted		
	REIT	Financial Ex-REIT	Non-financial	REIT	Financial Ex-REIT	Non-financial
Log(Assets in mil.)	8.16	9.05	7.90	9.48	12.14	10.84
Debt/Equity	2.00	1.90	1.11	3.22	4.59	1.45
Cash/Assets	0.03	0.12	0.08	0.03	0.13	0.09
Liquidity/Assets	-0.01	0.07	0.04	-0.01	-0.01	0.03
Short Term Debt Ratio	0.09	0.22	0.15	0.08	0.37	0.16
Debt Issuance/Assets	0.14	0.11	0.14	0.14	0.03	0.07
Share Unrated	0.10	0.23	0.74	0.05	0.06	0.08
Average Rating	3.22	2.76	3.14	2.71	1.59	2.22
Observations	1211	1782	48958	1205	1708	15214

Panel B - Loan Characteristics

Loan size (mil.) measures size of the credit line balance, *(Un)drawn spread* is the cost on the (un)drawn portion of the credit line. *Maturity* is the average maturity of the credit line in months. These variables are winsorized at the 1% and 99% level. *Financial (General) Covenants* measures the share of credit lines that have any financial (general) covenant.

	Equal-Weighted			Value-Weighted		
	REIT	Financial Ex-REIT	Non-financial	REIT	Financial Ex-REIT	Non-financial
Loan Size (mil.)	594.07	722.04	343.27	1,172.46	1,480.41	1,794.36
Drawn spreads (bps)	169.40	167.96	239.99	149.78	131.02	137.03
Undrawn spreads (bps)	26.35	24.52	31.49	22.48	16.66	18.23
Maturity (months)	42.93	40.22	47.98	44.30	37.40	44.88
Financial Covenanats	0.60	0.42	0.22	0.63	0.20	0.37
General Covenanats	0.23	0.26	0.14	0.20	0.04	0.14
Observations	1211	1782	48958	1205	1708	15214

Table 2: Credit line utilization by company types and rating group

Panel A - Full sample

The table shows the average number, credit line utilization rates (in percentage), and total committed balance on credit lines (in mil. of $) for borrowers by rating. The average is calculated over the sample from 2005Q1 to 2022Q4. We differentiate between three borrower groups: non-financial companies, REITs, and other non-REIT financial companies. Rating groups are: all As, BBB, non-IG, and unrated.

	All	AAA-A	BBB	Non-IG	Unrated
Number of REITs in a quarter	92.55	6.92	46.13	27.07	125.05
REIT - Total CL commitments ($ mil.)	634.14	2,089.38	996.33	725.87	412.33
REIT - Avg. Utilization (%)	29.87	8.15	20.89	26.37	34.97
REIT - Wt. Avg. Utilization (%)	28.19	11.91	23.17	31.29	32.96
Number of Financial Ex-REIT in a quarter	830.53	56.07	75.59	39.22	964.78
Financial Ex-REIT - Total CL commitments ($ mil.)	553.32	2,639.54	1,574.40	932.02	285.11
Financial Ex-REIT - Avg. Utilization (%)	21.58	11.02	17.64	23.25	22.62
Financial Ex-REIT - Wt. Avg. Utilization (%)	22.37	13.92	20.11	32.76	27.83
Number of Non-financials in a quarter	1,647.47	141.02	293.43	546.37	2,218.80
Non-financial - Total CL commitments ($ mil.)	496.01	1,780.32	1,369.49	571.78	229.72
Non-financial - Avg. Utilization (%)	22.47	5.20	10.04	19.40	26.79
Non-financial - Wt. Avg. Utilization (%)	17.00	3.25	9.89	26.16	24.26

Panel B - Crisis vs. normal times

The table shows the credit line utilization rates (in percentage) for borrowers by rating and by time period. The sample ranges from 2005Q1 to 2022Q4, where 2020Q1 is classified as the Covid-19 episode and 2007Q3 to 2009Q2 as the Global Financial Crisis (GFC) episode. We differentiate between three borrower groups: non-financial companies, REITs, and other non-REIT financial companies. Rating groups are: all As, BBB, non-IG, unrated.

	All	AAA-A	BBB	Non-IG	Unrated
REIT - Utilization (%) - normal times	28.77	6.99	19.98	25.52	33.94
REIT - Utilization (%) - GFC	38.04	20.43	27.18	32.05	41.81
REIT - Utilization (%) - Covid-19	48.30	24.04	43.88	56.29	51.36
Financial Ex-REIT - Utilization (%)- normal times	21.14	10.31	16.48	22.88	22.26
Financial Ex-REIT - Utilization (%) - GFC	25.30	16.29	29.19	25.80	25.69
Financial Ex-REIT - Utilization (%) - Covid-19	23.64	9.44	22.50	29.75	24.26
Non-financial - Utilization (%) - normal times	21.73	4.37	8.90	18.23	26.35
Non-financial - Utilization (%) - GFC	27.24	12.38	19.08	27.06	29.33
Non-financial - Utilization (%) - Covid-19	32.89	12.48	18.43	39.62	35.30

Table 3: Differential credit line utilization of REITs

The table presents results of running regression specification 1. *REIT* takes a value of one for REITs and zero for all other financial and non-financial firms. *Financial Ex-REIT* takes a value of one for financial firms excluding REITs, and zero otherwise. The omitted group is non-REIT borrowers in Panel A and non-financial borrowers in Panel B. We add the logarithm of total assets, the level of liquidity (cash minus short-term debt) over total assets and firm leverage (debt to equity), short-term debt to total debt, and quarterly debt issuance to assets as control variables starting in Column (2). All continuous variables are standardized to have a mean of 0 and standard deviation of 1. Column (5) restricts the sample to the years 2010–2019. Columns (1) to (5) sequentially add fixed effects as indicated in the specification row at the bottom of the table. N refers to the total number of observations. Standard errors are clustered at the 2-digit SIC code-level.

Panel A - REITs compared non-REIT borrowers

	Utilization Rate (%)				
	(1)	(2)	(3)	(4)	(5)
REIT	7.606***	8.063***	8.069***	8.001***	9.486***
	(0.276)	(2.232)	(2.234)	(2.240)	(2.851)
Log(Assets in mil.)		−6.233***	−6.150***	−6.180***	−6.547***
		(0.375)	(0.381)	(0.378)	(0.456)
Debt/Equity		0.737***	0.702***	0.642***	0.638***
		(0.163)	(0.163)	(0.164)	(0.206)
Liquidity/Assets		−7.961***	−7.810***	−7.852***	−7.690***
		(0.351)	(0.350)	(0.351)	(0.449)
Short Term Debt Ratio		1.519***	1.574***	1.593***	1.627***
		(0.279)	(0.280)	(0.279)	(0.344)
Debt Issuance/Assets		4.028***	4.280***	4.260***	4.239***
		(0.196)	(0.208)	(0.208)	(0.260)
Rating FE	N	Y	Y	N	N
Rating Group FE	N	N	N	Y	Y
Year-Quarter FE	N	N	Y	Y	Y
Sample					2010-2019
Obs.	246,872	182,384	182,384	182,384	105,348
R^2	0.003	0.171	0.180	0.177	0.188

Panel B - REITs compared to other financial and non-financial borrowers

	Utilization Rate (%)				
	(1)	(2)	(3)	(4)	(5)
REIT	7.606***	6.689***	6.690***	6.609***	7.871***
	(0.276)	(2.215)	(2.217)	(2.222)	(2.826)
Financial Ex-REIT		−6.587***	−6.590***	−6.584***	−8.222***
		(0.724)	(0.723)	(0.724)	(0.883)
Log(Assets in mil.)		−5.171***	−5.085***	−5.123***	−5.269***
		(0.382)	(0.388)	(0.386)	(0.465)
Debt/Equity		0.818***	0.784***	0.725***	0.713***
		(0.165)	(0.164)	(0.166)	(0.209)
Liquidity/Assets		−8.082***	−7.930***	−7.973***	−7.818***
		(0.351)	(0.350)	(0.351)	(0.448)
Short Term Debt Ratio		1.946***	1.998***	2.014***	2.146***
		(0.276)	(0.276)	(0.276)	(0.341)
Debt Issuance/Assets		3.944***	4.187***	4.167***	4.114***
		(0.195)	(0.206)	(0.207)	(0.255)
Rating FE	N	Y	Y	N	N
Rating Group FE	N	N	N	Y	Y
Year-Quarter FE	N	N	Y	Y	Y
Sample					2010-2019
Obs.	246,872	182,384	182,384	182,384	105,348
R^2	0.003	0.177	0.186	0.184	0.198

Table 4: Differential credit line utilization of REITs - Impact of Capital Structure

This table presents results of running regression specification 1 with additional interaction terms. The sample period is 2005Q1 to 2022Q4. REIT takes a value of one for REITs and zero for all other financial and non-financial firms. We add the logarithm of total assets, firm leverage (total debt to equity), the level of cash over total assets, the ratio of short-term debt to total debt, and the size of quarterly debt issuance over total assets as control variables. All continuous variables are standardized to have a mean of 0 and standard deviation of 1. Columns (2) to (6) sequentially add interactions of the REIT indicator with capital structure characteristics. Standard errors are clustered at the borrower level.

	Utilization Rate (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
REIT	8.894***	8.353***	10.304***	11.247***	9.357***	9.514***
	(1.470)	(1.371)	(3.227)	(1.653)	(1.623)	(1.854)
Log(Assets in mil.)	−7.623***	−7.626***	−7.626***	−7.654***	−7.614***	−7.606***
	(0.376)	(0.376)	(0.375)	(0.376)	(0.376)	(0.377)
Debt/Equity	0.910***	0.870***	0.908***	0.893***	0.912***	0.909***
	(0.165)	(0.166)	(0.165)	(0.165)	(0.165)	(0.165)
Cash/Assets	−5.353***	−5.357***	−5.373***	−5.365***	−5.351***	−5.351***
	(0.294)	(0.294)	(0.293)	(0.292)	(0.294)	(0.294)
Short Term Debt Ratio	3.616***	3.610***	3.611***	3.537***	3.623***	3.621***
	(0.280)	(0.280)	(0.279)	(0.282)	(0.280)	(0.280)
Debt Issuance/Assets	4.591***	4.585***	4.591***	4.576***	4.623***	4.595***
	(0.197)	(0.197)	(0.197)	(0.197)	(0.202)	(0.197)
REIT x Debt/Equity		1.409				
		(1.180)				
REIT x Cash/Assets			2.725			
			(4.738)			
REIT x Short Term Debt Ratio				5.848***		
				(1.692)		
REIT x Debt Issuance/Assets					−1.133	
					(0.795)	
REIT x Log(Assets in mil.)						−1.394
						(2.449)
Rating Group FE	Y	Y	N	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y
Obs.	193,213	193,213	193,213	193,213	193,213	193,213
R^2	0.155	0.155	0.155	0.155	0.155	0.155

Table 5: Differential credit line utilization of REITs as a function of stock returns

