

# Corporate Diversification and the Cost of Debt: Evidence from REIT Bank Loans and Mortgages

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## Abstract

This paper investigates whether corporate diversification by property type and by geography reduces the costs of debt capital. It employs asset-level information on the portfolios of US REITs to measure diversification, and looks at two of their main sources of debt capital: 3,289 commercial mortgages and 957 bank loans. The paper finds that diversification across different property types does indeed dependably reduce the cost of these different types of debt. The effect is 6.9 to 8.7 basis points for bank loans if a firm's property Herfindahl Index is lowered by one standard deviation. The corresponding effect for commercial mortgages is around 23 basis points. For mortgages, collateral diversification rather than corporate diversification is priced. Additionally, after the crisis, the salience of the collateral asset increases. For diversification across regions, we do not find a consistent relationship with capital costs.

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# 1 Introduction

Diversification has been called the only free lunch in Finance, and for many assets, the risk-reduction effects of diversification have been well documented. But whether lenders reward the lower risk resulting from a well-diversified portfolio by a lower cost of debt capital remains an open question, especially so for real estate.

Franco, Urcan and Vasvari (2010) investigate the effect of corporate diversification on the cost of debt and find that diversified firms have lower bond spreads, especially when firms diversify across unrelated industrial segments. In a more recent paper, Aivazian et al. (2015) study the impact of diversification on price and non-price contract terms of bank debt, and find that diversified firms have significantly lower loan rates than their focused counterparts. Hann, Ogneva, and Ozbas (2013) document that the cost of capital is substantially lower for diversified firms than for a portfolio of comparable single-segment firms, especially if the different segments of the diversified firms have low cash flow correlations. There exists also some evidence showing that banks with (regionally) diversified loan portfolios face a lower cost of debt (Deng, Elyasiani, and Mao 2007).

As far as we know, these are the only papers investigating the issue and it has not been studied at all for real estate. However, real estate companies provide an ideal setting to study this, since they allow the researcher to assess corporate diversification in a very precise manner.

In this paper, we attempt to fill this gap in the literature by investigating the impact of real estate portfolio diversification on the cost of debt. We use data on the bank loans and mortgages of Real Estate Investment Trusts (REITs) to link loan and mortgage spreads to diversification using an extensive set of control variables. We investigate diversification in two dimensions: property type and geographic location of all individual property assets owned by 145 US REITs between 1995 and 2014. We analyze diversification both at the REIT portfolio level and at the level of specific portfolios used as collateral to secure multi-asset mortgages.

High dividend payout ratios (Ott, Riddiough, and Yi, 2005) combined with low cash

holdings (Hardin, Highfield, Hill, and Kelly, 2009) give debt financing an important role in the capital structure of REIT firms. While the economic magnitudes differ, studies show that REITs tend to maintain significantly larger debt ratios than their non-REIT counterparts.<sup>1</sup> Given the importance of debt in financing real estate investments of REITs, debt financing costs are likely to have a significant impact on investors' return on equity. A better understanding of the relationship between portfolio structure and the cost of debt to finance the assets in the portfolio would thus be useful.

While not much is known about the relationship between corporate diversification and the cost of debt, there exists a burgeoning literature investigating the impact of corporate diversification on firm value. Lang and Stulz (1994), Berger and Ofek (1995), and Servaes (1996) show that diversified firms trade at a discount relative to their non-diversified industry peers, but other studies document results that put some nuances to this finding.

For example, Graham, Lemmon, and Wolf (2002) show that the diversification discount can be explained by firms' tendency to acquire companies that trade at a discount. Villalonga (2004) attributes the apparent diversification discount to the problems in the Compustat industrial segment data that is a result of self-reporting biases. Using establishment-level data free of such biases, Villalonga (2004) finds a diversification premium. This underlines the importance of precise measurement of corporate diversification.

In that regard, studying REITs has several important benefits. First, the data on REIT portfolio holdings is free of self-reporting biases as the location and nature of each property asset in a REIT's portfolio are assessed and reported unequivocally. Second, as REITs are legally required to generate 75% of their income from real estate and real estate-related assets, this industry is relatively homogenous, with firms that have similar growth opportunities and other characteristics. As the majority of their assets are composed of buildings, REIT assets are more tangible compared to assets of firms operating in other industries, thus allowing clear-cut measurement of focus and diversification.

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<sup>1</sup>See Feng, Ghosh, and Sirmans (2007), and Alcock, Steiner, and Tan (2014) for examples.

Although our key research question has not been addressed directly, there are some studies that look at the value effects of portfolio diversification for REITs. Specifically, both Capozza and Seguin (1999) and Eichholtz, Op 't Veld, and Schweitzer (2000) investigate whether REIT diversification affects performance. Capozza and Seguin (1999) evaluate the impact of REIT focus on corporate-level cash flows and asset-level cash flows separately. The authors document that REIT focus is positively associated with asset-level cash flows but not related to corporate-level cash flows. They explain this finding by noting that the benefits of diversification at the asset level are offset by the operational expenses at the corporate level.<sup>2</sup>

Eichholtz, Op 't Veld, and Schweitzer (2000) show that regional diversification is associated with better REIT stock performance, while diversification across property types seems to destroy shareholder value. A more recent study on this topic is by Hartzell, Sun, and Titman (2014), who also analyze the diversification-performance relationship for a REIT sample. They find a negative relationship between geographic diversification and firm value. However, these results do not hold for property type diversification. They also show that geographically diversified REITs have lower firm value if they have less institutional ownership and less concentrated ownership.

We do not expect that the results regarding the relationship between REIT diversification and equity performance are very predictive for our analysis regarding the relationship between diversification and the cost of debt. For equity holders, both the upside and the downside of cash flow volatility is relevant, while lenders are mostly concerned with downside risk, since they will not profit from any upside above the expected performance. From the standpoint of a firm's equity providers, firm specialization may be a good idea if this creates returns to managerial scope, and thereby stronger stock performance. The additional specific risk can easily be diversified away. For debt providers, the specific risk resulting from managerial specialization would not increase loan performance, but may well enhance default risk, so lenders are

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<sup>2</sup>Capozza and Seguin (1999) also briefly touch upon the relationship between diversification and interest expenses, but the data they use are quite limited in scope and time, covering only a subset of listed REITs and only eight years. Furthermore, their analysis lacks appropriate control variables needed for solid conclusions in this matter.

more likely to value corporate diversification, which would translate into lower loan spreads.

Our contribution to the literature is twofold. First, we evaluate the relationship between firm diversification and cost of debt using a single homogenous industry where the majority of firms' asset holdings are real estate properties. Second, we disentangle collateral diversification from firm diversification and directly document the impact of collateral diversification on the cost of the debt to finance it. Defining diversification measures using properties that are linked to a specific loan allows us to capture the asset characteristics with first-order importance to the creditors. Furthermore, the mortgage loan sample enables us to control for the individual characteristics of the properties used as collaterals for a particular loan, which alleviates the concerns about results being driven by omitted variables on the collateral level.

We investigate the relationship between bank loan spreads and firm diversification using the Dealscan database and measure portfolio diversification by calculating Herfindahl indices. We find that a one standard deviation decrease in a firm's property type Herfindahl Index lowers the bank loan spread by 0.09 standard deviation, or 6.9 basis points. The subsample analysis shows that the decline in spread is more pronounced for secured loans (8.7 basis points). Our findings on geographical location demonstrate that a one standard deviation decrease in a firm's geographic Herfindahl Index increases the spread by 7.5 basis points. Furthermore, the increase in spread goes up to 10.2 basis points when we restrict the sample to secured loans. Overall, we find that loan spreads diminish as REITs diversify by asset type and focus geographically.

We also evaluate the impact of diversification on commercial mortgages using data from SNL. SNL provides information on individual REIT mortgages and on the assets on which they are collateralized. This allows us to create a direct diversification measure based on the real assets collateralizing the mortgage, on top of our analysis on the company level. Furthermore, we can control for the characteristics of the properties employed to secure a particular mortgage loan. Mortgages deviate from bank loans with prioritizing the collateral rather than the cash flows of firms as banks mainly care

downside risk, that is when real estate mainly secures the lending.

Consistent with the loan analysis, our analysis indicates that firms enjoy lower mortgage spreads with greater diversification by property type. However, in line with our expectations, the relationship mainly holds at the collateral level. We document that a one standard deviation decrease in a firm's property type Herfindahl Index reduces the spread by 23 basis points after controlling for collateral characteristics. The relationship is prominent when there are more properties in a collateral pool.

We also analyze the crisis and post-crisis periods. Our results demonstrate that firms benefit more from collateral diversification after the crisis hit. Additionally, firm diversification also matters in the crisis and post-crisis periods. We do not find a significant effect of geographic diversification in mortgage pricing, although the signs of the coefficients are both negative. Overall, these findings indicate that lenders have become more critical for the assets securing their mortgage lending and seem to reward firms more if firms diversify their assets and collaterals by their type after the crisis hit.

The remainder of the paper is organized as follows: Section 2 provides the hypothesis development. Section 3 explains the data and reports the descriptive statistics. Section 4 reports the empirical findings on both bank loans and mortgages. We conclude in the final section.

## **2 Literature and Hypotheses**

This section discusses the literature and hypotheses related to property type and geographical diversification that we test in this study. There is a well-established literature regarding the impact of corporate diversification on firm value, and some of that literature explicitly discusses effects on debt financing. This impact evolves around two main channels working in opposite directions: the coinsurance effect and principal-agency issues.

The research on the impact of the coinsurance effect goes back to Lewellen (1971) who proposed that the imperfect correlation between the cash flow streams of different

business segments of a conglomerate reduces the expected default rate, which in turn enables a higher debt capacity for a diversified firm relative to a stand-alone firm. Higgins and Schall (1975) refine this coinsurance hypothesis in a theoretical framework. Moreover, the existence of internal capital markets could improve the efficiency of investment (Matsusaka and Nanda, 2002). These effects should be beneficial to lenders, possibly translating into lower required interest rates.

On the other hand, agency-based arguments predict corporate diversification to decrease corporate performance. This would likely increase lender risk, translating into a higher cost of debt. For example, Nagarajan and Sridhar (1996) develop a model in which a firm is subject to product market competition, and show that mandated segment disclosures may induce firms to reduce the value relevance of their disclosures in order to deter market entry by a rival firm. Scharfstein and Stein (2000) model the inefficiencies in internal capital allocation, and argue that the rent-seeking behavior of divisional managers can distort the functioning of internal capital markets and lead to overinvestment into weak divisions and underinvestment into good divisions. Rajan, Servaes, and Zingales (2000) model how internal power struggles can lead to inefficiencies in capital allocation of a conglomerate. Their model predicts that the inefficiency in internal resource allocation increases with the diversity in resources and investment opportunities of the divisions. Using a panel of diversified firms operating in the U.S. over the period from 1980 to 1993, they find that greater the diversity of a conglomerate is, the lower the diversified firm's value relative to a portfolio of single-segment firms is.

The literature on the impact of diversification on firm value pays far less attention to geographical diversification than industry diversification (Waldron, 2011), possibly because geographical diversification is so hard to measure precisely for corporations. The existing research on geographical diversification is mainly focused on whether firms'

operations are internationally diversified or not.<sup>3</sup> There is no literature at all on the effect of geographical diversification and the cost of debt, so we cannot use existing results to guide us in our hypotheses development on this matter.

We expect that the coinsurance and agency issues play their roles here as well, but we propose a third dimension likely affecting the trade-off between concentration and diversification: the effects of distance. Other than property type diversification, geographic diversification inevitably introduces distance into a property portfolio. Eichholtz, Holtermans, and Yönder (2016) show that distance between a property and its owner significantly decreases rental cash flows. If lenders know this, they should find geographic diversification less desirable than property type diversification. Besides that, distance between a property and its owner also likely implies distance between a property and the lender, making it harder for the lender to judge the quality of the property asset, its tenants, and therefore its cash flow quality. This added uncertainty would likely make geographic diversification relatively less attractive to lenders.

Based on the literature cited above, we would expect property type diversification to be associated with lower spreads on real estate loans. This is also because the risk-reduction effects of property diversification are relatively high due to low cross-property-type correlations (Geltner and Kluger, 1998), while agency issues are unlikely to play a big role in real estate, given its rather high transparency.

On the other hand, the distance effects described above would make geographic diversification less desirable for lenders, which puts upward pressure on spreads. So here, the opposing effects of diversification and distance may lead to results than can go either way, and that could even cancel each other out.

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<sup>3</sup>The empirical evidence on the impact of international diversification on firm value is mixed. Denis, Denis, and Yost (2002) find that, internationally diversified firms tend to trade at a discount relative to a portfolio of single-segment, domestic firms. On the other hand, Morck and Yeung (1991) find that multinationality has no significant impact on shareholder value as measured by firms' q ratio. Goerzen and Beamish (2003) find a positive association between economic performance and international asset dispersion.



### 3 Data and Summary Statistics

To measure firm diversification, we obtain data on the property portfolios of REITs from the SNL Real Estate database. SNL provides information on each property that is purchased or sold by a U.S. REIT. We collect data regarding 62,909 properties purchased or sold by 368 REITs in the U.S. for the time period between 1995 and 2014.

