Institutional Cross-Ownership and Firm Value: Evidence from Real Estate Investment Trusts*

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Abstract

This paper contributes to the ongoing debate about whether and how institutional cross-ownership (ICO) affects firm behavior. Using a sample of equity REITs, which provide significant advantages for isolating a monitoring channel, we find a robust and positive relation between ICO and REIT firm value. The positive relation between ICO and firm value is driven mainly by motivated investors and becomes stronger when we construct our ICO measures using blockholdings. Our difference-in-differences (DID) analysis, using mergers between institutional investors, suggests a causal relation exists between ICO and firm value. After investigating various channels through which ICO could affect firm behavior, we conclude that asset allocation decisions and performance are the most plausible explanations. Our finding that the monitoring associated with ICO aids managers in their portfolio disposition strategies further supports this conclusion. This enhanced monitoring leads to increased property portfolio returns as well as more geographic diversification.

Keywords: cross-ownership, firm value, monitoring, asset allocation, REITs

JEL classification: G11, G23, G32, L22, D82

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1. Introduction

The role of institutional investors in firm decision making and valuation has been studied extensively. In recent years, there has been an increased focus on institutional investors who own equity in multiple firms of the same industry. Institutional cross-ownership (ICO), also known as common ownership, has increased, at least in part, because of the continued growth of index investment and consolidation in the asset-management industry. In 1990, less than 20% of S&P500 firms had a blockholder that also owned a block of shares in a peer firm. This number has increased to over 80% (Lewellen and Lowry, 2019). This increase in ICO has generated a debate about whether and how ICO affects firm behavior.[1]

Despite the growing literature on ICO and its effect on firm behavior, little research directly investigates the impact of ICO on firm value. One explanation for this lack of research is that ICO may affect firm valuation and performance in various ways, such as through product market competition (He and Huang, 2017), corporate governance (Edmans et al., 2018; Kang et al., 2018, He at al, 2018), innovation (Chemmanur et al., 2016; López et al., 2017; Borochin et al., 2018; Freeman, 2018), mergers and acquisitions (Brooks et al., 2018), financial reporting and voluntary disclosure (Jung, 2013; He et al., 2018, Park et al., 2018, Pawliczek and Skinner, 2018), and cash holdings (Semov, 2017). It is therefore difficult to identify accurately through which channel(s) cross-ownership affects firm value.

We study a sample of equity real estate investment trusts (REITs), which operate under restrictions that potentially shut down many of the aforementioned channels and thus provide significant advantages for testing the relation between ICO and firm value. REITs are popular investment vehicles among institutional investors because of relatively stable dividend streams and diversification benefits. Conditional on this high institutional ownership, how does ICO affect REIT behavior and firm value? Our main hypothesis is that ICO enhances firm value mainly through more effective monitoring of a firm's asset allocation decisions, after controlling for the effect of institutional ownership. Specifically, institutional

[1] One concern is that cross-owning investors may have incentives to maximize the return of their portfolio of multiple firms rather than the returns of individual firms. In addition, if investors own stakes in peer firms, and investor interests affect firm decision making, firms might not behave competitively (Backus et al. 2019; Azar et al., 2016, 2018; Kini et al, 2018).

investors (especially “motivated” investors and blockholders) holding multiple REITs have better access than other investors to soft information on the illiquid assets held by equity REITs that trade in local markets with high information asymmetry. Cross-owners are more likely to be effective monitors because of these information advantages. More specifically, their presence leads to better investment and operating decisions by REITs, which enhances REIT valuation. Our empirical results suggest that institutional cross-holders monitor primarily by evaluating a REIT’s property portfolio and helping managers make decisions to dispose of properties in markets with poor investment prospects. We also provide evidence that the information acquired from holding multiple REITs leads to increased property portfolio returns as well as more geographic diversification.

The legal setting and organizational structure under which REITs operate also help isolate a monitoring channel. For example, equity REITs are relatively homogenous in terms of corporate governance (e.g., Chan et al., 2003; Ghosh and Sirmans, 2006; Hartzell et al., 2006), are not subject to significant product market competition, and are relatively easier to value because of the tangible nature of their underlying assets. They are also required to pay out at least 90% of annual taxable income in the form of dividends, which reduces cross-sectional variation in dividend distributions.

The link between firm value and asset allocation is relatively clear among REITs because the value of an equity REIT derives mostly from tangible and observable real assets. At least 75% of a REIT’s gross income must be derived from real estate assets; thus, the intrinsic value of an equity REIT is tightly linked to the value of its underlying real estate portfolio. This is in contrast to conventional firms, many of which have significant investments in difficult to value intangible assets and operate in multiple industry segments, which complicates data (information) acquisition (Villalonga, 2004).[2] In addition, unlike many less capital-intensive industries, the value of a REIT’s business franchise generally plays a less important role in stock valuation (Capozza and Seguin, 2003; Gentry et al., 2003; Hartzell et al., 2006). Thus, changes in REIT valuations are more tightly linked to changes in the firm’s base of tangible assets than in industries where changes in the market’s

[2] Earlier studies (e.g., Lang and Stulz, 1994; Berger and Ofek, 1995; Servaes, 1996) find that firms that operate in multiple industry segments trade at an average discount relative to single-segment firms. Villalonga (2004) concludes that this finding may be an artifact of (1) the definition of segment, (2) the frequent change of the segments that the firms report even when there is no real change in operations, and, most importantly, (3) the difference between the disaggregation in segment financial reporting and the true diversification. Focusing on an equity REIT sample allows us to overcome this concern because of the homogeneity of assets for which accounting data are reported.

valuation of the firm's business franchise often impede efforts to detect the effects of asset growth and portfolio allocation decisions on firm value (Green Street Advisors, 2014b).