The table presents results on the impact of market conditions on borrower credit line utilization. The sample period is 2005Q1 to 2022Q4. In Column (1), we analyze the sensitivity of credit line drawdowns to stock market performance (S&P 500). In Column (2), we separate the impact of positive and negative market perfomance on credit line utilization. In Column (3), we analyze the sensitivity of credit line utilization to market volatility (VIX). In Column (4), we analyze the sensitivity of credit line utilization in crisis times. *Crisis* is an indicator that takes a value of one during the GFC (2007Q3-2009Q2) and COVID-19 (2020Q1). In Column (5), we analyze credit line utilization to a borrower's industry performance (sub-sector return) calculated after excluding the borrower from the calculations of industry performance. Sub-sector return is measured as a weighted average of quarterly stock returns for firms in the same 2-digit SIC code for non-REITs and REIT-sub group classification for REITs. For REITs, sub-sector return is based on REIT classification into one of 9 sub-groups - Health Care, Industrial, Lodging/Resorts, Mortgage, Office, Residential, Retail, Diversified, or Commercial- Other. We regress sub-sector return against S&P 500 and estimate the residual. We then look at the impact of aggregate market conditions (S&P 500) and own industry conditions on borrower utilization. In column (6) and (7), we include measures of aggregate credit conditions as measured by the Excess Bond Premium (EBP, see Gilchrist and Zakrajšek (2012)) and Excess Loan Premium (ELP, see Saunders et al. (Forthcoming)). *REIT* takes a value of one for REITs and zero for all other financial and non-financial firms. We add the logarithm of total assets, the level of liquid assets over total assets, firm leverage (debt to equity), short term debt over total debt ratio, and debt issuance over total assets as control variables in all columns. All continuous variables are standardized to have a mean of 0 and standard deviation of 1. Standard errors are clustered at the borrower level.

	Utilization Rate (%)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REIT	7.308***	6.947***	7.351***	6.760***	6.447***	7.302***	7.420***
	(1.457)	(1.618)	(1.456)	(1.576)	(1.667)	(1.459)	(1.457)
REIT x S&P 500 return	-1.549***				-1.465**	-1.693**	-1.358**
	(0.559)				(0.600)	(0.709)	(0.634)
REIT x Positive S&P 500 return		-0.788					
		(1.218)					
REIT x Negative S&P 500 return		-1.892**					
		(0.867)					
REIT x VIX			1.993***				
			(0.711)				
REIT x Crisis				4.500*			
				(2.336)			
REIT x Sub-sector return					-1.424*		
					(0.731)		
REIT x EBP						-0.206	
						(0.808)	
REIT x ELP							0.630
							(0.868)
Controls	Y	Y	Y	Y	Y	Y	Y
Rating Group FE	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y
Obs.	187,470	187,470	187,470	187,470	126,810	187,470	182,652
R^2	0.172	0.172	0.172	0.172	0.155	0.172	0.171

Table 6: Effect of redemptions on REIT drawdowns

This table shows results of regressing the log change in the drawn credit line volume for each REIT on the log change in its shareholder equity – reflecting redemptions or stock repurchases by the issuer. The sample period is 2005Q1 to 2022Q4. Column (2) adds REIT fixed effects. Column (3) adds time fixed effects. Column (4) adds the logarithm of total assets, firm leverage (total debt to equity), the level of liquid assets over total assets, the ratio of short-term debt to total debt, and the size of quarterly debt issuance over total assets as control variables. Control variables are standardized to have a mean of 0 and standard deviation of 1. Standard errors are clustered at the REIT-level.

	Δ Drawn CL Volume			
	(1)	(2)	(3)	(4)
Δ Shareholder Equity	-0.330**	-0.407**	-0.381**	-0.441**
	(0.160)	(0.178)	(0.174)	(0.199)
Log(Assets in mil.)				0.012
				(0.105)
Cash/Assets				-0.157
				(0.123)
Debt/Equity				-0.008
				(0.037)
Short Term Debt Ratio				0.015
				(0.042)
Debt Issuance/Assets				0.011
				(0.020)
Controls	N	N	N	Y
REIT FE	N	Y	Y	Y
Year-Quarter FE	N	N	Y	Y
Obs.	6,589	6,583	6,583	2,388
R^2	0.003	0.026	0.057	0.128

Table 7: Reasons for credit line utilization by REITs - Crisis vs. normal times

The table presents results of running regression specification 4. The sample period is 2005Q1 to 2022Q4. Crisis takes a value of one for the GFC (2007Q3 to 2009Q2) and the Covid-19 period (2020Q1) and zero otherwise. Drawdown is the ratio of used credit line balance over firm asset size in the previous quarter. Drawdown is standardized to have a mean of 0 and standard deviation of 1. Panel A shows the results for investments, Panel B shows the results for cash, and Panel C shows the results for dividends per share. Standard errors are clustered at the firm-level.

Panel A - Investment

	(1) h=0	(2) h=1	(3) h=2	(4) h=3	(5) h=4
Drawdown/ Assets	0.00836***	0.00531***	0.00444	0.00519**	0.00784***
	(0.000)	(0.006)	(0.134)	(0.021)	(0.004)
Drawdown/Assets x Crisis	0.0162	-0.00282	0.00558	0.00324	-0.00150
	(0.554)	(0.883)	(0.659)	(0.789)	(0.876)
Constant	0.0212***	0.0411***	0.0615***	0.0802***	0.0999***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	11,418	11,039	10,711	10,461	10,098
R^2	0.079	0.113	0.144	0.165	0.203

Panel B - Cash

	(1) h=0	(2) h=1	(3) h=2	(4) h=3	(5) h=4
Drawdown/ Assets	-0.0690***	-0.0499***	-0.0461***	-0.0477***	-0.0374***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Drawdown/Assets x Crisis	0.161***	0.0826***	0.0455*	0.0301	0.0744***
	(0.000)	(0.001)	(0.098)	(0.294)	(0.008)
Constant	0.0124***	0.0304***	0.0465***	0.0668***	0.0883***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	12118	11753	11427	11115	10806
R^2	0.0422	0.0445	0.0580	0.0695	0.0775

Panel C - Dividend per share

	(1) h=0	(2) h=1	(3) h=2	(4) h=3	(5) h=4
Drawdown/ Assets	0.00779***	0.00599***	0.00618**	0.00588**	0.00594**
	(0.003)	(0.006)	(0.025)	(0.017)	(0.014)
Drawdown/Assets x Crisis	0.00997	-0.000111	-0.00760	0.00119	-0.0124
	(0.583)	(0.995)	(0.690)	(0.958)	(0.577)
Constant	0.00730***	0.0144***	0.0200***	0.0206***	0.0171***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	10,123	9,774	9,431	9,220	8,865
R^2	0.064	0.093	0.130	0.165	0.194

Panel D - Short-term Debt Ratio

	(1) h=0	(2) h=1	(3) h=2	(4) h=3	(5) h=4
Drawdown/ Assets	0.00501**	0.00858***	0.00798***	0.00342	0.00465
	(0.018)	(0.001)	(0.005)	(0.131)	(0.127)
Drawdown/Assets x Crisis	-0.00485	-0.0181*	-0.00873	-0.00141	0.00358
	(0.314)	(0.078)	(0.452)	(0.798)	(0.579)
Constant	-0.00407***	-0.00782***	-0.00930***	-0.00520***	-0.0107***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	2,544	2,387	2,224	3,761	2,043
R^2	0.093	0.135	0.160	0.114	0.171

Table 8: Effect of REIT Exposure on Bank Stock Returns

This table shows results of regressing bank stock returns on bank credit line commitment levels scaled by total assets as well as on a crisis indicator. The sample period is 2005Q1 to 2022Q4. The crisis indicator takes the value 1 for the GFC (2007Q3 to 2009Q2) and the Covid-19 period (2020Q1). Column (2) replaces the overall credit line commitments by REIT credit line commitments scaled by total assets. Column (3) adds non-REIT credit line commitments scaled by total assets. Column (4) adds term loans to REITs scaled by total assets. Column (5) adds the on-balance sheet exposure to CRE scaled by total assets. All these terms are added jointly with an interaction with the crisis dummy. All columns employ a set of controls close to the setup in Acharya et al. (forthcoming) and the Fama-French 3-factor model. All continuous variables are standardized to have a mean of 0 and a standard deviation of 1. Standard errors are clustered at the bank-level.

	Quarterly bank stock returns (%)				
	(1)	(2)	(3)	(4)	(5)
Overall Commitments (std.)	-0.382***				
	(-2.91)				
Overall Commitments (std.) x Crisis	-0.418				
	(-1.05)				
REIT CL Exposure (std.)		0.0842	0.187	0.169	0.212
		(0.78)	(1.45)	(1.25)	(1.55)
REIT CL Exposure (std.) x Crisis		-1.460***	-1.456***	-1.425***	-1.392***
		(-3.43)	(-3.02)	(-2.91)	(-3.01)
Non-REIT CL Exposure (std.)			-0.481**	-0.475**	-0.382**
			(-2.60)	(-2.55)	(-2.09)
Non-REIT CL Exposure (std.) x Crisis			-0.0111	-0.0124	-0.321
			(-0.03)	(-0.03)	(-0.89)
REIT TL Exposure (std.)				0.0668	0.128
				(0.53)	(0.98)
REIT TL Exposure (std.) x Crisis				-0.0652	-0.491
				(-0.16)	(-1.13)
CRE Exposure (std.)					0.816***
					(3.81)
CRE Exposure (std.) x Crisis					-2.419***
					(-5.46)
Constant	-13.88***	-12.46***	-13.51***	-13.18***	-9.922***
	(-5.63)	(-4.77)	(-4.31)	(-4.07)	(-3.29)
Controls	Y	Y	Y	Y	Y
Fama-French 3 Factor	Y	Y	Y	Y	Y
Obs.	9,013	9,014	9,014	9,014	9,014
R^2	0.482	0.482	0.483	0.483	0.486

Table 9: Loan Spreads

This table shows the results of regressing the all-in-drawn spread in credit line contracts onto indicators for borrower types. We compare REITs and other financial firms to non-financial firms. Columns (1) to (3) sequentially add fixed effects as indicated in the specification row at the bottom of the table. We add *Maturity* in months and *Loan Size* as the log facility amount, and an indicator for whether the loan has a financial covenant as control variables in Column (4). Column (5) controls for interactions between the REIT dummy and the control variables which we standardize for easier interpretation of the interaction coefficients. Column (6) adds the logarithm of total assets, the cash-over-assets ratio, leverage, profitability (defined as income over sales), and the market-to-book ratio as borrower controls. Column (7) adds an indicator for whether the spread is linked to SOFR. Standard errors are clustered at the borrower-level.