We observe the type and location as well as the net book value, purchase date, and sale date of each property in each REIT's portfolio. We classify property types into eight categories as retail, apartment, office, industrial, health care, hotel, self-storage, and others. Panel A of Figure 1 shows the average REIT portfolio share of each property type in the SNL universe. While retail assets have the largest share (21.72%), health care (8.19%) and self-storage (3.43%) are the property types with the smallest average shares. The portfolio weights of the other property types range between 10.19% and 19.34%.

The U.S. commercial real estate market is divided into eight subregions based on the definitions of the National Council of Real Estate Investment Fiduciaries (NCREIF): Pacific, Mountain, West North Central, Southwest, East North Central, South East, Northeast, and Mideast. Since this regional disaggregation has become the standard in the U.S. institutional investment market, we adhere to it in this paper. Panel B of Figure 1 presents the average portfolio share for each subregion in the SNL universe. While Pacific region has the highest average portfolio share (18.27%), Mountain and West North Central are the regions with the lowest average shares, 7.12% and 4.45%, respectively. The average share of properties located in other regions range between 11.66% and 16.52%.

<Figure 1 about here>

Following Capozza and Seguin (1999) and Hartzell, Sun, and Titman (2014), we measure asset diversification by Herfindahl indices based on property types and NCREIF

subregions. More specifically,

$$Firm\ HHI\ (by\ property\ type)_{it} = \sum_{j=1}^8 \left( \frac{Net\ Book\ Value\ of\ Property\ Type_{jit}}{Portfolio\ Net\ Book\ Value_{it}} \right)^2$$

$$Firm\ HHI\ (by\ subregion)_{it} = \sum_{j=1}^8 \left( \frac{Net\ Book\ Value\ of\ Properties\ in\ jth\ Subregion_{jit}}{Portfolio\ Net\ Book\ Value_{it}} \right)^2$$

where  $j$  denotes one of the property types or one of the subregions,  $i$  denotes the REIT, and  $t$  denotes the year in which the loan facility starts. We require that each year, the book values are available for at least 90% of the properties in a REIT's portfolio and there are at least three properties with non-missing net book values.<sup>4</sup> We also define a dummy variable that indicates whether *Firm HHI* is above or below the sample median.

$$Focus\ Dummy\ (by\ property\ type)_{it} = \begin{cases} 1, & Firm\ HHI\ (by\ property\ type)_{it} > Median\ HHI \\ 0, & otherwise \end{cases}$$

$$Focus\ Dummy\ (by\ subregion)_{it} = \begin{cases} 1, & Firm\ HHI\ (by\ subregion)_{it} > Median\ HHI \\ 0, & otherwise \end{cases}$$

As an alternative measure of diversification, we also calculate the number of property types and subregions with non-zero portfolio shares. Our results are robust to HHI definitions based on five property types (Apartment, Industrial, Office, Retail, and Others) and on states rather than subregions.

Panel A and B of Figure 2 plot average *Firm HHI* by property type and by subregion over time. While on average, property type concentration has been stable within a 10% range, geographic concentration has been decreasing over time.

<Figure 2 about here>

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<sup>4</sup>Alternatively, *Firm HHI* can be calculated based on the number of properties rather than book value shares. Our results are robust to these alternative definitions of HHI based on portfolio fraction of property types and subregions.

After calculating the firm-level concentration measures, we merge the SNL data set with the Loan Pricing Corporation's (LPC) Dealscan database. This database contains commercial (primarily syndicated) loans made to U.S. firms since the 1980s with a detailed set of additional information that we will employ as control variables. The Dealscan database covers over half of all commercial loans made in the U.S. (Carey and Hrycray, 1999). Our sample includes all Dealscan-covered commercial loans made to U.S. REITs with a facility starting year of 1995 or later as the coverage of the database increases since then.

We merge the Dealscan dataset to the SNL sample using the links provided by Chava and Roberts (2008). The Dealscan data set includes both individual facilities as well as multiple facilities with similar loan terms and pricing packaged together. Following Hertzell and Officer (2012), we use the largest facility in each deal or package as our unit of observation.

We control for a wide set of loan characteristics that previous research has shown to be related to loan spreads (e.g. Bharath, Sunder, and Sunder, 2008, and Hertzell and Officer, 2012). All our regressions include loan maturity, loan amount, loan type indicators (term loans, revolver loans  $\geq$  (or  $<$ ) 1 year and 364-day facility), primary purpose indicators (acquisition-related, corporate purposes, debt repayment, real estate, takeover, and working capital), indicators showing whether the loan is secured, syndicated, senior, and has financial covenants.

We define three indicator variables, *Secured Loan*, *Unsecured Loan*, and *Missing* that are equal to unity if the securitization status is secured, unsecured, or missing, respectively. *Syndicate* is a dummy variable that takes one if the distribution method is syndication. *Senior* is an indicator variable for whether the loan is senior. *Financial Covenant* equals one if there are any financial covenants attached to the loan and zero otherwise. After matching with HHI indices, our final sample consists of 958 firm-package observations for 145 stock exchange-listed equity REITs over the period between 1995 and 2014. Following the literature, we use all-in-drawn spread as our dependent variable which is measured in basis points net of LIBOR and any recurring

annual fees on the loan.

To control for firm characteristics, we collect REIT-level accounting data from SNL Real Estate. In all specifications, we include the logarithm of total assets, the debt ratio, the return on assets (ROA), and the market-to-book as financial controls. *Debt ratio* is defined as the ratio of total book debt to book value of assets. *ROA* is calculated as operating income scaled by total assets. *Market-to-book* is the ratio of the book value of total assets plus market capitalization minus common equity to the book value of total assets. All ratio variables and all-in-drawn spread are winsorized at the top and bottom 1%.

Panel A of Table 1 reports the descriptive statistics. The average loan spread in our sample is 163 basis points with a standard deviation of 78 basis points. REITs are more concentrated in terms of property type than subregion as the mean of *Firm HHI* by property type is 0.874 while the average *Firm HHI* by subregion is only 0.382. Additionally, variation in *Firm HHI* by subregion is larger than by property type with standard deviations of 0.263 and 0.192, respectively. The value of total assets is around \$2.96 billion for an average REIT. The average debt-to-assets ratio is 48.2%, an average REIT has a ROA of 3.117, and a market-to-book ratio of 1.303.

The average loan size in our sample is around \$295 million and the average time to maturity is 3.418 years. While 65.6% of our sample loans are line of credit, term loans constitute 22% the sample. In our sample, 27.6% of the loans are secured. REITs with secured loans are smaller, less profitable, and have lower market-to-book ratio than REITs with unsecured loans. Consistent with the previous literature, we find that the average spread for secured loans is higher than the average spread for the whole sample.<sup>5</sup>

<Table 1 about here>

We further evaluate the impact of diversification using the commercial mortgage data provided by SNL Real Estate on an annual basis. The data covers buildings in REIT

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<sup>5</sup>Hertzel and Officer (2012) argue that this counterintuitive result can be explained by the secured status being correlated with some component of credit risk that is missing from the set of control variables used in credit spread analysis.

portfolios that are used as collateral for a commercial mortgage, as well as the mortgage amount, the interest rate, the maturity date, an indicator whether the loan is a fixed rate contract, and a dummy for “cross-collateralization” indicating whether there are other properties securing the same mortgage. By matching the maturity date of encumbrance data across properties of a REIT in a given year, we are able to determine the set of properties jointly collateralizing the same mortgage. Similar to their firm counterparts, *Collateral HHI* indices by property type and subregion are calculated as follows:

$$Collateral\ HHI\ (by\ property\ type)_{it} = \sum_{j=1}^8 \left( \frac{Book\ Value\ of\ Property\ Type_{jit}}{Loan\ Collateral\ Book\ Value_{it}} \right)^2$$

$$Collateral\ HHI\ (by\ subregion)_{it} = \sum_{j=1}^8 \left( \frac{Book\ Value\ of\ Properties\ in\ Subregion_{jit}}{Loan\ Collateral\ Book\ Value_{it}} \right)^2$$

where  $i$  denotes the loan and  $j$  denotes the property collateralizing the loan. There are two advantages of using loan-specific Herfindahl indices of property type and subregion over their firm-level counterparts. First, the loan-level Herfindahl indices represent the characteristics of the properties that are directly linked to a specific loan. Therefore, they have a first-order importance to the creditors. Second, the mortgage loan sample enables us to control for the individual characteristics of the properties used as collateral for specific loans, which alleviates possible concerns about omitted variables at the collateral level. More specifically, we include the following property-specific characteristics in our analysis: an indicator showing whether the property’s age is less than 10 years, property type dummies, region dummies, and an indicator showing whether the property is renovated.

We calculate the mortgage spread by subtracting the 1-year LIBOR rate from the interest rate of encumbrance at origination to be consistent with the Dealscan data set.<sup>6</sup> The time to maturity is calculated by the difference between the year of maturity and

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<sup>6</sup>Alternatively, in order to control for the changes in the yield curve across time, we also calculate the mortgage spread by subtracting the Treasury rate with the closest time to maturity from the interest rate of encumbrance at origination. We obtain constant maturity treasury rates from the U.S. Treasury. Our unreported findings demonstrate similar results to using the spread over 1-year LIBOR.

the derived year of origination.<sup>7</sup> We also observe net book value of assets and the encumbrance value of a mortgage provided by SNL.

We present the descriptive statistics for the mortgage data in Panel B of Table 1. There are 5,302 properties collateralizing 3,289 mortgages (2,439 with single collateral asset and 850 with multiple collateral assets) of 134 listed REITs. The mean of the loan spread is 327 basis points, which is about 164 basis points higher than the average spread for the secured syndicated loans.<sup>8</sup> Similar to the syndicated loan sample, REITs are more focused by property type than by geographical region at the collateral level. If we compare firm diversification by collateral diversification, we observe that *Collateral HHI* is larger than *Firm HHI* by both property type and region, which is not very surprising: On average, there are only 4.66 properties collateralizing the same mortgage if there are more than one collateral, with a standard deviation of 8.42 properties.

In the mortgage loan sample, an average REIT has smaller total assets, higher debt-to-assets ratio, lower market-to-book ratio, and significantly lower ROA compared to an average REIT in the syndicated loan sample. The size of mortgage loans in our sample is \$40 million while the mean of the book value of average collateral is \$28 million. While 31% of the collaterals are less than 10 years old, 24% are renovated. The mean of the time to maturity is around 8 years, which is higher than the mean for the loan sample. Lastly, 88% of the mortgages in the sample have fixed interest rates.

## 4 Empirical Findings

In this section, we analyze the impact of firm-level and collateral-level diversification by property type and geographic location on loan spreads. We present the model and the estimation results first using the Dealscan Syndicated loan sample followed by the SNL

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<sup>7</sup>SNL only provides the maturity date but not the origination date. We assume that the origination year is the year when a mortgage contract with the same maturity date first appears in a given collateral for a given REIT.

<sup>8</sup>The mortgage sample mainly consists of fixed-rate mortgages, which on average have higher spreads than floating rate loans such as those in our syndicated-loan sample. When we limit our mortgage sample to floating-rate mortgages, the mean of spread declines to 183 basis points which is similar to the mean of secured syndicated-loan sample.

mortgage loan sample.

#### 4.1 Firm Diversification and Bank Loan Spread

We estimate the following empirical model for loan  $j$  extended to REIT  $i$  in year  $t$ :

$$\text{Loan Spread}_{ijt} = \beta_0 + \beta_1 \text{Firm HHI}_{it} + \beta_2 X_{it-1} + \beta_3 Y_{ijt} + \delta_t + \varepsilon_{ijt}$$

where  $X$  is the vector of firm-level controls (assets, portfolio book value-to-assets, debt ratio, ROA, and market-to-book);  $Y$  represents the loan-level control variables (the natural logarithms of time-to-maturity and loan amount, loan type, loan purpose fixed effects, and dummy variables indicating whether the loan is secured, syndicated, senior, and whether there are any financial covenants in the loan). Finally,  $\delta_t$  represents year fixed effects.

Table 2 reports the results on the relationship between REIT diversification by eight property types and loan spreads. In all regressions, standard errors are clustered at the firm level. The result in column (2) indicates that a one-standard-deviation decrease in *Firm HHI* by property type lowers the loan spread by 0.09 standard deviation, which corresponds to a spread reduction of 7.04 basis points. The coefficient estimate is significant at 1%. Columns 3 and 5 of Table 2 report the results with *Focus Dummy* and *Number of Property Types*. While concentrated (above-median HHI) REITs pay about 18.10 basis points more for syndicated loans compared to others, each additional property type decreases loan spreads by 6.57 basis points.

Column 4 of Table 2 controls for the property type with the largest share in a REIT's portfolio. *Maximum Share Property Type<sub>i</sub>* is an indicator variable that takes a value of one if property type  $i$  has the largest book value share in a REIT's portfolio, zero otherwise. The coefficient estimate of *Focus Dummy* decreases from 18.10 to 10.71 after controlling for the property type with the largest portfolio share and the t-statistic decreases from 3.40 to 2.13.

Note that the coefficient estimates for the control variables are in line with the

expectations. Loan spread significantly increases with the debt-to-assets ratio and decreases with firm size, growth opportunities, and loan amount. Comparing the results in Column 1 to those in other columns reveals that our concentration variables do not affect the coefficient estimates for the other control variables.

In Panel B, we restrict the sample to the secured loans. The coefficient estimates are larger in the secured loan sample relative to those estimated for all loans in Panel A. For instance, REITs that are focused by property type pay about 36 basis points more compared to others. The spread differential decreases to 23.87 basis points after we control for the property type with the largest share in the portfolio.