We first investigate whether ICO is predictive of firm value using a sample of equity REITs from 1995 through 2015. Our proxy for firm value is Tobin's Q, the most common measurement of firm value and growth opportunities.[3] In theory, Tobin's Q is the sum of the market value of a firm's equity and debt divided by the replacement cost of the firm's underlying assets. The market value of a firm's equity (the numerator of Tobin's Q) is readily observable if the stock is publicly traded. However, accurate estimates of the replacement cost of assets (i.e., the denominator of Tobin's Q) are not readily available for most firms. Therefore, in practice, the book value of debt is used as a proxy for its market value and the (depreciated) book value of assets is used as a proxy for their replacement cost. Analyzing REITs allows us to obtain an alternative proxy for firm value based on market value-based measures of a firm's debt and the replacement cost of assets.[4] In particular, we specify replacement costs to be the mark-to-market value of assets produced by Green Street Advisors, a prominent buy-side firm that specializes in REITs, to construct alternative Q-based measures for firm value, which we label as "Green Street" Q.

Using different measures of ICO as explanatory variables and controlling for a variety of firm characteristics as well as fixed effects, we first find that REIT valuations are positively related to ICO. This relation holds in our baseline regressions whether we measure firm value contemporaneously with our explanatory variables or one-year ahead.

Next, we measure ICO separately for "motivated" and "non-motivated" investors to more accurately capture the range of investor influence and characteristics (e.g., Fich et al., 2015), including their propensity to monitor firm investment decisions. We find strong and consistent evidence that it is a firm's motivated cross-owners that drive the positive relation between ICO and firm value, which is consistent with a monitoring channel. Institutional investors that block own at least 5% of the common equity of two or more firms within the same industry are likely to exert more influence on investment decisions. Therefore, we separately examine the role of large blockholders who cross-own REITs. We find the positive

[3] Numerous studies of conventional firms use Tobin's Q as a proxy for firm value. Commercial real estate studies that use Tobin's Q as the main measure of firm value or growth opportunities include Capozza and Seguin (2003), Han (2006), Hartzell et al. (2006), Devos et al. (2007), Eichholtz and Yonder (2015), Cheung et al. (2015), Hardin et al. (2017) and Chiang et al. (2018).

[4] The argument is that if a firm could quickly sell its underlying assets at their estimated market values, and immediately buy them back at the same price, then the estimated market value of a firm's underlying assets is a conceptually accurate measure of their replacement cost.

relation between ICO and firm value is even stronger when we construct our ICO measures using blockholdings.

Our OLS estimates could be biased by omitted variables, such as selection by investors and unobserved REIT managerial quality. We therefore perform a difference-in-differences (DID) analysis based on a quasi-natural experiment of mergers among institutional investors (He and Huang, 2017, and He et al., 2018). Our DID estimates help to establish a causal relation between ICO and firm value. We find strong and consistent evidence that increases in cross-ownership (through mergers) increases REIT firm value.

Guided by the existing literature on the determinants of REIT firm value and the role of institutional investors in REIT valuations, we next conduct a battery of tests to isolate the channel through which ICO affects valuations. These analyses rely on the DID setting to mitigate endogeneity concerns. Our results suggest that increases in ICO improve profitability and increase the propensity for REITs to reposition their portfolios. In particular, we find it is property dispositions, rather than acquisitions, that account for the link between ICO and asset allocations. This finding suggests that institutional cross-holders monitor primarily by evaluating the desirability of currently owned assets and by helping managers make decisions to dispose of properties with poor investment prospects. In addition, we find no causal relation between ICO and dividend payout ratios, weak evidence that ICO enhances stock market liquidity, no relation between ICO and external financing and capital structure, and no evidence that increased ICO leads to reduced G&A expenses. Taken together, these results suggest that the enhanced monitoring of asset allocation decisions is the primary driver of the positive relation between ICO and firm value.

To document a direct link between ICO and asset allocation decisions, we next construct quarterly firm-level property portfolio returns to directly measure the private market performance of each REIT's underlying property portfolio. Using this novel variable, we find that the property portfolios held by REITs with higher ICO outperform the portfolios owned by REITs with low ICO. We also find evidence that the enhanced monitoring associated with high ICO increases the propensity that REIT managers will reallocate their portfolios away from markets (MSAs) that subsequently underperform. We also find that REITs with high ICO are associated with more geographic diversifications in their portfolios.

Lastly, we examine the interactions among ICO, geographic diversification, and firm value. If cross-ownership facilitates more effective monitoring of asset allocation decisions, the diversification discount widely observed in the literature should be mitigated when

REITs have higher ICO. To test this hypothesis using our valuation regressions, we interact our ICO measures with the degree to which a REIT is geographically diversified. We find positive coefficients on the interaction terms, suggesting that REITs with more ICO exhibit a lower valuation discount from geographic diversification. Again, consistent with prior findings, we find this attenuation in the diversification discount only among REITs with more motivated cross-owners.