	All in drawn spread (bps)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REIT	-22.94***	-17.49***	-7.670**	-11.38***	-33.37***	-18.13**	-18.75**
	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.019)	(0.015)
Financial (Ex-REIT)	-25.45***	-3.713	-3.354	-9.511**	-9.316**	7.277	7.298
	(0.000)	(0.422)	(0.398)	(0.020)	(0.023)	(0.105)	(0.104)
Maturity (months)				-0.503***			
				(0.000)			
Loan Size ($ millions)				-0.0157***			
				(0.000)			
Financial Covenant				-11.45***	-13.03***	-12.19***	-12.19***
				(0.000)	(0.000)	(0.000)	(0.000)
Maturity (months, std.)					-9.683***	-9.069***	-9.052***
					(0.000)	(0.000)	(0.000)
Loan Size ($ millions, std.)					-20.56***	-11.93***	-11.93***
					(0.000)	(0.000)	(0.000)
REIT x Maturity (months, std.)					-19.66***	-15.74**	-15.71**
					(0.000)	(0.013)	(0.013)
REIT x Loan Size ($ millions, std.)					9.096	12.41**	11.47**
					(0.108)	(0.026)	(0.049)
REIT x Financial Covenant					24.90***	14.21	14.23
					(0.000)	(0.110)	(0.109)
REIT x SOFR linked							13.72
							(0.378)
Constant	188.2***	185.9***	180.4***	221.7***	187.0***	271.6***	271.9***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controls	N	N	N	N	N	Y	Y
Rating Group FE	N	Y	Y	Y	Y	Y	Y
Lender x Year-Quarter FE	N	N	Y	Y	Y	Y	Y
Obs.	16,980	16,980	13,232	13,141	13,141	9,403	9,403
R^2	0.006	0.149	0.554	0.573	0.574	0.602	0.602

Table 10: Incremental SRISK for US banks due to REIT Credit Line Exposure as of 2022Q4 – New methodology

The table presents results of applying our incremental SRISK methodology described in Equations 7 and 8. Panel A reports the estimated parameters we use as inputs for the incremental SRISK calculations. For $E[Utilization^k|Crisis]$ we estimate a quarterly regression for the respective firm type of the utilization rate on the S&P 500 return and predict the fitted value for a 40% market downturn. For γ^k we use the results from Table A4. Panel B shows the results for treating all borrowers equally in calculating the stress scenario. Panel C shows the results where we consider REITs as a separate group of borrowers with different drawdown properties. Panel D indicates the percentage increase from the baseline SRISK when considering the credit line business without borrower heterogeneity in the first column, with borrower heterogeneity in the second column, and the increase in the incremental values between borrower heterogeneity and no heterogeneity in the third column. Panel E compares the impact on the market valuation of banks from considering the credit line business without heterogeneity, the incremental effect of considering REITs as a separate borrower class, and the incremental effect of considering on-balance sheet CRE loans. Panel F depicts the main numbers of the previous panels as a bank-level bar chart relative to banks' market valuation. Large banks refers to the sum of the impact on the banks in our sample classified as large and, respectively, classified as regional for Regional banks. Numbers in USD billion unless stated otherwise. The calculations are using inputs as of 2022Q4.

Panel A – Estimated parameters

$E[Utilization^{REIT}\|Crisis]$	$E[Utilization^{Non-REIT}\|Crisis]$	γ^{REIT}	$\gamma^{Overall\ Commitments}$
0.448	0.294	10.52	10.28
$E[Utilization^{All}\|Crisis]$		γ^{All}	γ^{CRE}
0.301		7.04	7.24

Panel B – No heterogeneity in borrowers

Bank (Group)	$\text{SRISK}^{Baseline}$	SRISK^{LRMES}	SRISK^{CL}	$\text{SRISK}^{LRMES+CL}$
JPMORGAN CHASE & CO.	65.8	16.2	7.2	23.4
BANK OF AMERICA CORPORATION	77.5	15.9	8.8	24.7
WELLS FARGO & COMPANY	39.8	12.2	7.0	19.2
GOLDMAN SACHS GROUP, INC., THE	49.9	4.8	2.9	7.6
MORGAN STANLEY	11.3	4.9	1.9	6.8
All banks (N = 43)	464.6	97.3	51.0	148.3
Large banks (N = 21)	464.8	90.3	48.4	138.7
Regional banks (N = 22)	-0.2	7.0	2.6	9.6

Panel C – Reflecting REIT vs non-REIT borrowers

Bank (Group)	$SRISK^{Baseline}$	$SRISK^{LRMES}$	$SRISK^{CL}$	$SRISK^{LRMES+CL}$
JPMORGAN CHASE & CO.	65.8	27.7	7.2	35.0
BANK OF AMERICA CORPORATION	77.5	27.7	8.8	36.5
WELLS FARGO & COMPANY	39.8	21.5	7.0	28.5
GOLDMAN SACHS GROUP, INC., THE	49.9	8.3	2.9	11.1
MORGAN STANLEY	11.3	8.9	2.0	10.9
All banks (N = 43)	464.6	179.6	51.7	231.3
Large banks (N = 21)	464.8	163.1	48.9	212.0
Regional banks (N = 22)	-0.2	16.5	2.8	19.3

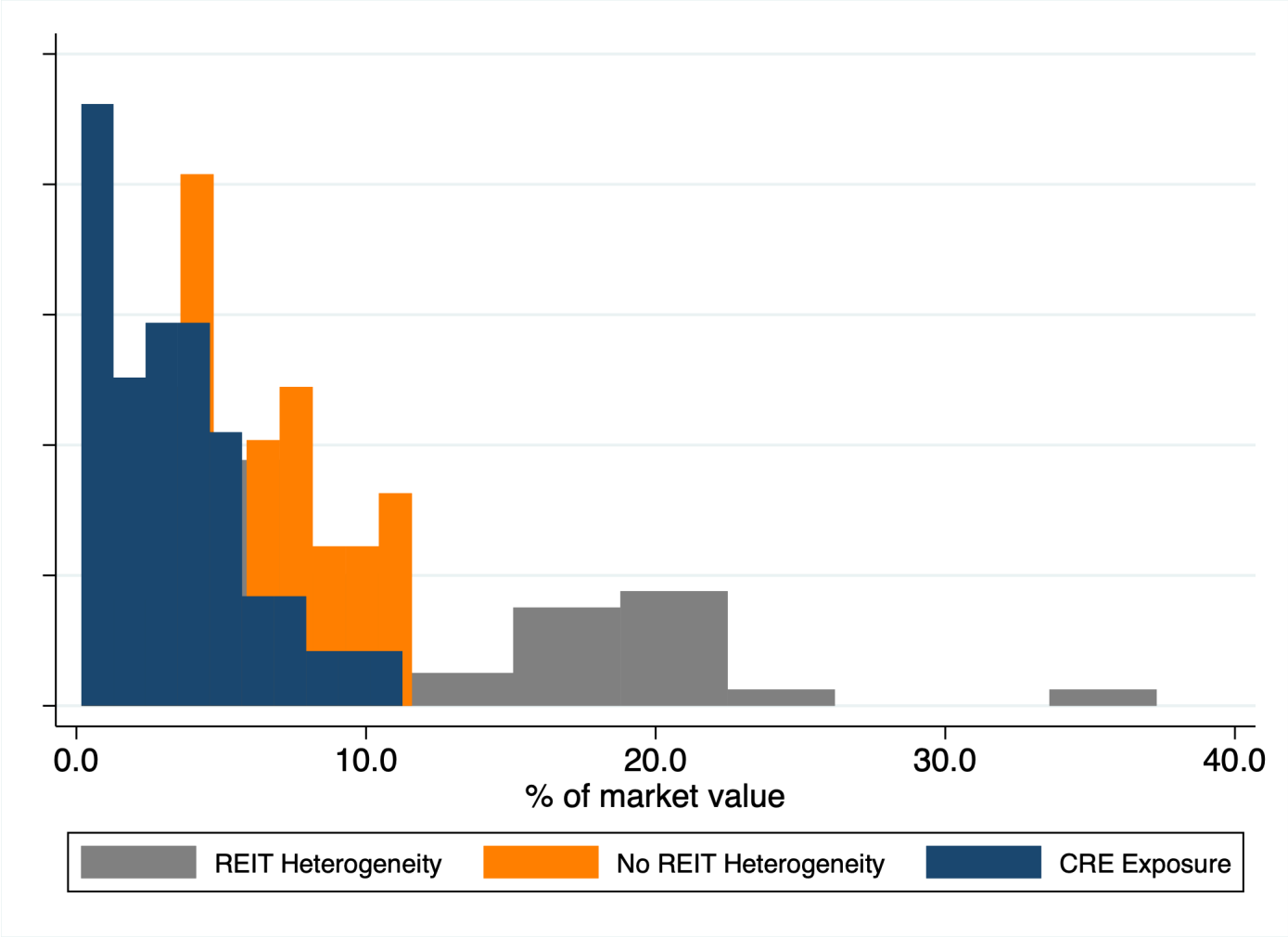
Panel D – Comparison to CRE Exposure (absolute values)

Bank (Group)	$SRISK^{Baseline}$	$SRISK^{LRMES}$ No REIT Heterogeneity	$SRISK^{LRMES}$ REIT Heterogeneity	$SRISK^{LRMES}$ CRE Exposure
JPMORGAN CHASE & CO.	65.8	16.2	27.7	1.9
BANK OF AMERICA CORPORATION	77.5	15.9	27.7	2.1
WELLS FARGO & COMPANY	39.8	12.2	21.5	3.0
GOLDMAN SACHS GROUP, INC., THE	49.9	4.8	8.3	0.3
MORGAN STANLEY	11.3	4.9	8.9	0.5
All banks (N = 43)	464.6	97.3	179.6	24.0
Large banks (N = 21)	464.8	90.3	163.1	17.6
Regional banks (N = 22)	-0.2	7.0	16.5	6.4

Panel E – Comparison to CRE Exposure (in %)

Bank (Group)	$SRISK^{Baseline}$	$SRISK^{LRMES}$ No REIT Heterogeneity	$SRISK^{LRMES}$ REIT Heterogeneity	$SRISK^{LRMES}$ CRE Exposure
JPMORGAN CHASE & CO.	65.8	24.6	42.1	2.9
BANK OF AMERICA CORPORATION	77.5	20.5	35.7	2.7
WELLS FARGO & COMPANY	39.8	30.6	53.9	7.5
GOLDMAN SACHS GROUP, INC., THE	49.9	9.6	16.6	0.6
MORGAN STANLEY	11.3	43.2	79.3	4.3
All banks (N = 43)	464.6	21.0	38.7	5.2
Large banks (N = 21)	464.8	19.4	35.1	3.8
Regional banks (N = 22)	-0.2	-3,599.7	-8,445.6	-3,259.1

Panel F – Bank-level market impact results (distribution)



A Additional Tables and Figures

Table A1: Summary Statistics - Borrower and Loan Characteristics - Median

This table displays descriptive statistics of our dataset. Panel A shows descriptive statistics at the borrower-quarter level taken from Capital IQ and Compustat. Numbers are averages over the 2005–2022 period. Panel B shows descriptive statistics on the credit line contract terms from DealScan. We split borrowers into three groups: REITs (SIC Code 6798), financial companies excluding REITs (SIC Code 60-67), and non-financial companies.

Panel A - Firm Characteristics

Log(Assets in mil.) measures firm size, *Cash/ Assets* measures the amount of liquid assets of the firm, *Debt/Equity* measures firm leverage. These variables are winsorized at the 1% and 99% level. *Share Unrated* is the share of firms without a credit rating. *Average Rating* is the average rating of the firm after converting credit ratings to a numerical scale with 1 for AAA, 2 for AA, and so on. Unrated firms are given a rating value of 10.