<Table 2 about here>

In Panel A and Panel B of Table A1, we repeat the analysis this time using HHI defined by five property types (Apartment, Industrial, Office, Retail, and Others) instead of eight property types. Results are consistent with those reported in Table 2. As an alternative to *Firm HHI* based on the net book value shares, we also use a definition based on the number of distinct types of properties and subregions in a portfolio. Panels A and B in Table A2 report the results for all loans and for the secured loan subsample, respectively. Our conclusions are robust to this alternative definition of HHI based on the number of properties.

Next, we investigate the effect of geographic diversification on the loan spread. Panel A of Table 3 reports the estimation results for all loans. We document that the loans of geographically-focused REITs have significantly lower spreads. A one-standard-deviation increase in *Firm HHI* by subregion is associated with a 0.09 standard deviation (6.87 basis points) decrease in loan spread. Additionally, an average focused REIT has 10.13 basis points lower spreads than an average diversified REIT. Controlling for the subregion with the largest portfolio share does not change the coefficient estimate significantly. Finally, on average, each additional subregion increases loan spread by 3.18 basis points.<sup>9</sup>

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<sup>9</sup>There is a negative correlation between *Firm HHI* by property type and by subregion. However, including both variables in the same regression does not change our results.



In Panel B, we restrict the sample to secured loans. For the subsample of secured loans, we find that a one-standard-deviation increase in *Firm HHI* by subregion is associated with a 9.32 basis points decrease in the spread. On average, firms with above-median regional concentration pay 18.65 basis points less. The coefficient estimate of *Focused Dummy* becomes insignificant after controlling for the subregion with the highest book value, potentially due to limited sample size.

<Table 3 about here >

In Panel A and Panel B of Table A3, we repeat the analysis using HHI defined by states rather than subregions. Our results are consistent with those in Table 3. As we did with property type concentration, we also define *Firm HHI* by subregion based on the number of properties rather than net book values. Results are reported in Table A4, which confirm our prior findings that higher geographical concentration is associated with lower loan spreads.

Overall, our findings on loan spreads indicate that on average, REITs that are diversified in terms of asset type and focused in terms of asset location pay lower interest rates when they borrow. The findings on geographic diversification are in line with Hartzell, Sun, and Titman (2014) who show that geographically focused REITs have better financial performance.

## 4.2 Portfolio Correlation and Bank Loan Spread

In this section, we define an alternative measure for concentration that is based on the portfolio correlation of returns on different property types (geographical regions). Following Hann, Ogneva, and Ozbas (2013), we calculate the book value-weighted portfolio correlation  $\rho_{it}$  for firm  $i$  in quarter  $t$  as

$$\rho_{it}^{property} = \sum_{j=1}^5 \sum_{k=1}^5 w_{ij} w_{ik} Corr_{[t-11,t]}(j,k)$$

where  $w_{ij}$  is the portfolio book value share of property type  $j$  of firm  $i$  and  $Corr_{[t-11,t]}(j,k)$  is the correlation between idiosyncratic returns of NCREIF property indices for property types  $j$  and  $k$  over the 3-year period before quarter  $t$ .<sup>10</sup> For each property type in a given year, we estimate idiosyncratic returns from a regression of property index return on national index return over the prior 12 quarters. NCREIF property indices are available for the following property types: Apartment, Hotel, Industrial, Retail, and Office. Since index returns are not available for all property types, we follow two different approaches to calculate portfolio correlation by type.

In the first approach, we drop other property types from the sample and renormalize the portfolio weights of the remaining property types (apartment, hotel, industrial, office, and retail properties). We call the resulting variable *Portfolio Correlation 1*. Alternatively, we substitute the returns on other property types with the national index return to calculate the variable *Portfolio Correlation 2*. We restrict the property type analysis to REITs whose total portfolio share of property types other than apartment, hotel, industrial, office, and retail properties is less than 10%. We use portfolio correlations calculated in the last quarter of the year prior to the syndicated loan.

Similarly, we define portfolio correlation by region as

$$\rho_{it}^{region} = \sum_{j=1}^4 \sum_{k=1}^4 w_{ij} w_{ik} Corr_{[t-11,t]}(j,k)$$

where  $w_{ij}$  is the share of region  $j$  in the portfolio of firm  $i$  and  $Corr_{[t-11,t]}(j,k)$  is the correlation between the idiosyncratic returns of NCREIF regional property indices for regions  $j$  and  $k$  over the 3-year period before quarter  $t$ . The regional index return is available for four regions, namely, East, West, South, and Midwest. Each of these regions consists of two subregions that we used to define our HHI measure by subregion.

Columns 1 to 4 in Table 4 report the estimation results from the regression of loan spreads on our portfolio correlation measures by property type. Columns 1 and 3 report the results for all loans and in Columns 2 and 4, we restrict the sample to secured

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<sup>10</sup>NCREIF property index return measures the investment performance (income and capital value return) of a very large pool of individual commercial real estate properties.

loans only. The signs of the coefficient estimates are consistent with our findings using Herfindahl Index such that higher portfolio correlation by type increases loan spreads. A one-standard-deviation (0.197) increase in *Portfolio Correlation 1* is associated with a 0.061 standard deviation (4.73 basis points) increase in the average spread. The coefficient estimates are economically more significant for the subsample of loans that are secured. We obtain similar results if we substitute the return on property types without an index with the return on national index (Columns 3 and 4).

Columns 5 and 6 of Table 4 report the estimation results using portfolio correlation by region for all loans and secured loans, respectively. Results are consistent with those in Table 3 such that a one-standard-deviation (0.346) increase in portfolio correlation is associated with 0.11 standard deviation (8.34 basis points) decrease in loan spread. Overall, our results are robust to an alternative measure of concentration.

<Table 4 about here >

### 4.3 Firm Diversification and Mortgage Spread

While the loan sample mostly consists of syndicated, unsecured and floating-rate loans, the mortgage sample mostly covers secured and fixed-rate loans, which also have a considerably time to maturity. With the advantage of observing collaterals directly, we can evaluate the impact of REIT and collateral diversification on the mortgage spread. Table 5 shows the results for firm diversification by property type and as we also observe collateral, we also investigate the relationship between collateral diversification and mortgage spread.

In the first three columns of Table 5, we treat each property serving as collateral, separately. Column 2 of Table 5 presents the impact of *Firm HHI* on the mortgage spread and in Column 3 we show the findings on the effect of the share of property type of the collateral. We do not find any significant impact of firm concentration by property type after controlling for the property (collateral) characteristics.

<Table 5 about here >

On the other hand, in the last three columns of Table 5, we pool properties collateralizing the same mortgage and calculate *Collateral HHI* for each collateral asset pool. We also limit our sample to mortgages collateralized by at least two properties. We find that a one-standard-deviation decline in *Collateral HHI* decreases the spread by 11% of spread standard deviation, corresponding to a decline in spread of 23 basis points.<sup>11</sup> When we regress both Herfindahl indices at the same time, our findings demonstrate that the coefficient of *Collateral HHI* remains significant while *Firm HHI* is still insignificant. Our interpretation of this finding is that lenders apparently look more strongly at collateral risk rather than firm risk when making a mortgage.

In the last column of Table 5, we also interact *Collateral HHI* with the logarithm of the collateral property count. The reason we interact *Collateral HHI* is that collateral diversification may matter differently with different numbers of properties serving as collateral. For instance, diversifying across only two assets may have a smaller effect than diversifying the collateral across many assets. In the regressions with interactions, our main variable of interest is the interaction term. The findings demonstrate that the impact of collateral diversification matter more if there are more assets collateralizing a mortgage. Economically, if there are five collateral assets (at the mean), a one-standard-deviation decline in *Collateral HHI* lowers the spread by 31 basis points.

The signs of the coefficients of the control variables are in line with expectations. We find that the book value of collateral significantly decreases the mortgage spread. Fixed rate mortgages have higher spreads by around 2%, all else being constant. Only the coefficient of *ROA* is against expectations.

Based on the results reported in Column 5 of Table 5, we calculate the spread difference between the mortgage spread with a certain number of collateral assets and the mortgage spread with only two collateral assets for different levels of *Collateral HHI* in the property type dimension. Again, spread is defined as the interest rate of a mortgage over the one-year LIBOR and *Collateral HHI* is calculated using the collateral

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<sup>11</sup>Our findings are robust to measuring *Collateral HHI* using the number of properties.

assets collateralizing the same mortgage. Collateral property count denotes the number of assets collateralizing the same mortgage. Figure 3 provides a three-dimensional picture of the results in 11 blocks, with each block in the figure representing a different number of collateral assets. On the horizontal axis, we have *Collateral HHI* and on the vertical axis we have the corresponding spread difference.

<Figure 3 about here >

The graph clearly shows the spread-reducing effect of adding more assets to collateralize a mortgage. The effect is especially strong between 5 and 50 assets, and mostly so for mortgages with diversified collateral. Beyond 50 assets, adding additional ones as collateral does not lead to a large further reduction in spread.

Table 6 shows the results on geographic diversification and mortgage spreads. We do not find any significant impact of *Firm HHI* by region and neither do we find a significant impact of collateral diversification. Overall, our findings regarding the mortgage sample indicate that diversification by property type has a significant impact on the mortgage spread and collateral diversification matters more than firm diversification. The findings are in line with the loan sample, although the effect of geographic diversification appears insignificant. In the last column, the interaction term is only significant at 10% and positive but the economic significance is weak.

<Table 6 about here >

#### 4.4 The Impact of Crisis

The Great Recession is mainly a real estate, specifically a mortgage crisis. The real estate boom led investors and lenders to value real estate assets and mortgages very generously and carelessly. However, after the crisis hit, real estate assets also serving as collateral to mortgages have become more important as the risks related to real estate

assets appeared to be more severe. This can potentially lead lenders to be more risk averse with the collateral assets. Accordingly, lenders might reward diversification more during the crisis and post-crisis periods.

We first graph the means of *Mortgage Debt/Total Debt* and *Revolving Credit Facilities (Drawn)/Total Debt* ratios by REITs since 2006. In Figure 4, we observe that *Mortgage Debt/Total Debt* decreases continuously since 2007 while *Revolving Credit Facilities (Drawn)/Total Debt* is more stable during the crisis and post-crisis periods. This is in line with the expectations that less mortgages are originated during and after the crisis. This can indicate that lenders are more critical with their mortgage lending. However, we do not see such a trend with revolving credit facilities.

<Figure 4 about here >

In Table 7 and 8, we evaluate the impact of crisis in our bank loan and mortgage analyses. We create a dummy variable for Crisis and After period and interact it with our diversification measures. Table 7 shows the results for bank loans. Our findings demonstrate that there is no significant impact of crisis on the relationship between our diversification measures and bank loan spreads. On the other hand, we document in Table 8 that the interaction term between *Collateral HHI* and the *Crisis and After* dummy is significant at 1% level with a positive sign. Additionally, the impact of the share of the property type of collateral is also statistically significant indicating that if the property type of the collateral is the main property type of the firm, the lender requires a higher spread during and after the crisis.<sup>12</sup>

Overall, in line with our expectations, the impact of collateral and firm diversification becomes more prominent after the crisis hit. However, we do not see such an impact for bank loans. These findings indicate that banks become more critical and risk averse and accordingly reward property type diversification after the crisis hit. We do not find

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<sup>12</sup>In our mortgage analysis, we estimate our models by collateral observations to be able to control for property type and region fixed effects. One potential problem with that approach could be that if there are more assets collateralizing a given mortgage, the number of observations in the analysis by the same mortgage will be increasing by the number of collateral assets. We also run the regressions by mortgage observations in Table A5 in the Appendix. Our findings are robust.

any effect of crisis on the relationship between geographic diversification and mortgage spread.

<Table 7 about here >

<Table 8 about here >

## 5 Concluding Remarks

In this paper, we investigate the relationship between diversification and the cost of debt, using REIT bank loans and mortgages. REITs offer a laboratory environment to investigate diversification and firm value, since they allow the researcher to assess corporate diversification in two dimensions, by property type and by location of the properties, and to do that in an unequivocal manner, without self-reporting bias. This is the first study investigating the relationship between diversification and the cost of debt for real estate, and since real estate is very commonly used to secure corporate loans, our findings have implications for firms other than REITs.

Using a sample of syndicated bank loans, we find that the loan spread declines as REITs diversify by property type and focus geographically. Economically, we document that there is a 6.9 basis-point decline in the spread as Firm HHI by property type decreases by one standard deviation. If we measure *Firm HHI* geographically, there is an increase in the spread by 7.5 basis points if *Firm HHI* diminishes by one standard deviation.

We additionally study a sample of mortgages, allowing us to investigate not just the effect of firm-level diversification, but also of diversification at the level of the mortgage collateral. We are able to control for collateral characteristics in our analysis and also to calculate Herfindahl indices for collateral diversification. Controlling for collateral characteristics, our findings demonstrate that the impact of collateral diversification appears to be more significant.

We find that one-standard-deviation decrease in the *Collateral HHI* leads to 23 basis-point decline in the mortgage spread. Our analysis on the interaction between *Collateral HHI* and the number of collateral assets show that the impact of collateral diversification by property type becomes more prominent if there are more collateral assets. Additionally, we document that lenders reward collateral diversification more during and after the crisis. We do not find any significant impact of geographic diversification on the mortgage spread.