Overall, this paper documents a causal relationship between the level of ICO and firm value. This suggests that cross-owners (especially motivated and blockholding cross owners) are more effective monitors and thus enjoy information advantages. Their presence therefore leads to better investment and operating decisions by the firms that are cross-owned, which produces higher valuation.

Our paper contributes to the emerging literature on ICO and firm behavior. Among the general finance literature, the most closely related study to ours is Kang et al. (2018), who also find that ICO increases firm value as measured by Tobin's Q. Our paper differs from Kang et al. (2018) because we conclude that ICO enhances firm value through the monitoring of asset investment strategies, while Kang et al. (2018) find that ICO enhances firm value through better corporate governance. Unlike Kang et al. (2018) who study general firms, we are able to conduct our analysis using a market-value-based measure of Q, which is conceptually superior to the calculation of traditional Q.

To the best of our knowledge, we are the first in the commercial real estate literature to examine the role of institutional cross-owners on firm performance and value. Evans et al. (2016a) and Evans et al. (2016b) examine the connection between ICO and seasoned equity offerings (SEOs).[5]

There is an extensive literature on REIT institutional ownership (e.g., Downs, 1998; Chan et al. 2003; Ghosh and Sirmans, 2003; Hartzell and Starks, 2003; Hartzell et al. 2006; Chung et al., 2012; Devos et al. 2013; Hardin et al., 2017; Ling et al., 2019). Most studies on REIT institutional ownership and firm value focus on investors' preferences for REITs with certain characteristics, such as size and liquidity (e.g., Dhar and Goetzman, 2006; Ciochetti et al., 2002; Hill et al., 2012; Cheung et al., 2015; Clayton and MacKinnon, 2003; Devos et al., 2013). Our study differs from this literature because we find that institutional cross-owners

[5] Evans et al. (2016a) suggest that REITs with substantial ICO tend to issue fairly priced SEOs; Evans et al. (2016b) find that block ICO increases the likelihood of SEOs and corporate control changes.

enhance firm performance by active monitoring, instead of passive selection. Our study is also related to Hartzell et al. (2014) and Hardin et al. (2017) who show that institutional investors, especially non-passive and motivated ones, increase firm monitoring. However, our focus is on cross-ownership and the causal relationship between ICO and firm value. Our paper also contributes to a substantial literature on diversification, asset allocation, and REIT performance (Denis et al., 1997; Hartzell et al., 2014; Capozza and Seguin, 1999; Campbell et al., 2003; Cronqvist et al., 2001; Ling et al., 2018; Wang and Zhou, 2017).

The paper proceeds as follows. Section 2 describes the data and provides variable definitions and summary statistics. Section 3 examines the relation between ICO and firm value. Section 4 contains our DID analysis. Section 5 discusses how ICO helps REIT managers make better asset allocation decisions. Section 6 examines whether ICO mitigates the diversification discount. Section 7 concludes.

2. Data

We start with a sample of 312 unique equity REITs (2,638 firm-years) obtained from the CRSP Ziman REIT database from 1995 through 2015.[6] We delete observations with missing financial information after merging with CRSP-Compustat. We also drop observations with incomplete information from the Compustat Annual database on total assets (*AT*), common equity (*CEQ*), closing stock price at the end of the calendar year (*PRCC_C*), and common shares outstanding (*CSHO*). This reduces the number of unique equity REITs to 292 (2,398 firm-years).

We next merge our firm-level data with SNL Real Estate Database and SNL Company Database to obtain several variables not available from Compustat. For each property held by each REIT, SNL provides information on its property type (e.g., office versus retail), location, acquisition and disposition dates, initial cost, and the depreciated and non-depreciated book value of each asset. This information allows us to accurately measure each REIT's geographic concentration in each metropolitan statistical area (MSA) at the beginning of each year.[7] We also calculate time-varying property-type concentrations for each REIT in

[6] Equity REITs own income-producing real estate and obtain most of their revenues from rents. Mortgage REITs invest in mortgages or mortgage-backed securities. According to the FTSE-NAREIT Index, the 186 equity REITs in their index as of January 31, 2019 had a total equity market capitalization of $1.0 trillion.
[7] SNL updates its property share data at the end of each calendar year.

a similar fashion. After deleting observations with missing data, our merged sample contains 130 unique equity REITs and 1,865 firm-year observations spanning the 1995-2015 period.

Finally, we merge our combined data set with ownership data from Thomson Reuters, which provides quarterly reports on the common stock holdings of 13f institutions. The SEC Form 13f is a quarterly filing with the Securities and Exchange Commission (SEC) required for all institutional investment managers with over $100 million in qualifying assets. Companies required to file SEC Form 13f include insurance companies, banks, pension funds, investment advisers and broker-dealers. Because of a well-known problem with the Thomson-Reuters Ownership data from June 2013 onward, we obtain 13f holdings data for 2013, 2014, and 2015 from the WRDS SEC Analytics Suite.[8] Merging our firm-level and ownership datasets further reduces our initial regression sample to 1,341 firm years for the 130 equity REITs.