	Median		
	REIT	Financial Ex-REIT	Non-financial
Log(Assets in mil.)	8.12	8.99	7.81
Debt/Equity	1.33	0.68	0.75
Cash/Assets	0.02	0.07	0.05
Liquidity/Assets	0.00	0.04	0.02
Short Term Debt Ratio	0.03	0.10	0.06
Debt Issuance/Assets	0.10	0.02	0.05
Share Unrated	0.00	0.00	1.00
Average Rating	4.00	3.00	3.00
Observations	1211	1782	48958

Panel B - Loan Characteristics

Loan size (mil.) measures size of the credit line balance, *(Un)drawn spread* is the cost on the (un)drawn portion of the credit line. *Maturity* is the average maturity of the credit line in months. These variables are winsorized at the 1% and 99% level. *Financial (General) Covenants* measures the share of credit lines that have any financial (general) covenant.

	Median		
	REIT	Financial Ex-REIT	Non-financial
Loan Size (mil.)	400.00	300.00	105.00
Drawn spreads (bps)	150.00	150.00	200.00
Undrawn spreads (bps)	25.00	20.00	25.00
Maturity (months)	48.00	45.00	60.00
Financial Covenanats	1.00	0.00	0.00
General Covenanats	0.00	0.00	0.00
Observations	1211	1782	48958

Table A2: Summary Statistics - Borrower and Loan Characteristics

This table displays descriptive statistics of our dataset. Panel A shows descriptive statistics at the borrower-quarter level taken from Capital IQ and Compustat. Numbers are averages over the 2005–2022 period. Panel B shows descriptive statistics at the loan level about the credit line contract terms from Loan Connector. We split borrowers into three groups: REITs, other financial companies, and non-financial companies.

Panel A - All A rated

	REIT	Financial Ex-REIT	Non-financial
	Mean	Mean	Mean
Log(Assets in mil.)	8.80	10.64	8.92
Debt/Equity	2.61	1.94	1.06
Cash/Assets	0.03	0.15	0.07
Liquidity/Assets	-0.00	0.09	0.02
Short Term Debt Ratio	0.06	0.23	0.17
Debt Issuance/Assets	0.14	0.03	0.08
Loan Size (mil.)	965.04	1,236.52	878.80
Drawn spreads (bps)	138.87	122.40	122.06
Undrawn spreads (bps)	21.38	14.63	17.58
Maturity (months)	43.97	36.74	48.30
Financial Covenanats	0.73	0.36	0.54
General Covenanats	0.37	0.10	0.21
Observations	149	403	1923

Panel B - BBB rated

	REIT	Financial Ex-REIT	Non-financial
	Mean	Mean	Mean
Log(Assets in mil.)	8.31	9.07	8.42
Debt/Equity	1.84	1.75	0.99
Cash/Assets	0.03	0.13	0.10
Liquidity/Assets	0.02	0.09	0.06
Short Term Debt Ratio	0.06	0.17	0.15
Debt Issuance/Assets	0.17	0.11	0.11
Loan Size (mil.)	687.15	720.75	805.60
Drawn spreads (bps)	169.35	149.20	148.98
Undrawn spreads (bps)	27.29	22.63	21.51
Maturity (months)	44.29	44.65	50.16
Financial Covenanats	0.61	0.50	0.57
General Covenanats	0.19	0.31	0.29
Observations	247	317	2376

Summary Statistics - Borrower and Loan Characteristics - Continued

Panel C - Non-IG rated

	REIT	Financial Ex-REIT	Non-financial
	Mean	Mean	Mean
Log(Assets in mil.)	8.07	8.61	7.59
Debt/Equity	1.96	1.76	1.12
Cash/Assets	0.03	0.12	0.09
Liquidity/Assets	-0.02	0.07	0.05
Short Term Debt Ratio	0.12	0.25	0.16
Debt Issuance/Assets	0.13	0.10	0.15
Loan Size (mil.)	512.99	435.91	518.33
Drawn spreads (bps)	170.96	197.87	206.20
Undrawn spreads (bps)	26.45	29.64	32.95
Maturity (months)	42.38	40.50	49.44
Financial Covenanats	0.57	0.52	0.56
General Covenanats	0.22	0.29	0.43
Observations	688	654	8482

Panel D - Unrated

	REIT	Financial Ex-REIT	Non-financial
	Mean	Mean	Mean
Log(Assets in mil.)	7.62	8.01	7.71
Debt/Equity	1.44	2.26	1.24
Cash/Assets	0.04	0.09	0.06
Liquidity/Assets	-0.00	0.02	0.03
Short Term Debt Ratio	0.09	0.19	0.10
Debt Issuance/Assets	0.18	0.19	0.17
Loan Size (mil.)	419.92	673.50	243.38
Drawn spreads (bps)	195.50	182.26	262.74
Undrawn spreads (bps)	30.48	29.16	33.54
Maturity (months)	42.02	39.75	47.47
Financial Covenanats	0.60	0.25	0.10
General Covenanats	0.24	0.35	0.06
Observations	127	408	36177

Table A3: Differential credit line utilization of REITs as a function of stock returns

The table presents results on the impact of market conditions on borrower credit line utilization. The sample period is 2005Q1 to 2022Q4. In Column (1), we analyze the sensitivity of credit line drawdowns to stock market performance (S&P 500). In Column (2), we separate the impact of positive and negative market perfomance on credit line utilization. In Column (3), we analyze the sensitivity of credit line utilization to market volatility (VIX). In Column (4), we analyze the sensitivity of credit line utilization in crisis times. *Crisis* is an indicator that takes a value of one during the GFC (2007Q3-2009Q2) and COVID-19 (2020Q1). In Column (5), we analyze credit line utilization to a borrower's industry performance (sub-sector return) calculated after excluding the borrower from the calculations of industry performance. Sub-sector return is measured as a weighted average of quarterly stock returns for firms in the same 2-digit SIC code for non-REITs and REIT-sub group classification for REITs. For REITs, sub-sector return is based on REIT classification into one of 9 sub-groups - Health Care, Industrial, Lodging/Resorts, Mortgage, Office, Residential, Retail, Diversified, or Commercial- Other. We regress sub-sector return against S&P 500 and estimate the residual. We then look at the impact of aggregate market conditions (S&P 500) and own industry conditions on borrower utilization. In column (6) and (7), we include measures of aggregate credit conditions as measured by the Excess Bond Premium (EBP, see Gilchrist and Zakrajšek (2012)) and Excess Loan Premium (ELP, see Saunders et al. (Forthcoming)). *REIT* takes a value of one for REITs and zero for all other financial and non-financial firms. *Financial Ex-REIT* takes a value of one for financial firms excluding REITs, and zero otherwise. All variables are standardized to have a mean of 0 and standard deviation of 1. We add the logarithm of total assets, the level of liquid assets over total assets, firm leverage (debt to equity), short term debt over total debt ratio, and debt issuance over total assets as control variables in all columns. Standard errors are clustered at the borrower level.

	Utilization Rate (%)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REIT	5.965***	5.603***	6.009***	5.430***	5.283***	6.006***	6.113***
	(1.451)	(1.612)	(1.450)	(1.568)	(1.656)	(1.448)	(1.446)
REIT x S&P 500 return	-1.459***				-1.387**		
	(0.557)				(0.599)		
Financial Ex-REIT	-6.038***	-5.900***	-6.038***	-5.989***	-5.258***	-6.046***	-6.110***
	(0.708)	(0.737)	(0.708)	(0.716)	(0.824)	(0.709)	(0.714)
Financial Ex-REIT x S&P 500 return	0.457**				0.186		
	(0.200)				(0.223)		
REIT x Positive S&P 500 return		-0.695					
		(1.218)					
REIT x Negative S&P 500 return		-1.802**					
		(0.864)					
Financial Ex-REIT x Positive S&P 500 return		0.159					
		(0.420)					
Financial Ex-REIT x Negative S&P 500 return		0.588*					
		(0.316)					
REIT x VIX			1.975***				
			(0.711)				
Financial Ex-REIT x VIX			-0.305				
			(0.284)				
REIT x Crisis				4.401*			
				(2.333)			
Financial Ex-REIT x Crisis				-0.372			
				(0.988)			
REIT x Sub-sector return					-1.192		
					(0.728)		
Financial Ex-REIT x Sub-sector return					1.602***		
					(0.364)		
REIT x EBP						0.824	
						(0.626)	
Financial Ex-REIT x EBP						-0.719**	
						(0.287)	
REIT x ELP							1.149
							(0.787)
Financial Ex-REIT x ELP							-0.403
							(0.357)
Controls	Y	Y	Y	Y	Y	Y	Y
Rating Group FE	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y
Obs.	187,470	187,470	187,470	187,470	126,810	187,470	182,652
R^2	0.177	0.177	0.177	0.177	0.160	0.177	0.176

Table A4: Effect of REIT Exposure on Bank Stock Returns - S&P 500 version

This table shows results of regressing bank stock returns on bank credit line commitment levels scaled by total assets as well as on the return of the S&P 500. The sample period is 2005Q1 to 2022Q4. Column (2) replaces the overall credit line commitments by REIT credit line commitments scaled by total assets. Column (3) adds non-REIT credit line commitments scaled by total assets. Column (4) adds term loans to REITs scaled by total assets. Column (5) adds the on-balance sheet exposure to CRE scaled by total assets. All these terms are added jointly with an interaction with the return of the S&P 500. All columns employ a set of controls close to the setup in Acharya et al. (forthcoming) and the Fama-French 3-factor model. All continuous variables are standardized to have a mean of 0 and a standard deviation of 1. Standard errors are clustered at the bank-level.

	Quarterly bank stock returns (%)				
	(1)	(2)	(3)	(4)	(5)
Overall Commitments (std.)	-0.645***				
	(-5.03)				
Overall Commitments (std.) x S&P 500 return	13.48***				
	(7.54)				
REIT CL Exposure (std.)		-0.436***	-0.286**	-0.212*	-0.193
		(-3.82)	(-2.44)	(-1.80)	(-1.65)
REIT CL Exposure (std.) x S&P 500 return		16.71***	13.74***	10.49***	10.52***
		(8.68)	(4.95)	(3.59)	(3.55)
Non-REIT CL Exposure (std.)			-0.596**	-0.597**	-0.599**
			(-2.37)	(-2.37)	(-2.36)
Non-REIT CL Exposure (std.) x S&P 500 return			9.487***	9.310***	10.28***
			(4.11)	(3.97)	(4.20)
REIT TL Exposure (std.)				-0.204*	-0.226**
				(-1.91)	(-2.11)
REIT TL Exposure (std.) x S&P 500 return				7.643**	8.766***
				(2.55)	(2.77)
CRE Exposure (std.)					0.143
					(0.76)
CRE Exposure (std.) x S&P 500 return					7.236**
					(2.41)
Constant	-16.50***	-15.19***	-16.43***	-16.52***	-15.55***
	(-6.67)	(-5.80)	(-4.70)	(-4.56)	(-4.27)
Controls	Y	Y	Y	Y	Y
Fama-French 3 Factor	Y	Y	Y	Y	Y
Obs.	9,013	9,014	9,014	9,014	9,014
R^2	0.497	0.497	0.500	0.501	0.502

Table A5: Effect of REIT Exposure on Bank Stock Returns - VIX version

This table shows results of regressing bank stock returns on bank credit line commitment levels scaled by total assets as well as on the VIX. The sample period is 2005Q1 to 2022Q4. Column (2) replaces the overall credit line commitments by REIT credit line commitments scaled by total assets. Column (3) adds non-REIT credit line commitments scaled by total assets. Column (4) adds term loans to REITs scaled by total assets. Column (5) adds the on-balance sheet exposure to CRE scaled by total assets. All these terms are added jointly with an interaction with the VIX. All columns employ a set of controls close to the setup in Acharya et al. (forthcoming) and the Fama-French 3-factor model. All continuous variables are standardized to have a mean of 0 and a standard deviation of 1. Standard errors are clustered at the bank-level.