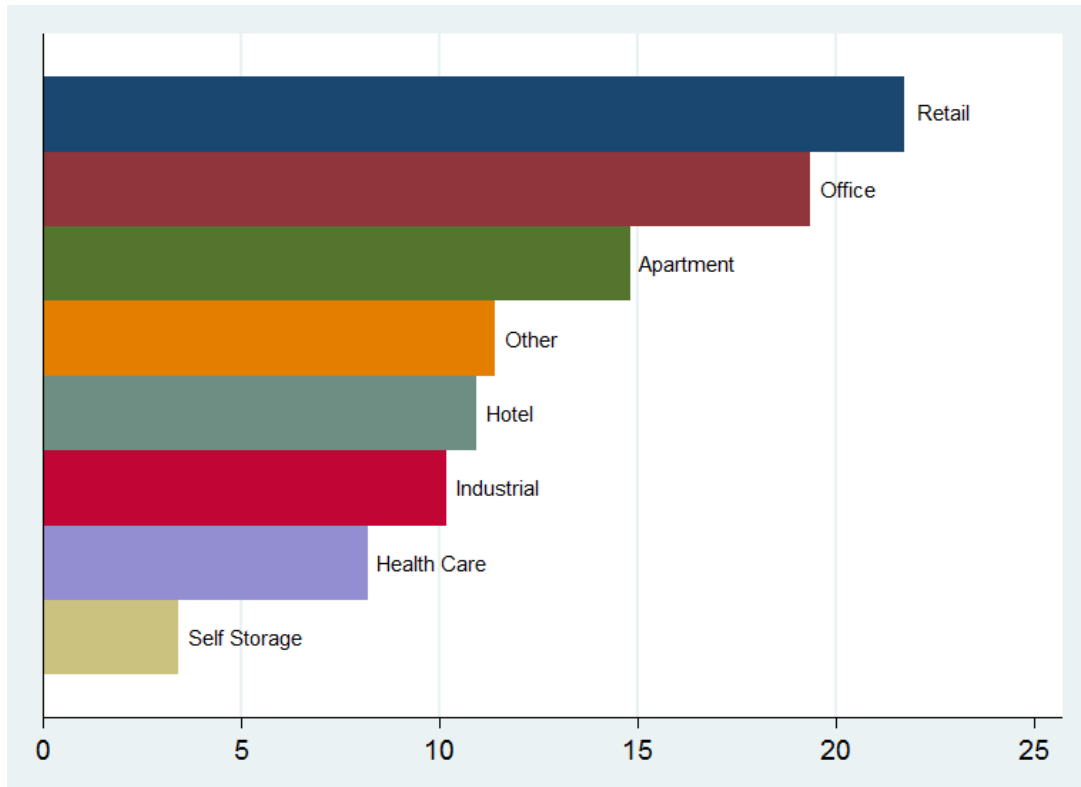
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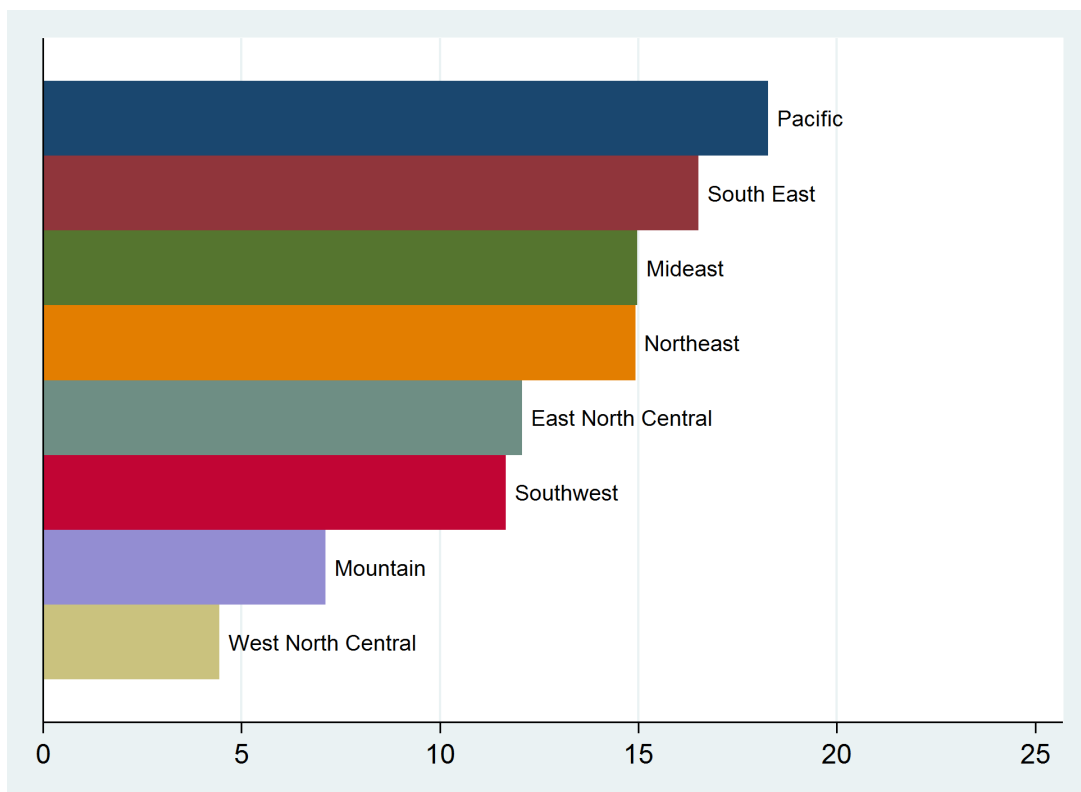
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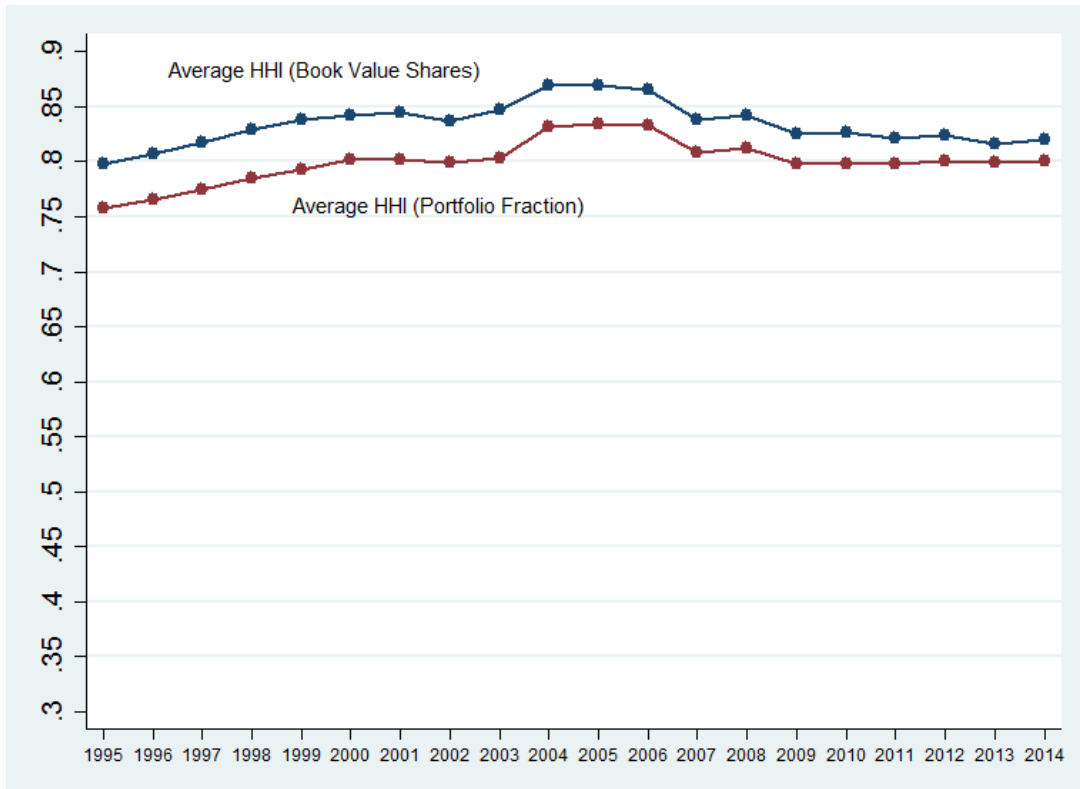


**Panel A: Average Percentage of REIT Properties by Property Type**

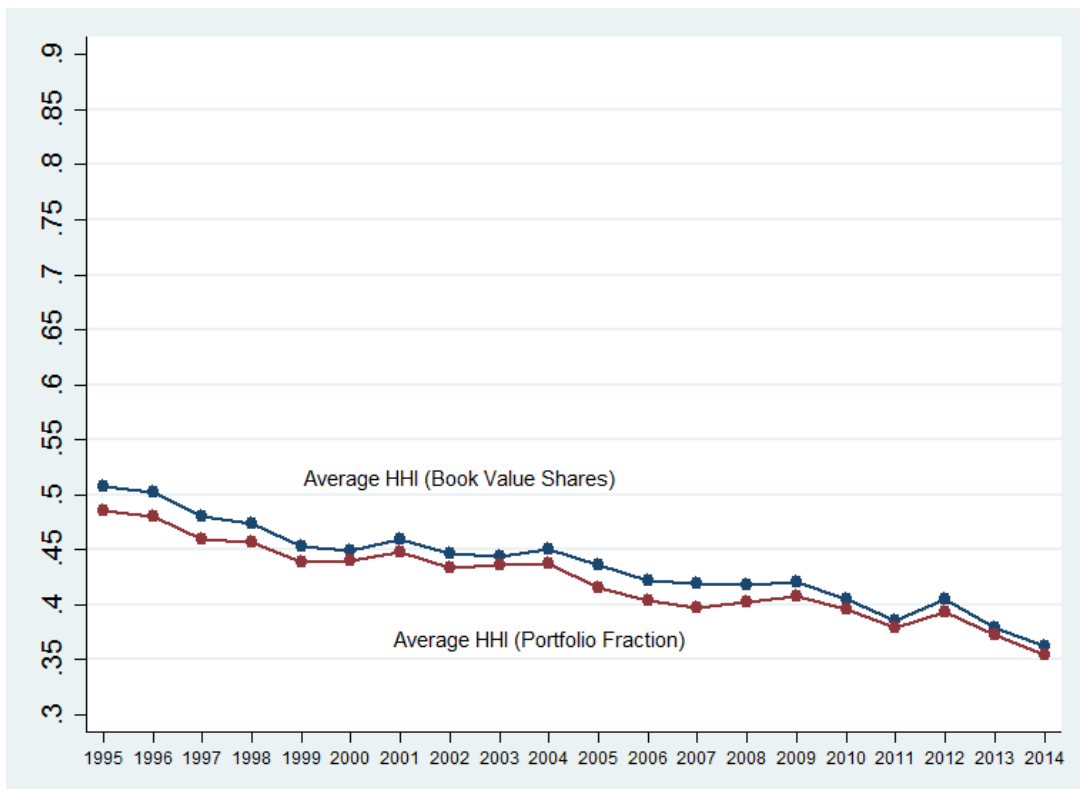


**Panel B: Average Percentage of REIT Properties by Subregion**

**Figure 1:** Panel A and Panel B illustrate the average portfolio share of each property type and each subregion where portfolio shares are calculated based on net book values.