2.1 Measuring REIT Firm Value

We first estimate firm values using Tobin's Q, which conceptually equals the market value of a company's asset divided by the replacement cost of its assets. The market value of a firm's publicly traded stock is readily available but not the market value of liabilities or the replacement cost of assets. The common approach is to use the book value of debt in the numerator and the depreciated book value of assets as a proxy for replacement cost in the denominator. That is, traditional Q is calculated as:

$$Traditional\ Q = \frac{Price\ per\ share \times Common\ Shares\ Outstanding + Book\ Value\ of\ Liabilities}{Book\ Value\ of\ Assets}.$$

Economic rates of depreciation for real estate assets can vary substantially from the accounting-based rates of depreciation (Ott et al., 2005). This is particularly important for our study because, except in periods of substantial price declines, the nominal value of commercial real estate (CRE) assets typically increases even as the book value of those assets decreases with tax (accounting) depreciation over time. This increase in nominal values is largely due to the increasing value of non-depreciable land.[9] An alternative to traditional Q,

[8] The main data issues include stale and omitted institutional 13F reports and excluded securities. For example, data on the institutional ownership of Blackrock Inc., one of the largest institutional investors in the U.S. equity market, is omitted or is incorrect for several quarters after June 2013. In addition, after June 2013 Thomson-Reuters dropped a sizable number of securities (30% of the overall universe) from their coverage. These dropped or excluded securities in recent quarters include all ETFs and about 6% of US common stocks (using CRSP share code 10, 11, and 12), including companies as large as Apple Inc. Ben-David et al. (2017) provide more details.

[9] A second problem associated with the use of book values in the denominator of Q is that they do not capture the replacement cost of intangible assets, such as human capital, patents, and technological advantages. This

"non-depreciated" Q, is the ratio of the market value of equity plus the book value of debt divided by the non-depreciated book value of assets. Although non-depreciated Q adds back accumulated depreciation, the denominator remains a measure of the historical cost of the firm's assets.

If a firm could quickly sell each of its underlying assets (and pay off all liabilities) at their market values, and immediately buy them back (or re-issue them) at the same price, then the total market value of a firm's underlying assets is an estimate of their replacement cost. A significant advantage of analyzing REITs is that several entities produce point estimates of the current market value of a firm's underlying assets and liabilities for a subset of the larger equity REITs. Such estimates are not available for other types of firms. Our firm-level estimates of the market values of underlying assets and liabilities were obtained from Green Street Advisors (www.greenstreetadvisors.com). These market-based estimates allow us to calculate an alternative measure of Q to mitigate the aforementioned measurement issues. Our "Green Street" Q is calculated as:

$$Green\ Street\ Q = \frac{(Price\ per\ share \times Diluted\ shares\ Outstanding) + Market\ Value\ of\ Liabilities}{(NAV\ per\ share \times Diluted\ shares\ Outstanding) + Market\ Value\ of\ Liabilities}.$$

Similar to the calculation of traditional (depreciated) Q, the numerator in Green Street Q includes the stock market value of the firm's equity (common equities, operating partnership units, and in-the-money options). Green Street's estimate of the market value of the firm's liabilities replaces the book value of liabilities in the numerator. The denominator is equal to the estimated total net asset value (NAV) of a REIT (i.e., the market value of the underlying properties and other assets), plus the market value of the firm's liabilities.

Green Street restricts its coverage to the most actively traded REITs. Thus, the use of Green Street data reduces our sample size. We are able to match 662 of our firm-year observations with the data from Green Street. These 662 observations are associated with 81 equity REITs.

Given the reduction in sample size that results from the merger with Thomson Reuters, we first check whether the book values of REITs in our regression sample are reasonable proxies for the book values the broader, pre-merger sample. We also examine the extent to which the book values in our main regression sample are similar to those in the smaller Green Street sample.

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measurement problem biases book value-based replacement cost estimates downward (and Qs upward) but is likely to be a relatively minor problem among equity REITs who own primarily tangible, in place, real property.

We first compare depreciated book value with non-depreciated book value for the 1,865 firm-year sample (obtained before merging with the ownership data from Thomson Reuters). These results are reported in columns (1) and (2) of Table 1; all dollar values are reported in nominal terms. The mean depreciated book value of assets in the larger sample is $3.3 billion, or 14% less than the $3.9 billion mean of non-depreciated book value. This depreciation wedge is similar for UPREITs, non-UPREITs, and REITs classified by alternative property types.[10]

In columns (3) and (4) of Table 1, we report the corresponding mean depreciated and non-depreciated book values for our sample after merging with ownership data from Thomson Reuters.[11] The average depreciated book value for this sample is $4.1 billion (column (3)), which is 23% greater than the corresponding depreciated book value of the larger sample (column (1)). This difference reflects the greater prevalence of institutional ownership among larger REITs. The average non-depreciated book value is $4.4 billion, or 8% larger than the mean depreciated book value.[12]

Relative to the sample of equity REITs prior to the merger with institutional ownership data, those in our baseline regression sample (column (3)) tend to be larger, equally likely to be UPREITs, but more likely to specialize in one of the major property types. Nevertheless, the correlation of depreciated book values in our regression sample with depreciated book values in the broader sample is 0.983; the corresponding correlation of non-depreciated book values is 0.989. Thus, the cross-sectional and time-series variation in the book values of REITs in our regression sample appears to be reasonable proxies for variation in the broader sample.

Next, we compare the book values of REITs in our regression sample with those in the smaller Green Street sample. Columns (5) and (6) of Table 1 display average depreciated and non-depreciated book values for this "Green Street" subsample. As expected, a comparison

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[10] Eighty-two percent of the firm-year observations in the larger sample are associated with UPREITs, which are, on average, twice the size of the non-UPREITs. Of the 1,865 firm-year observations, 408 (22%) are associated with retail REITs, 259 (14%) are associated with office REITs, and 673 (36%) are associated with ("other") REITs that specialize in a property type other than residential, office, retail, and industrial.