	Quarterly bank stock returns (%)				
	(1)	(2)	(3)	(4)	(5)
Overall Commitments (std.)	-0.479***				
	(-3.65)				
Overall Commitments (std.) x VIX	-0.391***				
	(-3.21)				
REIT CL Exposure (std.)		-0.0216	0.0639	0.0545	0.0550
		(-0.19)	(0.45)	(0.37)	(0.38)
REIT CL Exposure (std.) x VIX		-0.259***	-0.214***	-0.0973	-0.120
		(-2.75)	(-3.64)	(-1.34)	(-1.65)
Non-REIT CL Exposure (std.)			-0.517**	-0.498**	-0.488**
			(-2.29)	(-2.18)	(-2.20)
Non-REIT CL Exposure (std.) x VIX			-0.294***	-0.294***	-0.341***
			(-3.59)	(-3.33)	(-3.58)
REIT TL Exposure (std.)				0.106	0.116
				(0.82)	(0.88)
REIT TL Exposure (std.) x VIX				-0.243***	-0.297***
				(-4.20)	(-4.38)
CRE Exposure (std.)					0.0339
					(0.19)
CRE Exposure (std.) x VIX					-0.459***
					(-3.49)
Constant	-13.74***	-11.82***	-13.05***	-12.32***	-11.56***
	(-5.56)	(-4.50)	(-4.03)	(-3.70)	(-3.45)
Controls	Y	Y	Y	Y	Y
Fama-French 3 Factor	Y	Y	Y	Y	Y
Obs.	9,013	9,014	9,014	9,014	9,014
R^2	0.488	0.487	0.489	0.489	0.490

Table A6: Effect of REIT Exposure on Bank Stock Returns - Median split

This table shows results of regressing bank stock returns on a dummy indicating whether bank credit line commitments scaled by total assets are above median as well as on a crisis indicator. The sample period is 2005Q1 to 2022Q4. The crisis indicator takes the value 1 for the GFC (2007Q3 to 2009Q2) and the Covid-19 period (2020Q1). Column (2) replaces the above-median overall credit line commitments dummy by a dummy indicating whether credit line commitments to REITs scaled by total assets are above median. Column (4) adds a dummy indicating whether bank credit line commitments to non-REITs scaled by total assets are above median. Column (5) adds a dummy indicating whether bank term loans to REITs scaled by total assets are above median. Column (6) adds a dummy indicating whether bank on-balance sheet CRE exposure is above median. All these terms are added jointly with an interaction with the crisis dummy. All columns employ a set of controls close to the setup in Acharya et al. (forthcoming). Columns (3) to (6) employ the Fama-French 3-factor model. Standard errors are clustered at the bank-level.

	Quarterly bank stock returns (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
High Overall Commitments	-0.00362					
	(-0.01)					
High Overall Commitments x Crisis	-4.415***					
	(-3.05)					
High REIT CL Exposure		0.189	-0.247	-0.254	1.255	1.412
		(0.34)	(-0.49)	(-0.51)	(1.25)	(1.40)
High REIT CL Exposure x Crisis		-4.129**	-3.552***	-2.693**	-3.490	-4.107**
		(-2.07)	(-2.83)	(-2.19)	(-1.59)	(-2.04)
High Non-REIT CL Exposure				-0.560*	-0.562*	-0.540*
				(-1.94)	(-1.97)	(-1.89)
High Non-REIT CL Exposure x Crisis				-3.255***	-3.280***	-2.927***
				(-3.06)	(-3.08)	(-2.88)
High REIT TL Exposure					-1.840*	-1.667*
					(-1.91)	(-1.77)
High REIT TL Exposure x Crisis					0.907	0.452
					(0.45)	(0.26)
High CRE Exposure						0.876**
						(2.60)
High CRE Exposure x Crisis						-3.545***
						(-4.48)
Constant	3.496	4.450	-13.76***	-15.24***	-16.06***	-15.95***
	(1.08)	(1.26)	(-4.06)	(-4.79)	(-4.89)	(-5.08)
Controls	Y	Y	Y	Y	Y	Y
Fama-French 3 Factor	N	N	Y	Y	Y	Y
Obs.	9,013	9,014	9,014	9,014	9,014	9,014
R^2	0.079	0.078	0.482	0.484	0.484	0.485

Table A7: Effect of REIT Exposure on Bank Stock Returns - Bank Size interactions

This table shows results of regressing bank stock returns on bank credit line commitment levels scaled by total assets as well as on a crisis indicator. The sample period is 2005Q1 to 2022Q4. The crisis indicator takes the value 1 for the GFC (2007Q3 to 2009Q2) and the Covid-19 period (2020Q1). Column (2) replaces the overall credit line commitments by REIT credit line commitments scaled by total assets. Column (3) adds non-REIT credit line commitments scaled by total assets. Column (4) adds term loans to REITs scaled by total assets. Column (5) adds the on-balance sheet exposure to CRE scaled by total assets. All these terms are added jointly with an interaction with the crisis dummy. All variables of interest and their interaction with the crisis dummy are interacted with an indicator for whether a bank is classified as a large bank. All columns employ a set of controls close to the setup in Acharya et al. (forthcoming) and the Fama-French 3-factor model. All continuous variables are standardized to have a mean of 0 and a standard deviation of 1. Standard errors are clustered at the bank-level.

	Quarterly bank stock returns (%)				
	(1)	(2)	(3)	(4)	(5)
Overall Commitments (std.)	-0.246				
	(-1.63)				
Overall Commitments (std.) x Crisis	-0.393				
	(-0.88)				
Large Bank	-0.116	-1.479*	-1.429	-1.476	-0.200
	(-0.17)	(-1.81)	(-1.41)	(-1.43)	(-0.15)
Overall Commitments (std.) x Large Bank	-0.590**				
	(-2.07)				
Crisis x Large Bank	-3.256*	-0.893	-0.567	-0.582	-4.866
	(-1.66)	(-0.43)	(-0.29)	(-0.28)	(-1.54)
Overall Commitments (std.) x Crisis x Large Bank	0.890				
	(0.86)				
REIT CL Exposure (std.)		0.0318	0.136	0.127	0.161
		(0.23)	(1.01)	(0.93)	(1.22)
REIT CL Exposure (std.) x Crisis		-1.267**	-1.272**	-1.271**	-1.093*
		(-2.09)	(-2.04)	(-2.03)	(-1.93)
REIT CL Exposure (std.) x Large Bank		0.306	0.298	0.274	0.151
		(1.25)	(1.05)	(0.94)	(0.56)
REIT CL Exposure (std.) x Crisis x Large Bank		-0.000128	-0.105	-0.111	0.471
		(-0.00)	(-0.10)	(-0.10)	(0.49)
Non-REIT CL Exposure (std.)			-0.476**	-0.467**	-0.362**
			(-2.58)	(-2.53)	(-1.99)
Non-REIT CL Exposure (std.) x Crisis			0.0131	0.00800	-0.249
			(0.03)	(0.02)	(-0.78)
REIT TL Exposure (std.)				0.0883	0.0689
				(0.65)	(0.52)
REIT TL Exposure (std.) x Crisis				0.0472	-0.0115
				(0.12)	(-0.03)
CRE Exposure (std.)					0.826***
					(3.93)
CRE Exposure (std.) x Crisis					-2.607***
					(-6.02)
CRE Exposure (std.) x Large Bank					1.114
					(1.02)
CRE Exposure (std.) x Crisis x Large Bank					-1.532
					(-0.52)

Table A6: Regulatory treatment of various exposures

This table summarizes the treatment of bank exposure to various borrower types under the Basel III regime. TL refers to term loan, CL refers to credit line. The entries in the credit risk columns specify the treatment of the respective exposure type when calculating regulatory risk weights for, e.g., risk-weighted capitalization ratios. The entries in the liquidity risk column specify the treatment of the respective exposure type – committed through a credit line – when calculating the liquidity coverage ratio. Default rates taken from https://www.spglobal.com/ratings/en/research/articles/240624-default-transition-and-recovery-2023-annual-global-financial-services-default-and-rating-transition-study-13137806.

Borrower type	Credit risk TL	Credit risk CL	Liquidity risk
REIT	"IRBA: Banks calculate own risk weight, NBFIs historically low default rates (1.03%) SA: CRE 20.43. Risk weight 75% for BBB"	"Credit Conversion Factor 20% for maturity less than one year. Credit Conversion Factor 50% for maturity of more than one year."	40% outflow assumption
Financial	"IRBA: Banks calculate own risk weight, NBFIs historically low default rates (1.03%) SA: CRE 20.18. Risk weight 50% for BBB"	"Credit Conversion Factor 20% for maturity less than one year. Credit Conversion Factor 50% for maturity of more than one year."	40% outflow assumption
Non-financial	"IRBA: Banks calculate own risk weight, NFC historically higher default rates (1.94%) SA: CRE 20.43. Risk weight 75% for BBB"	"Credit Conversion Factor 20% for maturity less than one year. Credit Conversion Factor 50% for maturity of more than one year."	10% outflow assumption
CRE loans	"IRBA: Banks calculate own risk weight SA: CRE 20.87. Risk weight LTV-dependent with 90% for medium LTV"	"Credit Conversion Factor 20% for maturity less than one year. Credit Conversion Factor 50% for maturity of more than one year."	10% outflow assumption

Figure A1: Commercial Real Estate (CRE) loans by bank types

This figure shows the reported on-balance sheet exposure to the commercial real estate market scaled by the total book value of equity of the bank. Data is from the FR Y-C (FDIC Call Reports) at the quarterly frequency from 2013Q1 to 2023Q2. Banks are classified as follows: community banks (assets $<$ \$10 billion), regional banks (assets between \$10 and \$100 billion), super-regional banks (assets between \$100 billion and \$250 billion), and largest banks (assets greater than \$250 billion).