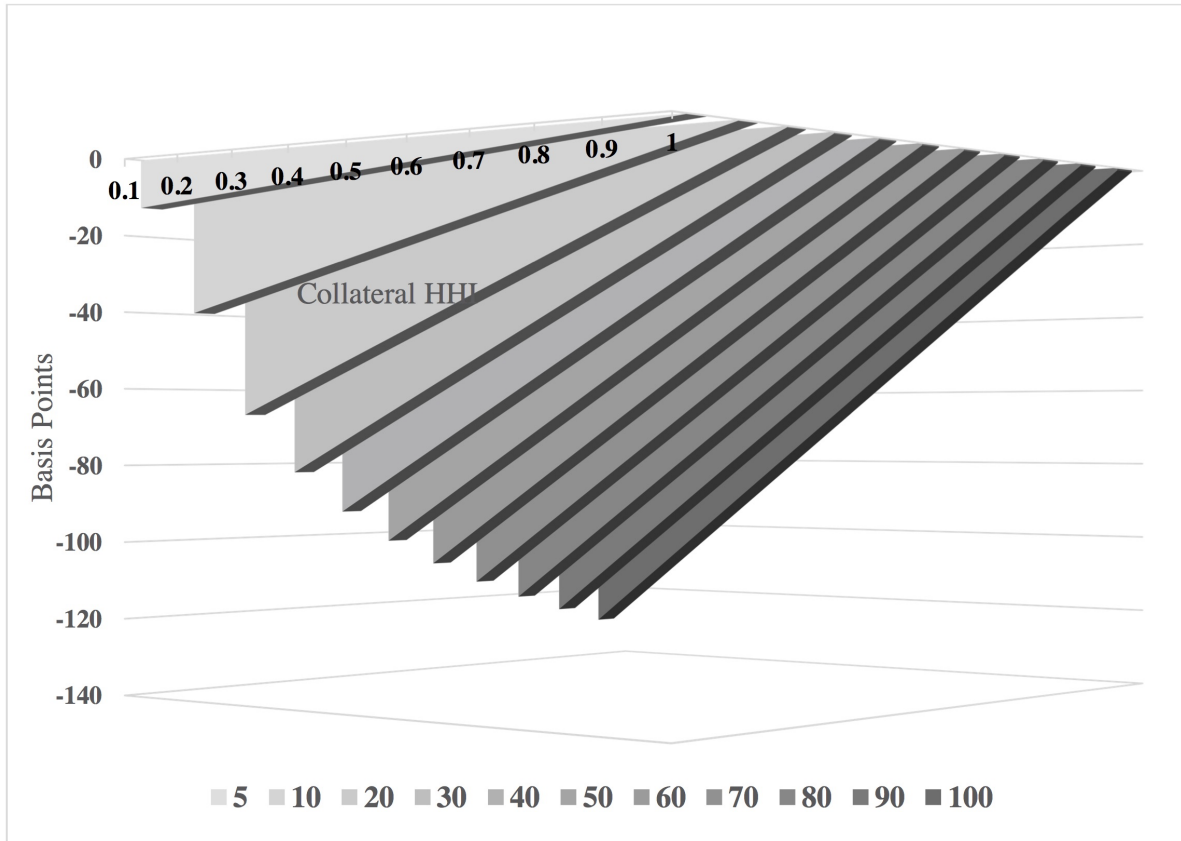


Panel A: Time Series of Average Herfindahl Index by Property Type

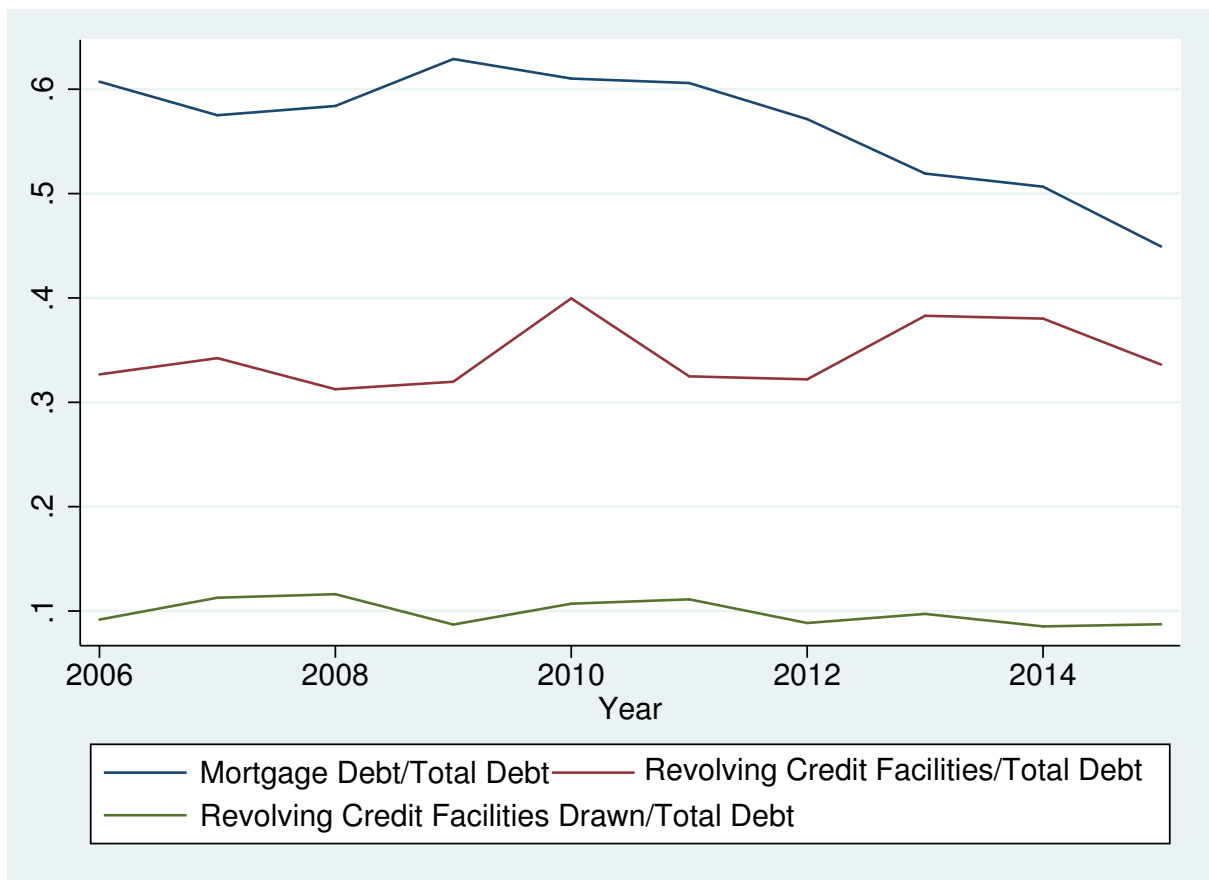


Panel B: Time Series of Average Herfindahl Index by Subregion

**Figure 2:** Panel A and B plot the average *Firm HHI* by property type and subregion over time. The blue line represents average HHI calculated based on net book values whereas the red line represents average HHI calculated based on the fraction of properties in a REIT's portfolio.



**Figure 3:** This figure presents the differential spread between the mortgage spread with a given number of collateral assets and Collateral HHI and the mortgage spread with only one collateral asset applying model 5 in Table 5. *Spread* is the interest rate of a mortgage over one-year LIBOR. *Collateral HHI* is calculated using the collateral assets collateralizing the same mortgage. *Collateral property count* is for the number of properties collateralizing the same mortgage. Each block in the figure represents a give number of collateralizing assets. On the horizontal axis, we have Collateral HHI and on the vertical axis we have the corresponding differential spread.



**Figure 4:** The figure presents the means of *Mortgage Debt/Total Debt* and *Revolving Credit Facilities (Drawn)/Total Debt* ratios by REITs since 2006.



**Table 1: Descriptive Statistics**

Panel A and Panel B show the descriptive statistics for the syndicated loan sample and mortgage sample, respectively. *Spread* is the interest rate of a loan or mortgage over one-year LIBOR. *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios based on the net book value shares of eight property types, five property types, NCREIF subregions and states. *Portfolio Correlation* is the net book value-weighted correlations between different property types (and regions) calculated using quarterly returns on NCREIF property indices. Since index returns are not available for all property types, we follow two different approaches to calculate portfolio correlation by type (see Table 4). *Collateral HHI* is calculated using the portfolio of properties collateralizing the same mortgage. *Debt Ratio* is defined as the ratio of total book debt to book value of assets. *ROA* is calculated as operating income scaled by total assets. *Market-to-Book* is the ratio of the book value of total assets plus market capitalization minus common equity to the book value of total assets. *Portfolio BV/Assets* is the ratio of portfolio book value to total assets. All firm-level controls are lagged relative to loan spread and loan characteristics. *LTV* for mortgages is calculated as the ratio of the sum of book value of collateral assets to mortgage amount.

Panel A: Syndicated Loan Sample	All Loans			Secured Loans		
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.
<i>Concentration Measures by Property Type</i>						
Firm HHI (by eight property type)	0.874	0.192	958	0.893	0.181	264
Firm HHI (by five property type)	0.875	0.192	958	0.894	0.181	264
Portfolio Correlation 1 (by property type)	0.896	0.197	723	0.896	0.196	214
Portfolio Correlation 2 (by property type)	0.881	0.202	723	0.881	0.204	214
<i>Concentration Measures by Geography</i>						
Firm HHI (by region)	0.382	0.263	958	0.382	0.268	264
Firm HHI (by state)	0.235	0.203	958	0.244	0.227	264
Portfolio Correlation (by region)	0.366	0.346	958	0.378	0.351	264
<i>Firm Controls</i>						
Ln(Assets)	14.307	1.103	958	13.834	1.110	264
Portfolio BV/Assets	0.810	0.416	958	0.753	0.437	264
Leverage	0.482	0.154	958	0.501	0.178	264
ROA	3.117	3.458	958	2.576	3.356	264
Market-to-Book	1.303	0.298	958	1.211	0.245	264
<i>Loan Variables</i>						
Spread (basis points)	162.990	78.182	958	202.456	89.663	264
Ln(Loan Maturity)	3.418	0.668	958	3.332	0.689	264
Ln(Loan Amount)	19.031	1.046	958	18.557	1.089	264
Financial Covenant	0.624	0.485	958	0.742	0.438	264
Senior	0.998	0.046	958	0.992	0.087	264
Syndicate	0.961	0.193	958	0.947	0.225	264

## Descriptive Statistics (Cont.)

Panel B: Mortgage Sample	Mean	Std. Dev.	Obs.
<i>Concentration Measures</i>			
Firm HHI (by property type)	0.829	0.226	5,302
Firm HHI (by region)	0.421	0.262	5,302
Collateral HHI (by property type)	0.938	0.154	850
Collateral HHI (by region)	0.736	0.263	850
Collateral Property Count	4.658	8.415	850
<i>Firm Controls</i>			
Assets (\$ billion)	2.581	3.614	5,302
Debt Ratio	0.551	0.142	5,302
ROA	1.814	3.007	5,302
Market-to-Book	1.234	0.230	5,302
<i>Loan Variables</i>			
Spread (basis points)	327.322	200.036	5,302
Mortgage Amount (\$ billion)	0.040	0.069	5,302
Property Book Value (\$ billion)	0.028	0.036	5,302
Less Than 10 Years Old (1=yes)	0.307	0.461	5,302
Renovated (1=yes)	0.245	0.430	5,302
Time-to-Maturity	7.655	6.385	5,302
Fixed Rate (1=yes)	0.884	0.321	5,302

**Table 2: Bank Loan Spread and Diversification by Eight Property Types**

This table presents the results from the regression of loan spreads on *Firm HHI* by property type. Panel A (Panel B) reports the results for all loans (secured loans). *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios based on the net book value shares of eight property types, namely, Apartment, Health Care, Hotel, Industrial, Office, Retail, Self Storage, and Others. *Focus Dummy* indicates whether *Firm HHI* is above its sample median. *Number of Property Types* counts the number of property types with a non-zero portfolio share. *Maximum Share Property Type<sub>i</sub>* is an indicator variable that takes a value of one if property type *i* has the largest book value share in a REIT's portfolio, zero otherwise. All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

Panel A: All Loans					
	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		36.664*** (2.992)			
Focus Dummy			18.098*** (3.397)	10.712** (2.129)	
Number of Property Types					-6.566*** (-3.070)
Ln(Assets)	-13.531*** (-2.801)	-13.982*** (-2.976)	-13.689*** (-2.933)	-10.590** (-2.546)	-11.435** (-2.291)
Portfolio BV/Assets	-20.120*** (-3.522)	-20.434*** (-3.783)	-18.758*** (-4.008)	-16.313*** (-2.802)	-18.183*** (-3.825)
Leverage	60.138*** (3.842)	66.158*** (4.390)	70.005*** (4.650)	67.058*** (4.147)	70.177*** (4.824)
ROA	-2.072** (-2.373)	-1.729* (-1.950)	-1.619* (-1.856)	-1.564* (-1.750)	-1.760* (-1.970)
Market-to-Book	-33.247*** (-3.123)	-33.387*** (-3.272)	-36.448*** (-3.535)	-36.150*** (-3.688)	-35.372*** (-3.367)
Ln(Loan Maturity)	4.730 (1.073)	4.535 (1.038)	4.489 (1.051)	2.825 (0.691)	4.525 (1.017)
Ln(Loan Amount)	-11.361*** (-2.827)	-11.268*** (-2.975)	-11.209*** (-2.908)	-12.256*** (-3.598)	-12.001*** (-3.094)
Missing	6.441 (1.210)	5.417 (1.030)	4.854 (0.934)	5.364 (1.132)	4.021 (0.768)
Secured Loan	38.779*** (5.987)	37.582*** (6.117)	36.490*** (6.049)	31.403*** (4.557)	36.035*** (5.863)
Financial Covenant	-1.070 (-0.217)	-0.857 (-0.177)	-0.911 (-0.190)	0.337 (0.075)	-0.782 (-0.164)
Senior	-68.686*** (-4.100)	-67.687*** (-4.092)	-65.175*** (-3.881)	-50.740*** (-2.827)	-66.557*** (-4.119)
Syndicate	-18.604* (-1.794)	-17.409* (-1.710)	-16.044 (-1.590)	-12.280 (-1.315)	-15.538 (-1.539)
Maximum Share Property Type FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	958	958
Adj. R-squared	0.539	0.546	0.551	0.576	0.552