[11] In order to calculate the non-depreciated book value for this comparison sample, we lose 24 firm-year observations from our main regression sample of 1,341 firm-years due to missing data on the non-depreciated book value of the firm.

[12] Eighty-three percent of the firm-year observations are associated with UPREITs, which is similar to the 82% observed in the larger sample. Of the 1,317 firm-year observations, 413 (31%) are associated with retail REITs, 356 (27%) are associated with office REITs, and 335 (25%) are associated with REITs that specialize in non-core property types.

with columns (3) and (4) reveals that the firms followed by Green Street are notably larger than the typical REIT in our regression sample – the mean depreciated book value for our Green Street sample is \$6.3 billion, which is 54% larger than the corresponding mean for the base-case regression sample (column (3)). The equity REITs in the Greet Street subsample are also more likely to be UPREITs and more likely to specialize in one of the four major property types. Nevertheless, the correlation of depreciated book values in our regression sample with book values in the Green Street subsample is 0.962. Thus, the cross-sectional and time-series variation in the book values of REITs in our regression sample are similar to those in the smaller Green Street sample.

Column 7 of Table 1 contains averages of Green Street's estimates of the market value of the firm's underlying assets. We construct this by adding Green Street's estimate of the market value of the firm's liabilities to the estimated market value of its underlying assets (not the market value placed on the firm's stock).[13] The mean market value of the firm's assets is \$9.5 billion. This is 51 percent greater than the mean depreciated book value in our Green Street sample. These large differences suggest the extent to which book values may understate the market value (replacement cost) of a REIT's underlying assets.

2.2 Measuring ICO

We construct our measures of ICO following He and Huang (2017). Our main ICO measures include the percentage of a REIT's shares held by institutions that own shares in at least one other REIT (*PERICO*) and the number of unique institutions that cross-hold REIT *i* at time *t* (*NUMICO*). Several recent papers also partition institutional investors into groups based on their expected behavior; in particular, their ability and tendency to monitor (and pressure) managers. For example, Fich et al. (2015) and Hardin et al. (2017) classify 13f institutions as either "motivated" or "non-motivated" investors based on the magnitude of their stock holdings.[14] Using quarterly 13f filings for each institutional investor, we calculate the total market value of their overall portfolio and the percentage share of each REIT in that

[13] Green Street refers to the private market valuation of a REIT's common equity as its net asset value (NAV). We define NAV plus the estimated market value of the firm's liabilities as the firm's unlevered asset value (UAV). See Green Street Advisors' *Glossary of Commercial Real Estate Terms* for more discussion.

[14] It is well known that some of the 13f institution types (*TYPECODE*) in the Thomson Reuters S34 database are incorrectly classified. By focusing on the motivated and non-motivated cross-ownership variables, we circumvent this misclassification issue. We also follow Bushee (1998, 2001) and construct passive and non-passive cross-ownership variables, which yields similar results.

portfolio.[15] If REIT *i*'s weight is ranked in the top decile of the cross-holding institution's overall portfolio, the institution is classified as a motivated cross-holding investor/holder of REIT *i* shares at time *t*.[16]

One might argue that if some cross-holders tilt their portfolios toward one REIT and underweight the shares of the other REIT, they are likely to focus on influencing the performance of the over-weighted REIT. This may not be captured by our main ICO measures.[17] To capture the full range of investor influence and characteristics, including their monitoring of REIT investment decisions, we separately construct each ICO measure for motivated and non-motivated cross-owners. *M.PERICO* (*NM.PERICO*) is the percentage of a REIT's shares at time *t* held by motivated (non-motivated) cross-owners that also own shares in at least one other REIT. Similarly, *M.NUMICO* (*NM.NUMICO*) measures the number of unique motivated (non-motivated) institutions that cross-hold REIT *i* at time *t*.

We also construct corresponding ICO measures for block cross-owners, defined as cross-owners that own at least 5% of the REIT's outstanding shares. *B.PERICO* is the percentage of a REIT's shares owned by blockholders and *B.NUMICO* is the number of common blockholders that cross-hold REIT *i* at time *t*. For each block ICO measures, we separately examine motivated (*B.M.PERICO* and *B.M.NUMICO*) and non-motivated (*B.NM.PERICO* and *B.NM.NUMICO*) blockholders. Appendix 1 contains variable definitions for our set of cross-ownership variables.

2.3 Summary Statistics

The top panel in Table 2 contains summary statistics for our two measures of firm value: traditional Q and the Green Street Q. The mean (median) traditional Q for our regression sample is 1.32 (1.26) with a standard deviation of 0.32. The use of the market value of assets in the denominator reduces the average (median) Q in our Green Street sample to 1.02 (1.01).