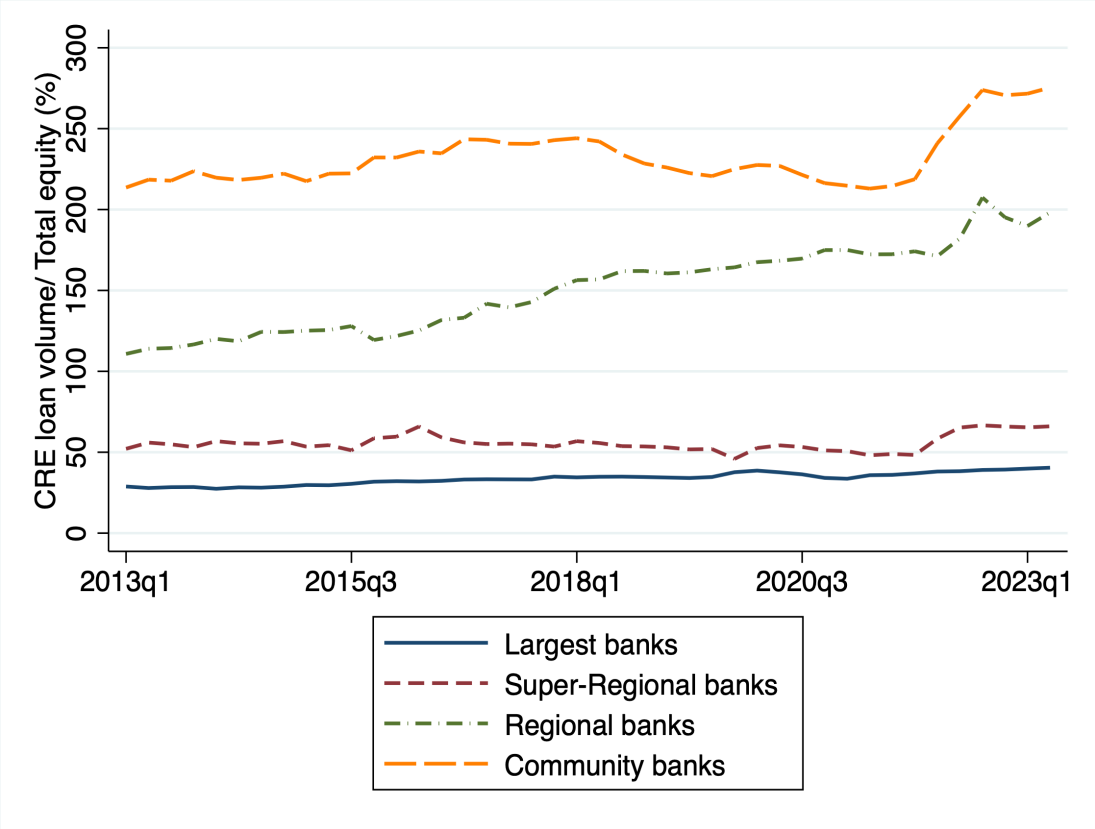
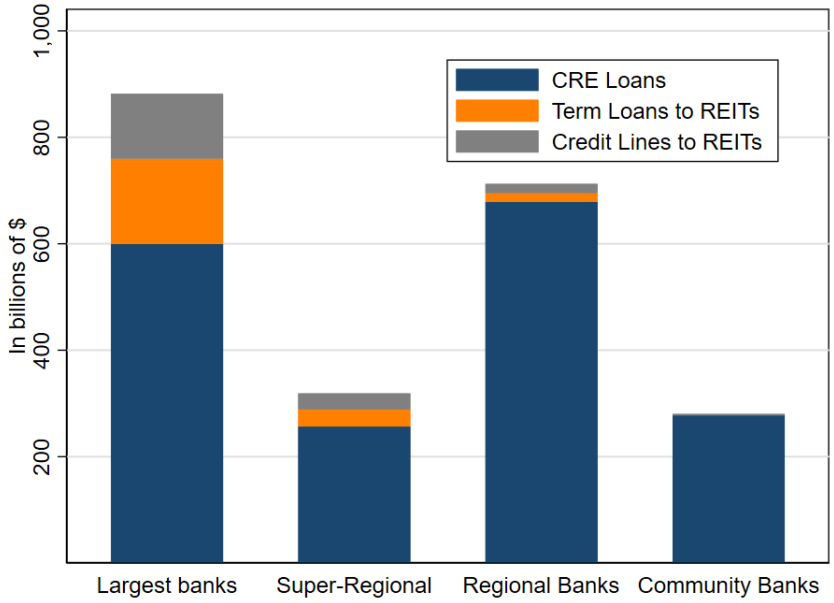


Figure A2: Banks' Exposure to Commercial Real Estate (CRE) by Bank Type

This figure shows the total exposure of banks to commercial real estate (CRE) by stacking their direct exposure through on-balance sheet CRE loans and indirect exposure through banks' term loans and credit lines to Real Estate Investment Trusts (REITs). Banks are classified as follows: community banks (assets < $10 billion), regional banks (assets between $10 and $100 billion), super-regional banks (assets between $100 billion and $250 billion), and largest banks (assets greater than $250 billion). Data is from DealScan, FR-Y9C filings, and Capital IQ.

Panel A - Comparing direct and indirect exposure to CRE by bank type in 2022Q4



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Panel B - Comparing direct and indirect exposure to CRE by bank type from 2013Q1 to 2023Q2

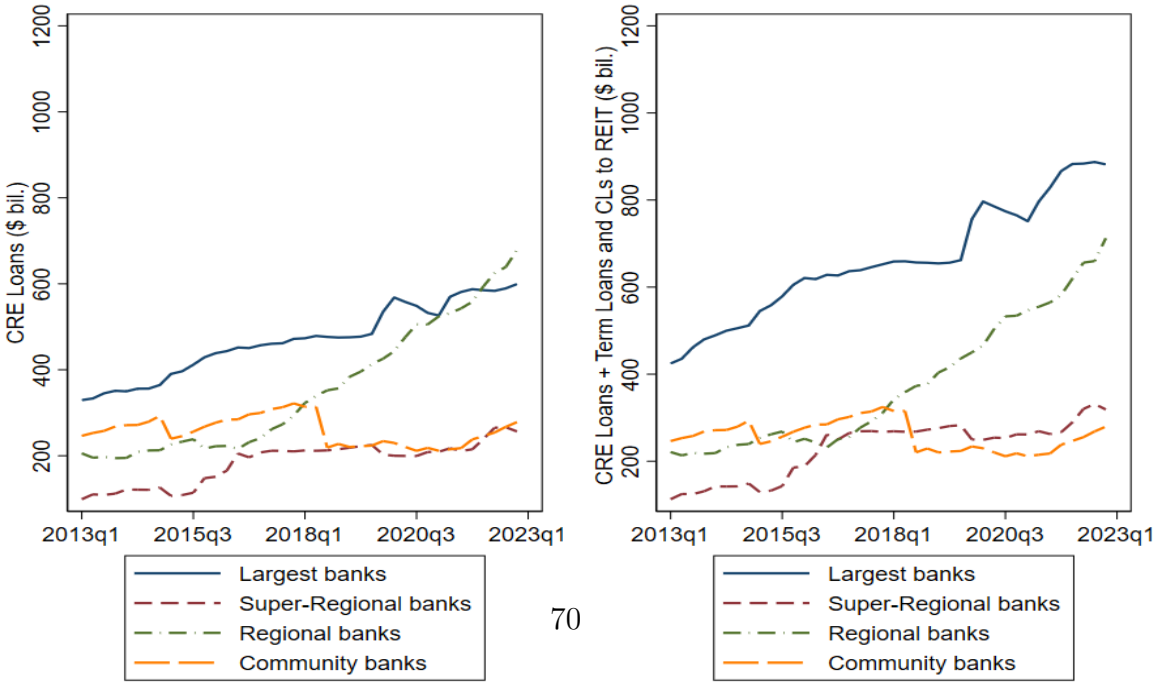


Figure A3: Banks' Term Loan and Credit Line Exposure to REITs - Scaled by Equity

This figure plots the combined term loan and credit line exposure of banks to REITs scaled by the total equity of the bank. Data is from the FR Y-C at the quarterly frequency from 2013Q1 to 2023Q2. We split banks into three types: community banks (assets $<$ 10\$ billion), regional banks (assets between 10\$ and 100\$ billion), and large banks (assets over 100\$ billion)