## Bank Loan Spread and Diversification by Eight Property Types (Cont.)

Panel B: Secured Loans

	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		50.370** (2.121)			
Focus Dummy			36.005*** (3.863)	23.866* (1.791)	
Number of Property Types					-13.633*** (-4.134)
Ln(Assets)	2.888 (0.453)	0.844 (0.130)	0.996 (0.155)	3.028 (0.482)	5.418 (0.798)
Portfolio BV/Assets	-38.340*** (-3.085)	-37.545*** (-3.172)	-27.736*** (-2.929)	-27.480** (-2.466)	-29.844*** (-2.831)
Leverage	64.011** (2.243)	71.701** (2.476)	76.199*** (2.781)	73.753** (2.416)	81.648*** (2.977)
ROA	-1.332 (-0.604)	-0.774 (-0.337)	-0.331 (-0.139)	-0.511 (-0.214)	-0.312 (-0.140)
Market-to-Book	-62.969*** (-3.470)	-71.284*** (-3.879)	-84.336*** (-4.859)	-82.603*** (-4.172)	-79.826*** (-4.310)
Ln(Loan Maturity)	3.692 (0.428)	3.486 (0.411)	1.788 (0.213)	-1.816 (-0.218)	1.475 (0.178)
Ln(Loan Amount)	-15.373** (-2.180)	-14.805** (-2.162)	-15.428** (-2.213)	-16.842** (-2.523)	-17.123** (-2.407)
Financial Covenant	5.660 (0.419)	5.138 (0.385)	3.112 (0.252)	5.138 (0.424)	-0.244 (-0.019)
Senior	-94.403*** (-3.207)	-91.274*** (-3.129)	-86.978*** (-2.993)	-78.962** (-2.451)	-84.582*** (-3.061)
Syndicate	-9.966 (-0.419)	-9.367 (-0.410)	-3.437 (-0.160)	-0.730 (-0.036)	-3.831 (-0.180)
Maximum Share Property Type FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	264	264	264	264	264
Adj. R-squared	0.400	0.407	0.435	0.440	0.434

**Table 3: Bank Loan Spread and Diversification by Subregion**

This table presents the results from the regression of loan spreads on *Firm HHI* by property subregion calculated using net book values. Panel A (Panel B) reports the results for all loans (secured loans). *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios based on the eight NCREIF subregions, namely, East North Central, Mideast, Mountain, Northeast, Pacific, Southeast, Southwest, and West North Central. *Focus Dummy* indicates whether *Firm HHI* is above its sample median. *Number of Regions* counts the number of regions with a non-zero portfolio share. *Maximum Share Region<sub>i</sub>* is an indicator variable that takes a value of one if subregion *i* has the largest book value share in a REIT's portfolio, zero otherwise. All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

Panel A: All Loans					
	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		-26.110*** (-2.902)			
Focus Dummy			-10.133** (-2.009)	-9.206* (-1.758)	
Number of Regions					3.179*** (3.162)
Ln(Assets)	-13.534*** (-2.802)	-15.379*** (-3.360)	-14.945*** (-3.306)	-13.727*** (-2.923)	-16.279*** (-3.523)
Portfolio BV/Assets	-20.135*** (-3.527)	-21.399*** (-3.765)	-20.583*** (-3.587)	-19.882*** (-3.494)	-21.539*** (-3.734)
Leverage	60.165*** (3.844)	64.096*** (4.199)	63.259*** (4.089)	62.409*** (4.053)	64.792*** (4.347)
ROA	-2.071** (-2.373)	-2.195** (-2.572)	-2.176** (-2.476)	-2.234** (-2.548)	-2.160** (-2.535)
Market-to-Book	-33.243*** (-3.123)	-30.790*** (-3.019)	-32.225*** (-3.025)	-30.424*** (-2.846)	-32.757*** (-3.195)
Ln(Loan Maturity)	4.729 (1.073)	4.304 (0.977)	4.991 (1.135)	4.537 (1.032)	4.639 (1.045)
Ln(Loan Amount)	-11.361*** (-2.827)	-11.337*** (-3.008)	-11.349*** (-2.912)	-11.409*** (-3.045)	-11.285*** (-2.992)
Missing	6.440 (1.210)	6.340 (1.208)	6.585 (1.242)	6.623 (1.259)	6.386 (1.218)
Secured Loan	38.775*** (5.987)	37.247*** (6.055)	37.136*** (5.978)	37.161*** (5.993)	36.474*** (6.012)
Financial Covenant	-1.070 (-0.217)	-1.150 (-0.238)	-0.428 (-0.088)	-0.699 (-0.141)	-0.701 (-0.145)
Senior	-68.675*** (-4.099)	-73.210*** (-4.347)	-74.252*** (-4.229)	-80.570*** (-4.391)	-76.807*** (-4.427)
Syndicate	-18.605* (-1.794)	-17.035 (-1.641)	-18.744* (-1.809)	-18.872* (-1.792)	-16.764 (-1.616)
Maximum Share Region FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	958	958
Adj. R-squared	0.539	0.545	0.542	0.542	0.547

## Bank Loan Spread and Diversification by Subregion (Cont.)

Panel B: Secured Loans

	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		-34.790*** (-3.032)			
Focus Dummy			-18.652* (-1.888)	-15.408 (-1.420)	
Number of Regions					4.329*** (2.693)
Ln(Assets)	2.876 (0.451)	-0.306 (-0.051)	-0.562 (-0.094)	-2.284 (-0.325)	-1.269 (-0.209)
Portfolio BV/Assets	-38.274*** (-3.079)	-38.525*** (-3.141)	-36.730*** (-2.813)	-36.188*** (-2.771)	-40.315*** (-3.367)
Leverage	63.961** (2.241)	64.907** (2.375)	67.897** (2.446)	77.672** (2.554)	63.978** (2.300)
ROA	-1.333 (-0.604)	-1.538 (-0.706)	-1.226 (-0.569)	-1.145 (-0.531)	-1.557 (-0.709)
Market-to-Book	-62.936*** (-3.468)	-59.281*** (-3.266)	-63.529*** (-3.382)	-60.073*** (-2.960)	-62.220*** (-3.345)
Ln(Loan Maturity)	3.697 (0.429)	2.351 (0.276)	3.329 (0.387)	1.446 (0.170)	2.414 (0.280)
Ln(Loan Amount)	-15.367** (-2.179)	-14.884** (-2.196)	-15.862** (-2.281)	-14.493** (-2.179)	-15.200** (-2.230)
Financial Covenant	5.672 (0.420)	4.015 (0.306)	5.964 (0.451)	4.377 (0.323)	4.682 (0.357)
Senior	-94.401*** (-3.206)	-100.602*** (-3.418)	-104.996*** (-3.505)	-107.229*** (-3.499)	-105.544*** (-3.496)
Syndicate	-9.984 (-0.420)	-9.780 (-0.409)	-8.398 (-0.342)	-14.351 (-0.587)	-9.020 (-0.370)
Maximum Share Region FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	264	264	264	264	264
Adj. R-squared	0.400	0.407	0.407	0.399	0.409

**Table 4: Bank Loan Spread and Portfolio Correlation**

This table presents the results from the regression of loan spreads on *Portfolio Correlation* by property type and region. Columns 1, 3, and 5 report the results for all loans whereas in columns 2, 4, and 6 we restrict the sample to secured loans only. *Portfolio Correlation* is the book value-weighted correlations between different property types (or subregions) calculated using quarterly returns on NCREIF property indices. Since index returns are not available for all property types, we follow two different approaches to calculate portfolio correlation by type. In Columns 1 and 2, we drop other property types from the sample and renormalize the portfolio weights of property types with index returns (apartment, hotel, industrial, office, and retail properties). In Columns 3 and 4, we simply substitute the returns on other property types with the national index return. All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Loan Spread					
	Renormalized Weights		National Index		(5)	(6)
	(1)	(2)	(3)	(4)		
Portfolio Correlation (by type)	24.024** (2.057)	57.867** (2.425)	26.033** (2.248)	61.904*** (2.712)		
Portfolio Correlation (by region)					-24.101*** (-3.303)	-34.844*** (-3.398)
Ln(Assets)	-11.007** (-2.055)	7.560 (1.148)	-11.079** (-2.079)	7.158 (1.095)	-15.890*** (-3.469)	-1.215 (-0.200)
Portfolio BV/Assets	-17.792*** (-2.970)	-36.864** (-2.558)	-17.583*** (-3.000)	-36.212** (-2.576)	-21.699*** (-4.021)	-35.691*** (-2.834)
Leverage	63.558*** (3.057)	46.759 (1.464)	64.206*** (3.100)	49.136 (1.537)	67.412*** (4.390)	67.682** (2.455)
ROA	-2.666*** (-3.044)	-4.123* (-1.899)	-2.644*** (-3.017)	-4.094* (-1.893)	-2.038** (-2.422)	-1.410 (-0.653)
Market-to-Book	-32.494** (-2.455)	-65.374** (-2.281)	-32.407** (-2.450)	-66.833** (-2.336)	-31.778*** (-3.048)	-61.897*** (-3.261)
Ln(Loan Maturity)	6.522 (1.306)	0.972 (0.101)	6.539 (1.308)	0.849 (0.088)	4.564 (1.036)	2.331 (0.273)
Ln(Loan Amount)	-12.763*** (-3.005)	-20.486*** (-2.890)	-12.803*** (-3.024)	-20.606*** (-2.930)	-11.618*** (-3.081)	-15.457** (-2.255)
Missing	3.388 (0.541)		3.281 (0.524)		6.621 (1.269)	
Secured Loan	33.907*** (4.781)		33.859*** (4.791)		36.983*** (6.109)	
Financial Covenant	-2.730 (-0.451)	2.715 (0.177)	-2.723 (-0.450)	2.891 (0.190)	-1.047 (-0.219)	4.032 (0.310)
Senior	-74.522*** (-3.612)	-110.649*** (-2.937)	-74.525*** (-3.630)	-110.357*** (-2.958)	-79.131*** (-4.642)	-110.256*** (-3.758)
Syndicate	-17.643 (-1.344)	3.019 (0.106)	-17.408 (-1.333)	3.173 (0.113)	-17.219 (-1.642)	-9.020 (-0.376)
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	723	214	723	214	958	264
Adj. R-squared	0.524	0.404	0.525	0.408	0.548	0.413

**Table 5: Mortgage Spread Regressions on HHI by Eight Property Types**

This table presents the regression of mortgage spread on Firm HHI and Collateral HHI by property type using each collateral observation. *Spread* is the interest rate of a mortgage over one-year LIBOR. *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios. *Collateral HHI* is calculated using the collateral assets collateralizing the same mortgage if there are more than one properties pooled in a mortgage. *Collateral property count* is for the number of properties collateralizing the same mortgage. *LTV* for mortgages is calculated as the ratio of the sum of book value of collateral assets to mortgage amount. The dummy for properties less than years old and for renovated dummies are controls for collateral quality. The regressions include property type, economic region, and year fixed effects. The standard errors are heteroskedasticity-robust and clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Mortgage Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm HHI (by property type)		25.048 (0.953)			-11.814 (-0.389)	
Collateral Property Type Share			24.422 (1.253)			
Collateral HHI (by property type)				141.560*** (3.637)	147.771*** (3.674)	-55.876 (-0.951)
X log(Collateral Property Count)						99.542*** (3.090)
log(Collateral Property Count)				-11.210 (-1.216)	-11.046 (-1.207)	-99.936*** (-3.323)
log(Asset Book Value)	-16.712*** (-2.775)	-17.315*** (-2.982)	-17.799*** (-3.179)	-26.930*** (-5.243)	-26.578*** (-5.196)	-26.130*** (-5.041)
log(Mortgage Value)	-15.769*** (-3.057)	-15.893*** (-3.074)	-15.728*** (-3.108)	-7.353 (-1.266)	-7.246 (-1.225)	-5.978 (-1.039)
Less Than 10 Years Old (1=yes)	-12.617 (-1.525)	-13.199 (-1.631)	-13.612* (-1.680)	-16.581 (-1.577)	-16.452 (-1.565)	-16.613 (-1.615)
Renovated (1=yes)	-1.699 (-0.236)	-2.184 (-0.301)	-2.557 (-0.343)	-7.091 (-0.699)	-6.871 (-0.677)	-5.299 (-0.536)
Log(Time-to-Maturity) (in years)	-11.922* (-1.803)	-11.728* (-1.762)	-11.981* (-1.817)	-16.165 (-1.551)	-16.379 (-1.552)	-18.348* (-1.757)
Fixed Rate (1=yes)	200.468*** (10.056)	199.203*** (10.280)	198.202*** (10.287)	207.063*** (7.176)	207.339*** (7.117)	186.542*** (5.669)
log(Firm Size)	5.821 (1.150)	6.047 (1.236)	6.671 (1.394)	1.722 (0.282)	1.538 (0.248)	3.419 (0.567)
Debt Ratio	80.204* (1.955)	85.709** (2.093)	85.888** (2.102)	135.647*** (3.654)	133.698*** (3.580)	115.466*** (3.087)
ROA	3.536* (1.869)	3.958** (2.212)	3.963** (2.160)	4.716* (1.675)	4.539 (1.598)	4.769* (1.744)
Market-to-Book	-1.652 (-0.059)	-3.500 (-0.125)	-5.363 (-0.194)	0.295 (0.009)	1.619 (0.051)	-17.358 (-0.513)
Property Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Economic Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,302	5,302	5,302	2,863	2,863	2,863
Adjusted R-squared	0.615	0.615	0.616	0.676	0.676	0.684