The mean, median, and standard deviation of our cross-ownership variables are reported in the second panel of Table 2. The mean cross-ownership percentage (*PERICO*) is 61%. The percentage of shares held by motivated institutions that also own shares in at least

[15] Our portfolios include only publicly-traded securities available from Thomson Reuters.
[16] As noted by Hardin et al. (2017), our calculated portfolio allocations are approximations because the 13f filings provide stock ownership information only if the value of the position exceeds $200,000 or if the institution owns more than 10,000 shares.
[17] We thank Desmond Tsang for this comment.

one other REIT (*M.PERICO*) averages 11%. The average REIT is owned by 130 institutional investors that simultaneously own stock in another REIT. On average, seven of the 130 cross-owning investors are classified as motivated; the remaining 123 are classified as non-motivated. Overall, the statistics presented in Table 2 reveal that the majority of cross-holding institutions in our sample are non-motivated institutions.

The mean, median, and standard deviation of our block cross-ownership variables are reported in the third panel of Table 2. The percentage of shares held by institutions that block own shares in at least two REITs (*B.PERICO*) is 19%. The percentage of REIT shares held by motivated blockholding institutions that also block-own shares in at least one other REIT (*B.M.PERICO*) averages 15%. On average, the REITs in our sample are owned by two blockholding institutions that simultaneously own a block of stock in another REIT. On average, less than one institution is a motivated block cross-holder of REIT stocks; the median is zero.

Summary statistics for our control variables are provided in the bottom panel of Table 2. These control variables have been shown to be associated with REIT institutional ownership and firm value (e.g., Hartzell et al., 2014). *IO* is REIT *i*'s institutional ownership percentage at the end of year *t*. *GEODIV* and *PropDIV* capture the degree to which the firm is diversified across geographic regions and property types. Herfindahl Indexes (HHI) for REIT *i* at the end of year *t* are calculated for both MSAs and property types as the sum of the squared proportion of a REIT's assets invested across MSAs or property types.[18] We use the negative of Herfindahl Indexes for ease of interpretation: thus, the higher is *GEODIV* or *PropDIV,* the greater is the degree of diversification.

Other control variables include the logarithm of the reported book value of total assets at the end of year *t* (*LOGSIZE*), the book value of total long-term debt and current liabilities divided by the book value of total assets (*LEVERAGE*), *EBITDA* in year *t* divided by the book value of assets at the end of year *t* (*EBITDA/TA*), the ratio of the stock's trading volume to total shares outstanding at the end of year *t* (*TURNOVER*), and a dummy variable set equal to one if the REIT is structured as an UPREIT (*UPREIT*).[19]

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[18] Property types include office, multi-family, industrial, retail, and all other. For geographic locations, we follow Hartzell et al. (2014) and use MSAs defined by the National Council of Real Estate Investment Fiduciaries (NCREIF).

[19] An umbrella partnership REIT (UPREIT) typically consists of two entities: a REIT and an operating partnership (OP). The REIT issues stock to the public and uses the funds it raises to purchase properties and a

The average institutional ownership is 62%. The average property type diversification, *PropDIV*, is -0.846, which indicates a typical REIT is highly focused by property type. In contrast, the average *GEODIV* is -0.223, which implies that REITs are relatively more diversified across MSAs, consistent with the finding of Capozza and Seguin (1999), Hartzell et al. (2014) and Ling et al. (2018). Eighty-three percent of our REIT-quarter observations represent UPREITs. An average REIT in our sample has a market cap of $2.1 billion, a leverage ratio of 60%, an *EBITDA/TA* of 11%, and a turnover ratio of 14%.

3. Does Institutional Cross-Ownership Enhance Firm Value?

3.1 Methodology

To examine the relation between firm value and institutional cross-ownership, we estimate the following regression model:

$$Q_{i,t\ or\ t+1} = \alpha + \beta ICO_{i,t} + \theta GEODIV_{i,t} + \varphi PropDIV_{i,t} + \gamma IO_{i,t} + \tau Firm\ Controls_{i,t} + \omega^{r} Region\ Weights_{i,t} + \omega^{p} PropType\ Weights_{i,t} + \varepsilon_{i,t}\,, \qquad (1)$$

where our outcome variable, $Q_{i,t}$ or $Q_{i,t+1}$, is either a REIT's traditional Q or Green Street Q measured at the end of year t or $t+1$.[20] Our test variable, $ICO_{i,t}$, is a cross-ownership variable based on the number or percentage of cross-owners (*PERICO* and *NUMICO*), block cross-owners (*B.PERICO* and *B.NUMICO*), or motivated (block) cross-owners (*M.PERICO*, *M.NUMICO*, *B.M.PERICO*, and *B.M.NUMICO*). All variables based on the number of unique cross-holders (i.e., *NUMICO*) are logarithmic.

We also include in all regression specifications the time-varying weight placed on each region and property type within the REIT's portfolio.[21,22] These region weights are superior

controlling interest in the OP. The operating partners receive OP units for the real estate assets they contribute to the OP and enjoy deferral of capital gains taxation.

[20] To account for the difference between the economic rates of depreciation and the accounting-based rates of depreciation, we re-estimate Equation (1) for the *non-depreciated Q*. Results based on the *non-depreciated Q* are reported in Appendices 2 and 3, respectively.

[21] Geographic regions are classified by SNL and include (1) NE (Northeast): ME, VT, NH, NY, CT, RI, MA, PA, NJ, DE (2) ME (Mideast): MD, WV, VA, KY, NC, SC, DC, (3) SE (Southeast): TN, GA, FL, AL, MS, (4) EN (East North Central): MI, IL, OH, IN, WI, (5) WN (West North Central): MN, IA, MO, KS, NE, SD, ND, (6) SW (Southwest): TX, OK, AR, LA, (7) MT (Mountain): MT, ID, WY, UT, CO, NM, AZ, NV, ad (8) PC (Pacific): WA, OR, CA, AK, HI.