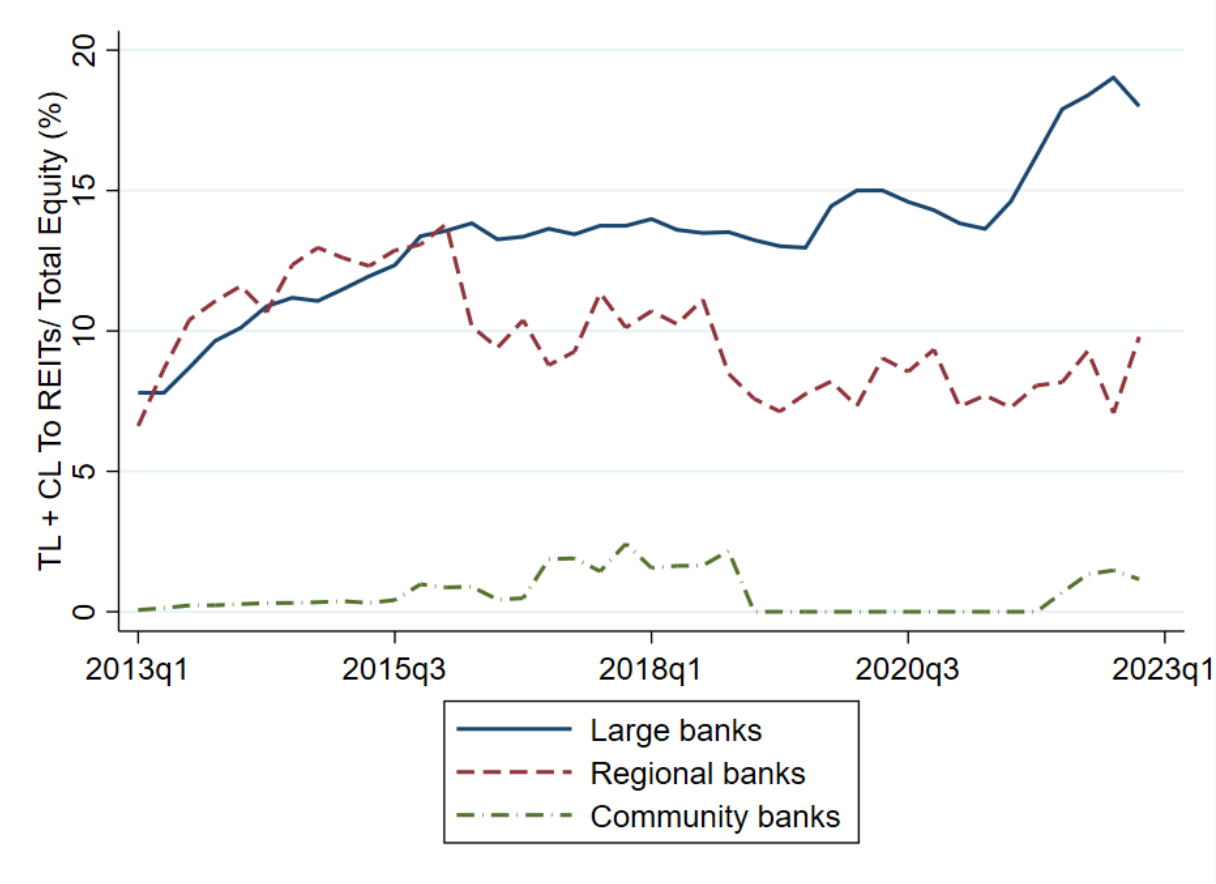
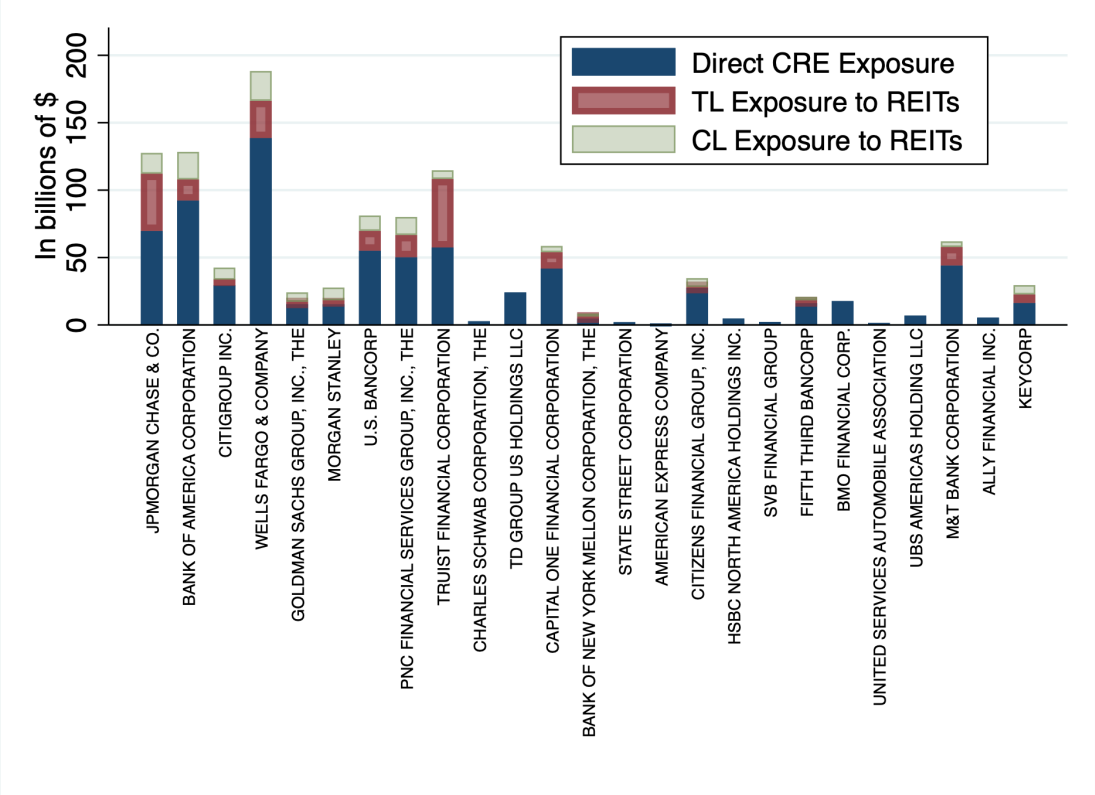


Figure A4: Banks' total exposure to CRE - 2022 Q4

Panel A of this figure plots the total exposure of the largest 25 banks in the US to the CRE market split into three categories: their direct on-balance sheet CRE exposure, their term loans to REITs and their credit lines to REITs. Panel B then displays the share of the term loan and credit line exposure to REITs in the sum of the three categories.



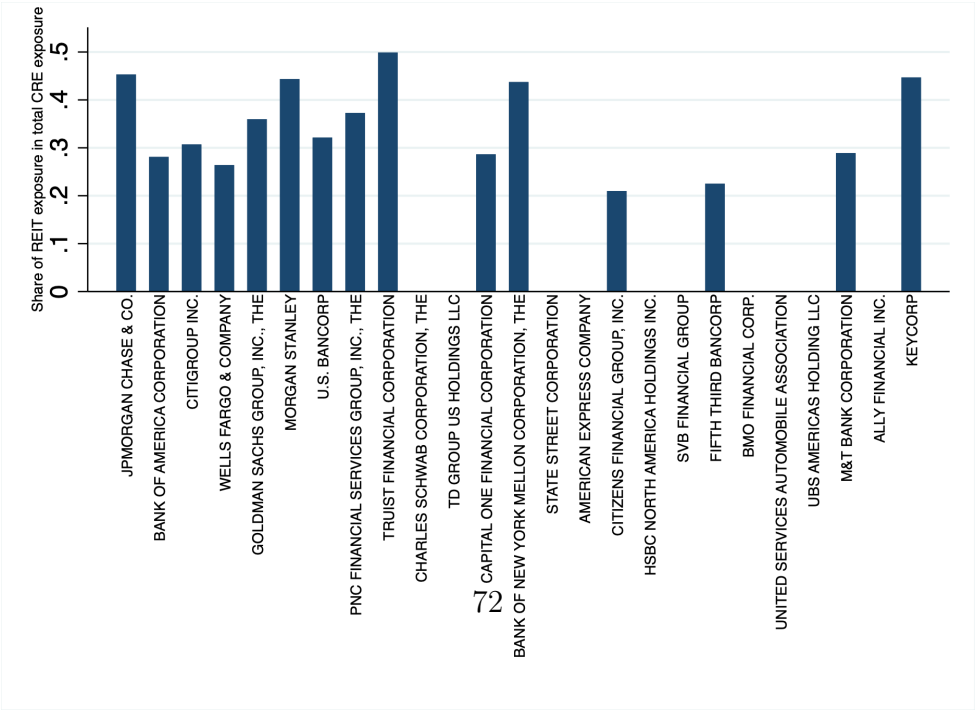
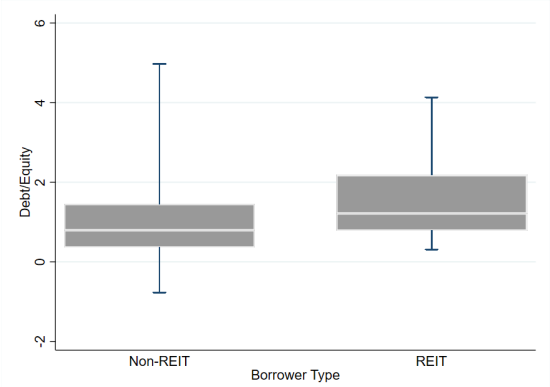
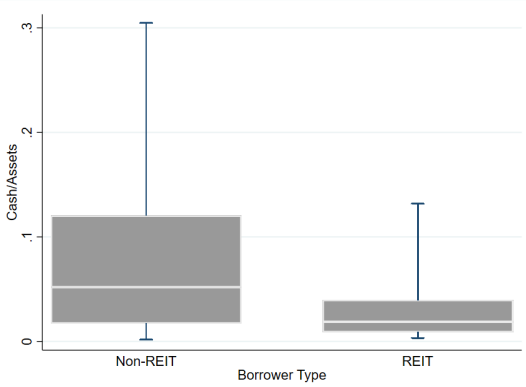


Figure A5: Comparing REITs to non-REITs

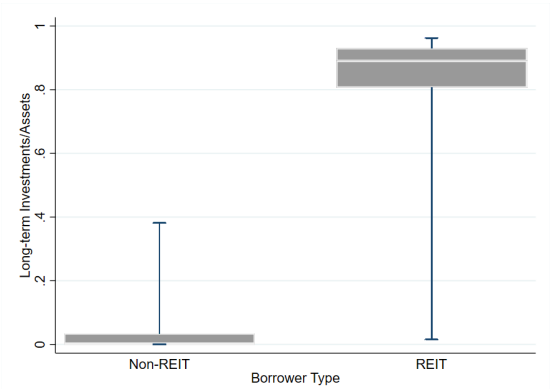
This figure compares the distribution of REIT and non-REIT financial characteristics. The box plots the 25th, median, and 75th percentile, while the caps denote the 5th and 95th percentile of the distribution. The distribution is based on the full sample between 2005 and 2022 and data is from Capital IQ and Compustat.



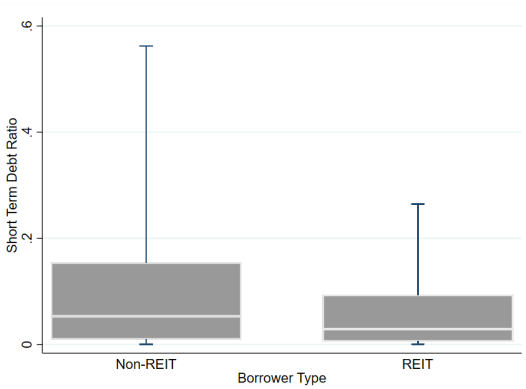
(a) Leverage



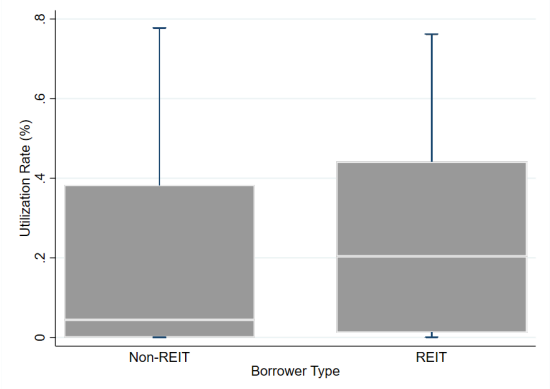
(b) Cash-to-Assets



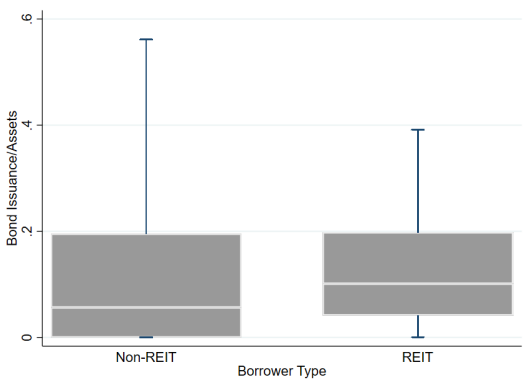
(c) Long-term Investments to Assets



(d) Short-term debt to Total Debt



(e) Credit Line Utilization Rate



(f) Long-term Debt Issuance to Assets

Figure A6: Median credit line utilization rates by borrower category

This figure plots the median credit line utilization rate by borrowers in each quarter. We define the utilization rate as the drawn portion of total credit line commitments and plot the median utilization rates. We separate borrowers into three groups - REITs, financials excluding REITs, and non-financial firms. Data is from 2010Q1 to 2022Q4 and is obtained from Capital IQ.