**Table 6: Mortgage Spread Regressions on HHI by Subregion**

This table presents the regression of mortgage spread on *Firm HHI* and *Collateral HHI* by region using each collateral observation. *Spread* is the interest rate of a mortgage over one-year LIBOR. *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios. *Collateral HHI* is calculated using the collateral assets collateralizing the same mortgage if there are more than one properties pooled in a mortgage. *Collateral property count* is for the number of properties collateralizing the same mortgage. *LTV* for mortgages is calculated as the ratio of the sum of book value of collateral assets to mortgage amount. The dummy for properties less than years old and for renovated dummies are controls for collateral quality. The regressions include property type, economic region, and year fixed effects. The standard errors are heteroskedasticity-robust and clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Mortgage Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Firm HHI (by region)		9.551 (0.419)			10.061 (0.338)	
Collateral Region Share			-4.231 (-0.260)			
Collateral HHI (by region)				29.204 (1.114)	24.666 (0.952)	-67.415 (-1.557)
X log(Collateral Property Count)						57.313* (1.720)
log(Collateral Property Count)				-9.380 (-0.963)	-9.785 (-0.988)	-42.212* (-1.867)
log(Asset Book Value)	-16.712*** (-2.775)	-16.558*** (-2.698)	-16.864*** (-2.691)	-24.851*** (-4.347)	-24.716*** (-4.295)	-25.980*** (-4.747)
log(Mortgage Value)	-15.769*** (-3.057)	-15.768*** (-3.050)	-15.708*** (-2.991)	-9.435 (-1.503)	-9.535 (-1.494)	-8.514 (-1.326)
Less Than 10 Years Old (1=yes)	-12.617 (-1.525)	-12.613 (-1.520)	-12.649 (-1.537)	-17.172 (-1.639)	-17.319 (-1.623)	-17.289* (-1.697)
Renovated (1=yes)	-1.699 (-0.236)	-1.772 (-0.245)	-1.633 (-0.223)	-8.405 (-0.774)	-8.287 (-0.770)	-6.883 (-0.670)
Log(Time-to-Maturity) (in years)	-11.922* (-1.803)	-11.787* (-1.781)	-11.967* (-1.815)	-12.803 (-1.204)	-12.769 (-1.200)	-11.971 (-1.143)
Fixed Rate (1=yes)	200.468*** (10.056)	200.392*** (10.076)	200.466*** (10.042)	217.118*** (7.056)	217.143*** (7.037)	198.136*** (6.529)
log(Firm Size)	5.821 (1.150)	6.554 (1.333)	5.547 (1.126)	1.628 (0.245)	2.260 (0.323)	3.024 (0.462)
Debt Ratio	80.204* (1.955)	80.205* (1.959)	80.322* (1.965)	154.728*** (3.655)	153.905*** (3.635)	156.898*** (3.778)
ROA	3.536* (1.869)	3.498* (1.885)	3.535* (1.861)	4.174 (1.515)	4.129 (1.485)	3.953 (1.472)
Market-to-Book	-1.652 (-0.059)	-2.372 (-0.087)	-1.065 (-0.039)	16.296 (0.496)	16.163 (0.497)	17.036 (0.535)
Property Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Economic Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,396	4,396	4,396	4,396	4,396	4,396
Adjusted R-squared	0.642	0.642	0.643	0.643	0.645	0.645

**Table 7: Subperiod Analysis (Commercial Loan Sample)**

This table presents the results from the subperiod analysis of loan spreads and concentration at the property type and geographical region level. *Crisis and After* equals one for the period 2007-2014, and zero otherwise. The standard errors are heteroskedasticity-robust and clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Loan Spread			
	Panel A: Concentration by Property Type		Panel B: Concentration by Property Subregion	
	(1)	(2)	(3)	(4)
Firm HHI (by Property Type)	42.561*** (3.138)		-28.279*** (-2.758)	
X Crisis and After	-15.726 (-0.888)		7.425 (0.481)	
Focus Dummy		23.790*** (3.939)		-12.927** (-1.994)
X Crisis and After		-17.656** (-2.098)		8.755 (0.844)
Ln(Assets)	-14.097*** (-2.994)	-13.749*** (-3.011)	-15.454*** (-3.368)	-15.046*** (-3.332)
Portfolio BV/Assets	-20.448*** (-3.841)	-18.622*** (-4.209)	-21.597*** (-3.767)	-21.047*** (-3.640)
Leverage	65.606*** (4.352)	68.744*** (4.609)	64.072*** (4.204)	62.859*** (4.065)
ROA	-1.743* (-1.953)	-1.590* (-1.839)	-2.191** (-2.570)	-2.137** (-2.444)
Market-to-Book	-32.868*** (-3.189)	-35.933*** (-3.428)	-30.640*** (-2.994)	-32.119*** (-3.001)
Ln(Loan Maturity)	4.489 (1.027)	4.069 (0.950)	4.234 (0.958)	4.875 (1.103)
Ln(Loan Amount)	-11.255*** (-2.981)	-11.158*** (-2.920)	-11.259*** (-2.951)	-11.281*** (-2.887)
Missing	5.359 (1.016)	4.920 (0.963)	6.277 (1.189)	6.362 (1.183)
Secured Loan	37.317*** (6.028)	36.478*** (6.059)	37.232*** (6.053)	37.016*** (5.935)
Financial Covenant	-0.931 (-0.193)	-0.934 (-0.196)	-1.162 (-0.240)	-0.522 (-0.107)
Senior	-67.273*** (-4.060)	-62.905*** (-3.719)	-73.569*** (-4.360)	-75.993*** (-4.264)
Syndicate	-17.363* (-1.709)	-16.023 (-1.599)	-16.884 (-1.631)	-18.300* (-1.768)
Observations	958	958	958	958
Adjusted R-squared	0.546	0.553	0.545	0.542
Loan Type Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

**Table 8: Subperiod Analysis (Mortgage Sample)**

This table presents the results from the subperiod analysis of loan spreads, concentration at the property type, and geographical region level. Panel A and Panel B report the results for our concentration measures by property type and subregion, respectively. *Crisis and After* equals one for the period 2007-2014, and zero otherwise. The standard errors are heteroskedasticity-robust and clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

<b>Panel A: Concentration by Property Type</b>				
	Mortgage Spread			
	(1)	(2)	(3)	(4)
Firm HHI (by property type)	-1.558 (-0.047)			-2.612 (-0.062)
X Crisis and After	66.585 (1.654)			-9.466 (-0.161)
Collateral Property Type Share		-5.044 (-0.222)		
X Crisis and After		67.912** (2.189)		
Collateral HHI (by property type)			-20.783 (-0.592)	-19.937 (-0.528)
X Crisis and After			341.490*** (5.682)	346.403*** (5.365)
log(Collateral Property Count)			-4.684 (-0.612)	-4.653 (-0.608)
Crisis and After	297.183*** (6.781)	297.408*** (8.598)	70.494 (1.029)	74.059 (0.999)
Firm Characteristics	Yes	Yes	Yes	Yes
Mortgage Characteristics	Yes	Yes	Yes	Yes
Property Type Fixed Effects	Yes	Yes	Yes	Yes
Economic Region Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,302	5,302	2,863	2,863
Adjusted R-squared	0.616	0.618	0.690	0.690

## Subperiod Analysis (Mortgage Sample) (Cont.)

Panel B: Concentration by Property Subregion				
	Mortgage Spread			
	(1)	(2)	(3)	(4)
Firm HHI (by region)	-9.225			-7.080
	(-0.417)			(-0.256)
X Crisis and After	52.645			50.865
	(1.315)			(0.877)
Collateral Region Share		-20.396		
		(-1.292)		
X Crisis and After		49.161*		
		(1.812)		
Collateral HHI (by region)			6.104	10.804
			(0.229)	(0.393)
X Crisis and After			44.619	21.577
			(1.018)	(0.487)
log(Collateral Property Count)			-8.323	-9.449
			(-0.912)	(-1.036)
Crisis and After	340.063***	343.128***	386.074***	389.026***
	(16.455)	(17.685)	(8.950)	(9.691)
Firm Characteristics	Yes	Yes	Yes	Yes
Mortgage Characteristics	Yes	Yes	Yes	Yes
Property Type Fixed Effects	Yes	Yes	Yes	Yes
Economic Region Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,302	5,302	2,863	2,863
Adjusted R-squared	0.616	0.616	0.668	0.668

**Table A1: Bank Loan Spread and Diversification by Five Property Types**

This table presents the results from the regression of loan spreads on *Firm HHI* by property type. Panel A (Panel B) reports the results for all loans (secured loans). *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios based on the book value shares of five property types, namely, Apartment, Industrial, Office, Retail, and Others. *Focus Dummy* indicates whether *Firm HHI* is above its sample median. *Number of Property Types* counts the number of property types with a non-zero portfolio share. *Maximum Share Property Type<sub>i</sub>* is an indicator variable that takes a value of one if property type *i* has the largest book value share in a REIT's portfolio, zero otherwise. All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

Panel A: All Loans					
	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		36.646*** (2.999)			
Focus Dummy			19.099*** (3.582)	12.605** (2.386)	
Number of Property Types					-8.725*** (-3.556)
Ln(Assets)	-13.531*** (-2.801)	-13.963*** (-2.970)	-13.463*** (-2.872)	-10.720*** (-2.617)	-11.569** (-2.347)
Portfolio BV/Assets	-20.120*** (-3.522)	-20.420*** (-3.780)	-18.254*** (-3.927)	-17.483*** (-2.975)	-17.383*** (-3.753)
Leverage	60.138*** (3.842)	66.337*** (4.394)	72.682*** (4.721)	71.092*** (4.641)	73.689*** (5.103)
ROA	-2.072** (-2.373)	-1.726* (-1.950)	-1.506* (-1.740)	-1.693* (-1.931)	-1.685* (-1.909)
Market-to-Book	-33.247*** (-3.123)	-33.396*** (-3.272)	-37.363*** (-3.609)	-39.636*** (-4.275)	-36.119*** (-3.470)
Ln(Loan Maturity)	4.730 (1.073)	4.532 (1.037)	4.245 (1.003)	3.033 (0.736)	4.362 (0.980)
Ln(Loan Amount)	-11.361*** (-2.827)	-11.277*** (-2.977)	-11.117*** (-2.891)	-11.532*** (-3.388)	-12.004*** (-3.142)
Missing	6.441 (1.210)	5.418 (1.030)	4.903 (0.948)	5.314 (1.096)	3.796 (0.729)
Secured Loan	38.779*** (5.987)	37.554*** (6.116)	36.497*** (6.092)	33.179*** (5.009)	35.319*** (5.758)
Financial Covenant	-1.070 (-0.217)	-0.855 (-0.177)	-0.901 (-0.190)	0.551 (0.119)	-0.842 (-0.177)
Senior	-68.686*** (-4.100)	-67.766*** (-4.098)	-65.810*** (-3.957)	-63.601*** (-3.822)	-67.294*** (-4.182)
Syndicate	-18.604* (-1.794)	-17.355* (-1.705)	-15.112 (-1.505)	-11.882 (-1.244)	-14.282 (-1.415)
Maximum Share Property Type FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	958	958
Adj. R-squared	0.539	0.546	0.552	0.571	0.555

## Bank Loan Spread and Diversification by Five Property Types (Cont.)

Panel B: Secured Loans

	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		49.833** (2.102)			
Focus Dummy			42.696*** (4.717)	33.456** (2.549)	
Number of Property Types					-16.710*** (-4.098)
Ln(Assets)	2.888 (0.453)	0.886 (0.137)	0.553 (0.089)	1.466 (0.240)	4.517 (0.674)
Portfolio BV/Assets	-38.340*** (-3.085)	-37.455*** (-3.164)	-27.252*** (-3.199)	-28.227*** (-2.780)	-28.798*** (-2.791)
Leverage	64.011** (2.243)	71.744** (2.476)	87.613*** (3.332)	86.207*** (3.009)	85.900*** (3.123)
ROA	-1.332 (-0.604)	-0.780 (-0.340)	0.144 (0.069)	-0.057 (-0.026)	-0.070 (-0.032)
Market-to-Book	-62.969*** (-3.470)	-71.210*** (-3.867)	-84.164*** (-4.790)	-82.568*** (-4.388)	-82.154*** (-4.361)
Ln(Loan Maturity)	3.692 (0.428)	3.500 (0.413)	0.863 (0.103)	-1.216 (-0.150)	1.080 (0.130)
Ln(Loan Amount)	-15.373** (-2.180)	-14.790** (-2.160)	-14.677** (-2.165)	-14.999** (-2.328)	-16.490** (-2.355)
Financial Covenant	5.660 (0.419)	5.115 (0.383)	3.174 (0.263)	5.433 (0.455)	0.328 (0.026)
Senior	-94.403*** (-3.207)	-91.338*** (-3.130)	-87.959*** (-3.090)	-82.826*** (-2.853)	-84.599*** (-3.052)
Syndicate	-9.966 (-0.419)	-9.402 (-0.411)	-2.762 (-0.131)	-0.318 (-0.016)	-4.478 (-0.211)
Maximum Share Property Type FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	264	264	264	264	264
Adj. R-squared	0.400	0.407	0.450	0.450	0.437