[22] Both HHIs and weights are calculated using the firm's adjusted book value/cost as defined by SNL. The use of adjusted cost or book value in place of unobservable true market values may understate (overstate) the value-weighted percentage of the REIT portfolio invested in regions that have recently experienced a relatively high (low) rate of price appreciation.

to the use of dummy variables because they control for the magnitude of a firm's allocation to each region, not just whether or not the firm owns property in that region.[23] Year fixed effects are included in the regressions. We cluster standard errors at the firm level.

3.2 Results Using the Percentage and Number of Cross-holders

Table 3 reports OLS regression results using the percentage of cross-ownership (*PERICO*) and the logarithm of the number of unique cross-holders (*NUMICO*). In the first four columns, the dependent variable is traditional Q, Q(t). In columns (5) – (8) we report the corresponding results using Green Street Q also measured at time *t*. To conserve space, the results for the control variables are not tabulated.

The estimated coefficient on *PERICO* reported in column (1) is positive and significant at the 10% level, indicating that the percentage of cross-holding institutional ownership is associated with increased firm value. A ten-percent increase in *PERICO* is associated with 3.5% increase in Q(t). An increase in *PERICO* from 25th percentile to 75th percentile is associated with 15% increase in Q holding all other variables at their means. In the results reported in Column (2), we replace *PERICO* with *M.PERICO* and *NM.PERICO* to separately examine the influence of motivated investors. The estimated coefficient on *M.PERICO* is positive and significant at the 5% level. Moreover, the economic magnitude is much larger: a ten-percent increase in *PERICO* is associated with 6.4% increase in firm value. However, the estimated coefficient on *NM.NUMICO* cannot be distinguished from zero, suggesting the overall effect reported in Column (1) mainly comes the motivated cross-holders.

We obtain similar using the number of cross-owners in place of the percentage of such owners. In Column (3), a one-standard-deviation increase in *NUMICO* from its mean is associated with 2.3% increase in Q(t).[24] In the results reported in Column (4), the estimated coefficient on *M.NUMICO* is positive and highly significant (*t*-stat=4.94). However, we cannot distinguish the estimated coefficient on *NM.NUMICO* from zero. These results reinforce our primary finding: it is the motivated cross-owners who are supporting higher firm valuations.

We find similar results in columns (5) – (8) using Green Street Qs as the dependent variable, except that the estimated significance of our cross-owner variables is muted when

[23] We find similar results replacing these weights with simply dummies.

[24] Recognizing that the mean and standard deviation have changed in log transformation, we use the standard deviation of the raw *NUMICO*, with mean of 130 and standard deviation of 94. The effect of one-standard-deviation increase in *NUMICO* on Q(t) is calculated as $=0.042\times\ln(1+94/130) = 0.023$; Similarly, the effect of one-standard-deviation increase in *NUMICO* on Q(t+1) is calculated as $=0.038*\ln(1+94/130) = 0.021$.

percentages are used in place of the number of cross-owners (columns (5) and (6)).[25] The estimated coefficient on *NUMICO* reported in column (7) is positive and significant at the 10% level. Moreover, the estimated coefficient on *M.NUMICO* is positive and highly significant (t-stat=4.69), while the coefficient on *NM.NUMICO* cannot be distinguished from zero. These results highlight the monitoring role played by motivated investors who have better knowledge about local markets (Ling et al., 2019) and are better monitors (Hartzell et al., 2014; Hardin et al. 2018).[26]

The estimated coefficients on *GeoDIV* reported in columns (1) – (4) are negative and significant at the 5% level; that is, more geographically diversified REITs tend to have lower Qs than geographically focused REITs. We do not find a significant relationship between Q and property type diversification, possibly due to the relative lack of variation in *PropDIV* observed in most REITs (Hartzell et al., 2014). Unlike the results for traditional Q, the coefficient estimates for *GeoDIV* using Green Street Qs are not significant (columns (5) – (8)), possibly due to the reduction of sample size.

Interestingly, when ICO is included in the regressions, the marginal effect of institutional ownership is never positive and significant. The unreported variance inflation factor (VIF) diagnosis suggests multicollinearity exists when both ICO variables and *IO* are included in the regressions. To investigate this multicollinearity, we first orthogonalize each ICO variable with respect to *IO*. The effects of ICO on firm valuations are still significant. Next, we re-run our regressions excluding *IO* and find that the effects of ICO become stronger. However, as we cannot completely rule out the possibility of measurement error, we retain *IO* as a control variable, although this increases the standard errors of our estimated ICO coefficients. Most of the unreported coefficients on the control variables are insignificant, suggesting that much of the variation in firm value is captured by *GEODIV*, the time-varying geographical and property type weights, and year fixed effects.

We find a large variation in firm-level correlation between contemporary and one-year ahead Q. In Table 4, we therefore report results using Qs measured at the end of the next

[25] The sample used to estimate the results based on the Green Street Q is more populated than the sample of market value of assets (Green Street) in Table 1. These two samples are not perfectly matched.