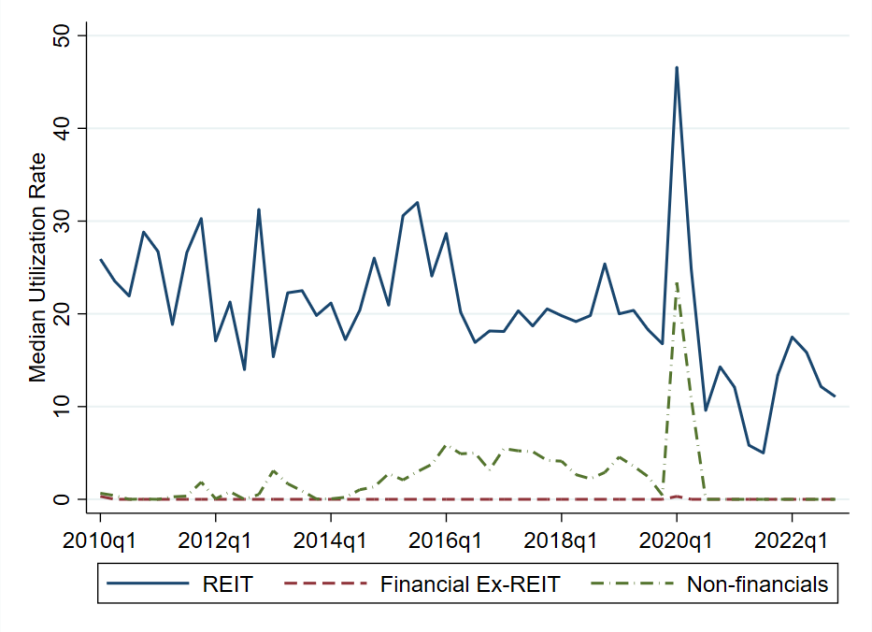
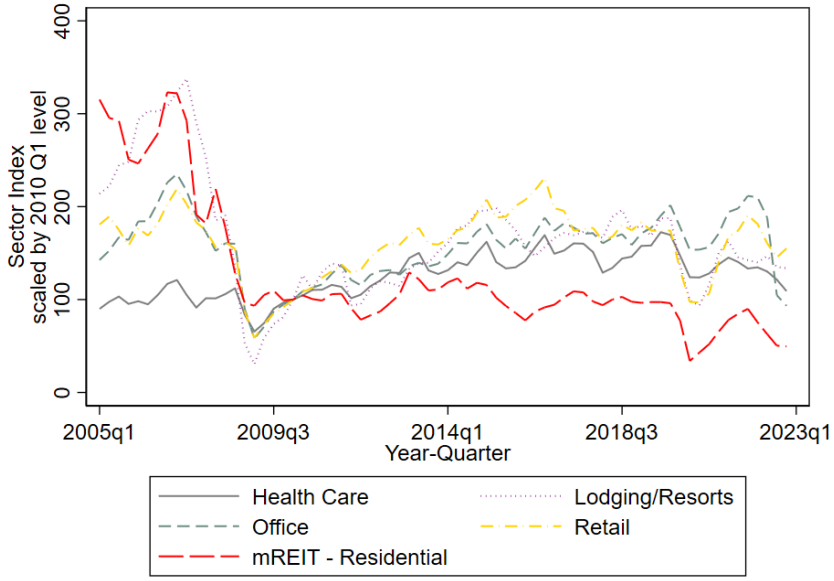


Figure A7: REIT long-term stock market performance by subsector

This figure plots the quarterly stock market returns of various REIT subsectors from 2005Q1 to 2022Q4. All stock prices are scaled by values in 2010Q1. Indices are created as a weighted average of individual REIT prices, with the weights corresponding to the market capitalization of each REIT in 2010Q1. Panel A plots REIT subsectors with less than 200% growth rate between 2010 and 2022, and Panel B plots REIT subsectors with more than 200% growth. Stock price data is from CRSP.

Panel A - Small growth REITs



Panel B - Large growth REITs

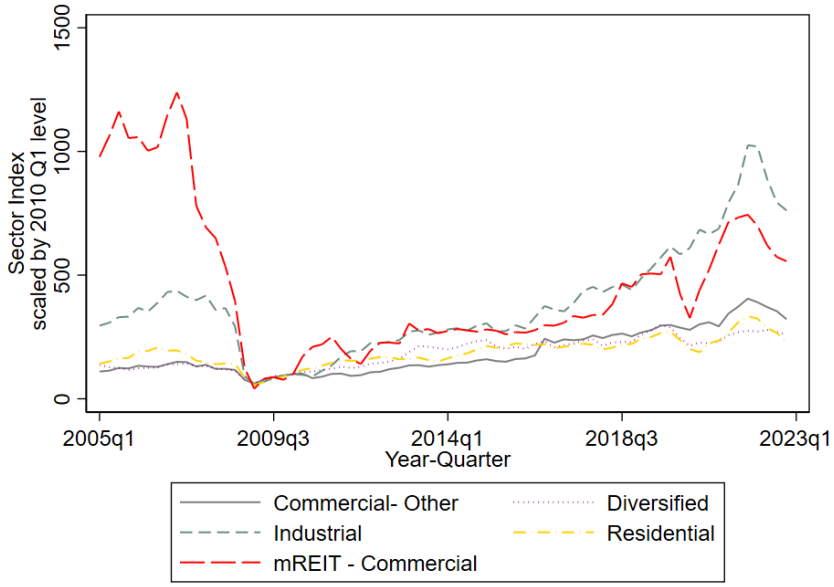
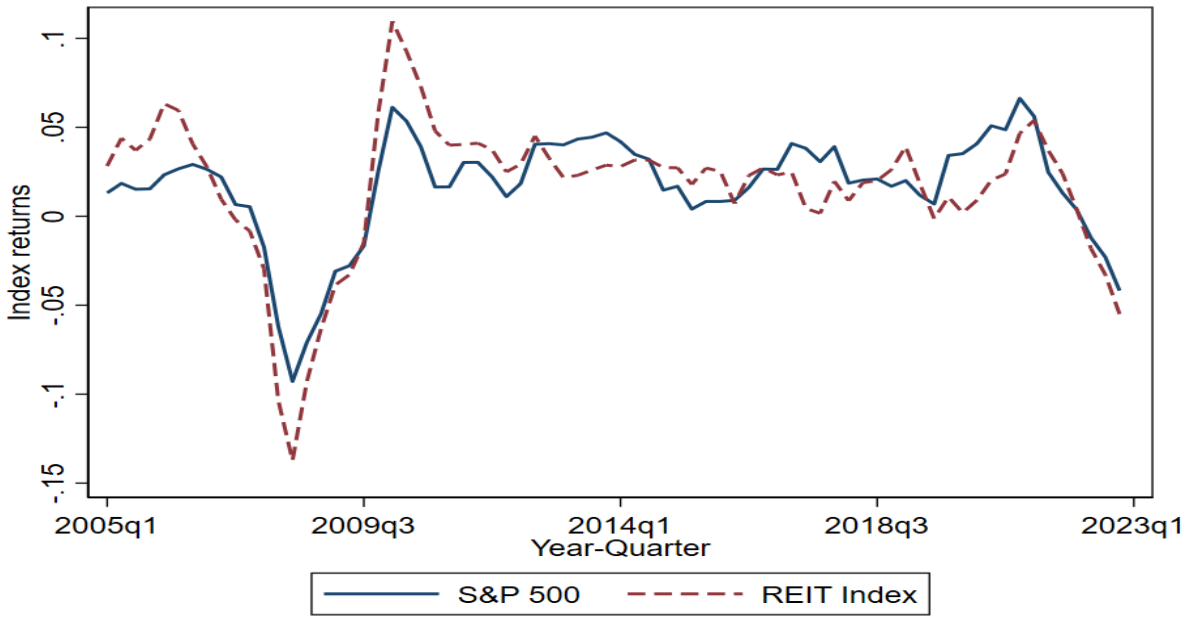


Figure A8: Co-Movement of the S&P 500 and REIT stock market performance

This figure shows comparisons between the S&P 500 and a REIT stock market index. Panel A plots the quarterly return smoothed with a symmetric 7-quarter moving average. Panel B plots a 2-year backward-looking moving average of the volatility of quarterly returns. Data is from 2005Q1 to 2022Q4 and is obtained from CRSP.

Panel A - Quarterly index return



Panel B - Volatility of Returns

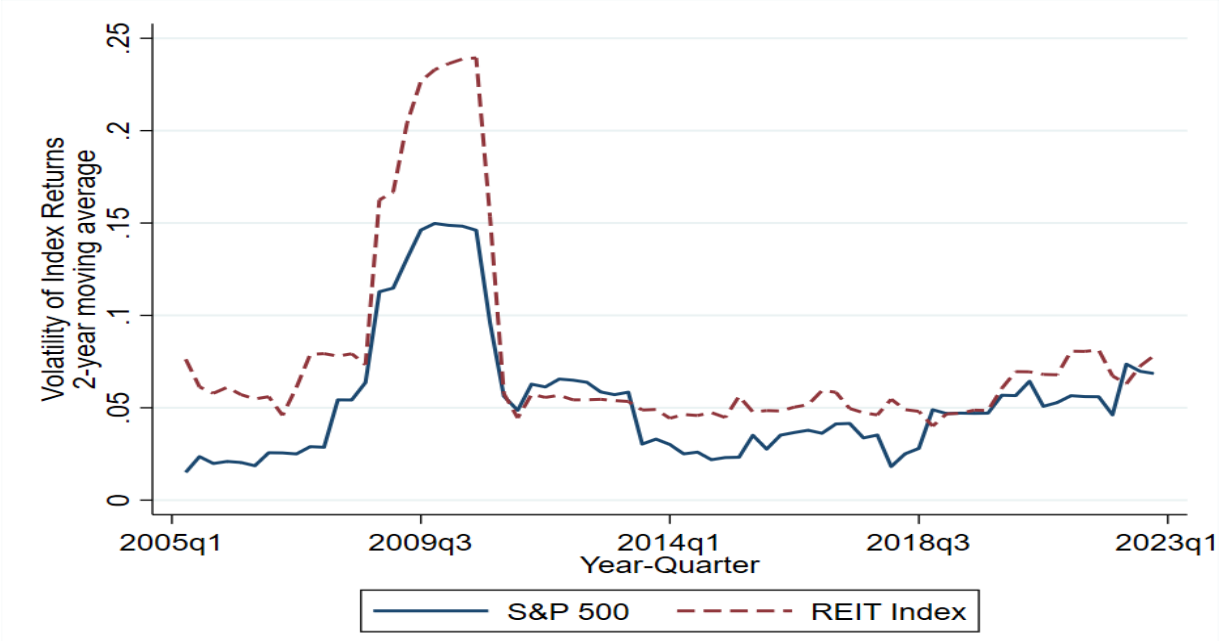


Figure A9: SRISK comparison bank-by-bank

This figure shows comparisons between the market revaluation effect from the SRISK exercise for three scenarios: considering credit line commitments without heterogeneity, considering credit line commitments with REIT heterogeneity, and considering CRE exposure.