**Table A2: Bank Loan Spread and Diversification by Eight Property Types  
(Based on the Number of Properties)**

This table presents the results from the regression of loan spreads on *Firm HHI* by property eight types where the portfolio shares are calculated based on the number of properties rather than their net book values. Panel A (Panel B) reports the results for all loans (secured loans). All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Loan Spread					
	Panel A: All Loans			Panel B: Secured Loans		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm HHI	37.589*** (3.318)			58.759*** (3.336)		
Focus Dummy		17.951*** (3.292)	11.045** (2.093)		35.294*** (3.880)	23.083 (1.647)
Ln(Assets)	-13.885*** (-2.969)	-13.944*** (-2.999)	-10.759** (-2.591)	0.812 (0.129)	-0.108 (-0.017)	2.601 (0.416)
Portfolio BV/Assets	-19.943*** (-3.805)	-17.703*** (-3.600)	-15.415** (-2.579)	-35.103*** (-3.129)	-26.645** (-2.599)	-26.209** (-2.245)
Leverage	66.344*** (4.453)	70.092*** (4.736)	67.593*** (4.131)	72.805** (2.579)	81.754*** (3.164)	77.115** (2.544)
ROA	-1.693* (-1.929)	-1.705* (-1.928)	-1.583* (-1.752)	-0.482 (-0.211)	-0.369 (-0.173)	-0.509 (-0.227)
Market-to-Book	-36.266*** (-3.575)	-36.838*** (-3.532)	-36.079*** (-3.648)	-77.834*** (-4.261)	-80.220*** (-4.750)	-79.020*** (-4.143)
Ln(Loan Maturity)	4.216 (0.971)	4.257 (0.997)	2.643 (0.641)	2.870 (0.346)	0.352 (0.044)	-2.669 (-0.320)
Ln(Loan Amount)	-11.163*** (-2.971)	-10.937*** (-2.833)	-12.151*** (-3.551)	-14.638** (-2.173)	-14.734** (-2.166)	-16.829** (-2.571)
Missing	5.155 (0.985)	5.262 (1.034)	5.616 (1.202)			
Secured Loan	37.894*** (6.196)	37.147*** (6.174)	31.727*** (4.593)			
Financial Covenant	-0.956 (-0.200)	-1.073 (-0.221)	0.169 (0.037)	4.214 (0.321)	2.624 (0.201)	4.578 (0.374)
Senior	-67.951*** (-4.154)	-65.332*** (-4.152)	-49.940*** (-2.852)	-91.434*** (-3.254)	-84.618*** (-3.160)	-75.896** (-2.442)
Syndicate	-17.109* (-1.709)	-18.749* (-1.927)	-13.956 (-1.520)	-9.002 (-0.411)	-10.982 (-0.522)	-6.581 (-0.323)
Maximum Share Region FE	No	No	Yes	No	No	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	264	264	264
Adj. R-squared	0.549	0.551	0.577	0.416	0.432	0.438

**Table A3: Bank Loan Spread and Diversification by State**

This table presents the results from the regression of loan spreads on *Firm HHI* by the property's state. Panel A (Panel B) reports the results for all loans (secured loans). *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios based on the U.S. states. *Focus Dummy* indicates whether *Firm HHI* is above its sample median. *Number of Regions* counts the number of regions with a non-zero portfolio share. *Maximum Share Region<sub>i</sub>* is an indicator variable that takes a value of one if subregion *i* has the largest book value share in a REIT's portfolio, zero otherwise. All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

Panel A: All Loans					
	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		-25.709** (-2.164)			
Focus Dummy			-13.011** (-2.582)	-9.064* (-1.717)	
Number of States					0.680** (2.550)
Ln(Assets)	-13.531*** (-2.801)	-14.697*** (-3.201)	-14.726*** (-3.391)	-15.507*** (-3.328)	-16.519*** (-3.945)
Portfolio BV/Assets	-20.120*** (-3.522)	-20.944*** (-3.708)	-19.412*** (-3.240)	-20.440*** (-3.251)	-21.777*** (-3.546)
Leverage	60.138*** (3.842)	59.989*** (4.015)	61.937*** (4.153)	62.174*** (3.974)	62.200*** (4.273)
ROA	-2.072** (-2.373)	-2.242** (-2.558)	-2.202** (-2.521)	-2.415** (-2.496)	-2.286** (-2.597)
Market-to-Book	-33.247*** (-3.123)	-32.253*** (-3.089)	-31.989*** (-3.014)	-30.757*** (-2.929)	-34.180*** (-3.282)
Ln(Loan Maturity)	4.730 (1.073)	4.305 (0.978)	3.919 (0.890)	3.911 (0.960)	4.367 (0.981)
Ln(Loan Amount)	-11.361*** (-2.827)	-11.058*** (-2.861)	-11.230*** (-2.965)	-9.770*** (-2.716)	-11.263*** (-2.999)
Missing	6.441 (1.210)	6.598 (1.249)	7.147 (1.367)	5.801 (1.122)	6.699 (1.273)
Secured Loan	38.779*** (5.987)	38.104*** (6.086)	37.059*** (6.095)	36.119*** (5.966)	36.715*** (6.110)
Financial Covenant	-1.070 (-0.217)	-1.069 (-0.220)	-0.453 (-0.094)	0.089 (0.018)	-0.889 (-0.182)
Senior	-68.686*** (-4.100)	-76.881*** (-4.568)	-79.203*** (-4.444)	-76.927*** (-4.509)	-78.656*** (-4.608)
Syndicate	-18.604* (-1.794)	-17.302* (-1.683)	-17.394* (-1.682)	-20.075* (-1.752)	-17.471* (-1.726)
Maximum Share Region FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes



## Bank Loan Spread and Diversification by State (Cont.)

Panel B: Secured Loans					
	Loan Spread				
	(1)	(2)	(3)	(4)	(5)
Firm HHI		-42.838** (-2.618)			
Focus Dummy			-20.705** (-2.046)	-10.224 (-0.895)	
Number of States					0.951* (1.714)
Ln(Assets)	2.888 (0.453)	0.182 (0.031)	-0.437 (-0.074)	-0.379 (-0.052)	-1.909 (-0.317)
Portfolio BV/Assets	-38.340*** (-3.085)	-38.490*** (-3.124)	-36.793*** (-2.814)	-41.031*** (-3.420)	-41.524*** (-3.330)
Leverage	64.011** (2.243)	60.336** (2.210)	60.867** (2.182)	88.903*** (2.658)	60.521** (2.248)
ROA	-1.332 (-0.604)	-1.758 (-0.794)	-1.441 (-0.665)	-1.402 (-0.638)	-1.551 (-0.706)
Market-to-Book	-62.969*** (-3.470)	-60.951*** (-3.326)	-60.796*** (-3.146)	-69.188*** (-3.165)	-65.076*** (-3.524)
Ln(Loan Maturity)	3.692 (0.428)	2.334 (0.281)	1.233 (0.140)	-2.069 (-0.227)	1.957 (0.226)
Ln(Loan Amount)	-15.373** (-2.180)	-14.470** (-2.172)	-15.114** (-2.272)	-12.400* (-1.689)	-15.076** (-2.205)
Financial Covenant	5.660 (0.419)	4.566 (0.354)	6.258 (0.477)	2.877 (0.221)	4.571 (0.345)
Senior	-94.403*** (-3.207)	-109.080*** (-3.792)	-107.285*** (-3.601)	-110.404*** (-3.435)	-108.880*** (-3.534)
Syndicate	-9.966 (-0.419)	-9.390 (-0.390)	-11.542 (-0.472)	-10.089 (-0.322)	-10.602 (-0.435)
Maximum Share Region FE	No	No	No	Yes	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	264	264	264	264	264
Adj. R-squared	0.400	0.409	0.410	0.458	0.407

**Table A4: Bank Loan Spread and Diversification by Subregion  
(Based on the Number of Properties)**

This table presents the results from the regression of loan spreads on *Firm HHI* by property subregion where the portfolio shares are calculated based on the number of properties rather than their book values. Panel A (Panel B) reports the results for all loans (secured loans). All regressions include loan type, loan purpose, and year fixed effects. The standard errors are clustered by REIT and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Loan Spread					
	Panel A: All Loans			Panel B: Secured Loans		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm HHI	-27.708*** (-2.951)			-46.220*** (-3.786)		
Focus Dummy		-13.421*** (-2.741)	-13.197** (-2.537)		-30.577*** (-3.086)	-30.193*** (-2.708)
Ln(Assets)	-15.520*** (-3.376)	-15.502*** (-3.431)	-14.333*** (-3.110)	-1.192 (-0.199)	-2.803 (-0.468)	-5.078 (-0.753)
Portfolio BV/Assets	-21.540*** (-3.838)	-21.178*** (-3.653)	-20.448*** (-3.534)	-38.766*** (-3.326)	-37.750*** (-3.284)	-36.440*** (-3.155)
Leverage	64.877*** (4.232)	65.629*** (4.203)	64.210*** (4.153)	65.687** (2.435)	71.520** (2.611)	78.534** (2.576)
ROA	-2.207** (-2.575)	-2.059** (-2.375)	-2.128** (-2.445)	-1.517 (-0.706)	-0.898 (-0.424)	-0.870 (-0.413)
Market-to-Book	-30.344*** (-2.983)	-32.524*** (-3.046)	-30.665*** (-2.864)	-56.928*** (-3.143)	-66.169*** (-3.400)	-62.471*** (-2.956)
Ln(Loan Maturity)	4.333 (0.979)	4.530 (0.997)	4.075 (0.897)	1.532 (0.180)	0.877 (0.100)	-0.758 (-0.089)
Ln(Loan Amount)	-11.358*** (-3.013)	-11.594*** (-2.943)	-11.582*** (-3.068)	-14.919** (-2.224)	-16.227** (-2.287)	-14.708** (-2.195)
Missing	6.214 (1.184)	6.473 (1.237)	6.617 (1.272)			
Secured Loan	36.746*** (5.972)	37.127*** (6.046)	37.145*** (6.082)			
Financial Covenant	-1.106 (-0.231)	-0.599 (-0.124)	-0.735 (-0.150)	3.539 (0.273)	5.120 (0.398)	3.958 (0.304)
Senior	-71.751*** (-4.300)	-76.599*** (-4.369)	-83.877*** (-4.571)	-98.973*** (-3.398)	-111.058*** (-3.721)	-119.422*** (-3.982)
Syndicate	-17.634* (-1.728)	-17.331* (-1.673)	-17.517* (-1.667)	-10.811 (-0.466)	-6.252 (-0.255)	-12.164 (-0.503)
Maximum Share Region FE	No	No	Yes	No	No	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	264	264	264
Adj. R-squared	0.546	0.545	0.546	0.413	0.423	0.417

**Table A5: Mortgage Spread Regressions on HHI  
(Mortgage Observations)**

This table presents the regression of mortgage spread on *Firm HHI* and *Collateral HHI* by property type and region using each mortgage observation. The regressions also include interaction terms between *Crisis and After* dummies and HHI indices. *Crisis and After* dummies are dropped due to multicollinearity. *Spread* is the interest rate of a mortgage over one-year LIBOR. *Firm HHI* is the Herfindahl index calculated using REITs' property portfolios. *Collateral HHI* is calculated using the collateral assets collateralizing the same mortgage. *Collateral property count* is for the number of properties collateralizing the same mortgage. The dummy for properties less than years old and for renovated dummies are controls for collateral quality. The regressions include property type, economic region, and year fixed effects. The standard errors are heteroskedasticity-robust and clustered by REIT, and t-ratios are reported in parentheses. \* indicates significance at the 10% level. \*\* indicates significance at the 5% level. \*\*\* indicates significance at the 1% level.

	Mortgage Spread			
	Panel A: By Property Type		Panel B: By Region	
	(1)	(2)	(3)	(4)
Firm HHI	13.203 (0.352)		-2.457 (-0.088)	
X Crisis and After	13.735 (0.243)		14.634 (0.253)	
Collateral HHI		-21.969 (-0.742)		-10.680 (-0.391)
X Crisis and After		178.207*** (3.183)		4.864 (0.130)
log(Collateral Property Count)	-3.578 (-0.333)	-2.434 (-0.248)	-3.840 (-0.350)	-5.131 (-0.456)
log(Asset Book Value) (average)	-24.361*** (-4.447)	-23.897*** (-4.520)	-23.661*** (-4.294)	-24.125*** (-4.222)
log(Mortgage Value)	-16.828** (-2.573)	-17.059*** (-2.747)	-16.703*** (-2.707)	-16.205*** (-2.770)
Less Than 10 Years Old (1=yes, average)	5.990 (0.175)	6.577 (0.201)	3.760 (0.111)	2.783 (0.082)
Renovated (1=yes, average)	79.695** (2.210)	87.541** (2.458)	80.502** (2.266)	80.187** (2.265)
Log(Time-to-Maturity) (in years)	-25.343** (-2.483)	-26.780*** (-2.656)	-25.832** (-2.559)	-25.476** (-2.516)
Fixed Rate (1=yes)	209.434*** (5.726)	207.659*** (5.941)	211.710*** (5.651)	210.904*** (5.585)
log(Firm Size) (lagged, t-1)	18.885** (2.529)	20.052*** (2.946)	18.666** (2.490)	18.545** (2.593)
Debt Ratio (lagged, t-1)	10.373 (0.281)	-0.181 (-0.005)	14.645 (0.413)	14.113 (0.401)
ROA (lagged, t-1)	4.630 (1.548)	4.422 (1.490)	4.598 (1.515)	4.752 (1.585)
Market-to-Book (lagged, t-1)	-19.120 (-0.463)	-18.409 (-0.463)	-18.889 (-0.476)	-17.444 (-0.435)
Property Type Fixed Effects	No	No	No	No
Economic Region Fixed Effects	No	No	No	No
Year-Fixed Effects	Yes	Yes	Yes	Yes
Observations	850	850	850	850
Adjusted R-squared	0.670	0.676	0.670	0.670