[26] We also follow Bushee (1998, 2001) and examine separately "transient," "dedicated," and "quasi-indexer." We find consistent results: non-passive (dedicated) investors are more important in supporting higher firm valuations. In contrast, due to their short-term focus and highly diversified holdings, transient investors have little incentive to monitoring REIT managers (An et al. 2016a; An et al. 2016b; Devos et al. 2013).

calendar year.[27] The results for these predictive regressions are very similar to the corresponding contemporaneous results reported in Table 3. The estimated coefficient on *PERICO* reported in column (1) is positive and significant at the 5% level. Thus, a ten-percent increase in *PERICO* is associated with 4.4% increase in Q(t+1). The estimated coefficient of *M.PERICO* in Column (2) has larger economic and statistical significance, consistent with Table 3. Again, the estimated coefficient on *NM.PERICO* is statistically indistinguishable from zero. The estimated coefficient on *NUMICO* reported in column (3) is positive and significant at the 5% level. A one-standard-deviation increase in *NUMICO* from its mean is associated with a modest 2.1% increase in Q(t+1). The estimated coefficient on *M.NUMICO* is positive and highly significant (t-stat=4.10) but, again, the coefficient on *NM.NUMICO* cannot be distinguished from zero.

The Green Street Q(t+1) results reported in columns (5) – (8) of Table 4 are similar to the corresponding Green Street Q(t) results reported in Table 3. In particular, the explanatory power of our cross-ownership variables is clearly concentrated among the motivated cross-owners. For example, the results suggest that a one-standard-deviation increase in *M.PERICO* (column (6)) is associated with a 9.2% increase in Q(t+1).[28]

Our results are robust to adding firm and year fixed effects. For example, the estimated coefficient on *PERICO* is 0.321 (compared to 0.352 in column (1) of Table 3) and the coefficient on *NUMICO* is 0.041 (compared to 0.042 in column (3) of Table 3). Both are statistically significant at 1% level. Given the importance of replacement cost estimates in the calculation of Q, we re-run our analyses using non-depreciated Q (discussed in section 2.1). These results, contained in Appendices 2 and 3, confirm a positive relationship between ICO and REIT firm value. Particularly, it is the motivated investors that drive the positive relationship between ICO and firm value.

3.3 Results Using Blockholders

Compared with institutional investors who hold a relatively small number of shares, blockholders can exert more influence on investment decisions. We therefore re-estimate Equation (1) using our previously defined measures of blockholdings as proxies for

[27] The mean, 10th percentile, and 90th percentile of firm-level correlation of contemporary and one-year ahead Q are 0.551, -0.010 and 0.922, respectively.

[28] In an untabulated analysis, we replicate our results in Tables 4, 6, and 7 for Qs measured at the end of calendar years t+2, t+3, t+4, and t+5. The magnitude and the significance of the coefficients on ICO decay with time. However, most coefficients remain statistically significant until calendar year t+3 (and t+5 for M.ICO).

institutional cross-ownership. The results using contemporaneous measures of traditional Q and Green Street Q are reported in Tables 5.

The estimated coefficient on *B.PERICO* (column (1)) is positive and statistically significant (t-stat=2.23), indicating that the number of block cross-owners is strongly associated with firm value. A ten-percent increase in *B.PERICO* is associated with 4.8% increase in Q(t). The estimated coefficient on *B.M.PERICO* (column 2) is positive and significant at the 1% level, although we cannot distinguished the coefficient on *B.NM.PERICO* from zero.

We obtain similar results using the number of shares controlled by block cross-owners in place of the percent of shares owned by such owners. The estimated coefficient on *B.NUMICO* (column (3)) is positive and highly significant (t-stat=4.79). A one-standard-deviation increase in *B.NUMICO* from its mean is associated with 10.1% increase in Q(t). In Column (4), the estimated coefficient on *B.M.NUMICO* is positive and highly significant (t-stat=5.09). Although the estimated coefficient on *B.NM.NUMICO* is also positive and significant at the 5% level, the magnitude is only about a third of the coefficient on motivated blockholder. This result suggests that block cross-owners whose portfolio weight in a REIT stock is not highly ranked in the top decile of the institution's overall portfolio can still influence REIT valuations if their ownership share is a large percentage of REIT *i*'s outstanding stock. The main results using Green Street Qs are consistent with these traditional Q results.

The cross-ownership results for blockholdings using Qs measured at the end of the following year are reported in Table 6. The estimated coefficients on the variables of interest are similar in magnitude and significance to those reported in Table 5, thus providing further evidence that the positive relation between ICO and firm value is driven primarily by motivated investors. The estimated coefficients on *GeoDIV* and *PropDIV* in Tables 5 and 6 are consistent with those in Tables 3 and 4.

3.4 Results Using Alternative Measures of ICO and *Q*

Table 7 reports contemporaneous Q(t) OLS results using alternative measures of cross-ownership.[29] We construct *NUMICOF* as the number of REITs that share any common

[29] Results using Q(t+1) are highly consistent and are available upon request. For brevity, we report results using Q(t) here and in later analyses.

institutional holder with the REIT *i* and *NUMAICOF* as the number of REITs block-held by the average cross-holding institution. *NUMICOF* measures the extent to which a REIT is connected to its peers through cross-ownership and *NUMAICOF* captures the intensity of cross-holding activities for the average institution and thus its incentive to influence the corporate policies of the cross-held REITs.[30] As in previous tables, for each alternative cross-ownership measure we separate motivated (*B.M.NUMICOF* and *B.M.NUMAICOF*) and non-motivated (*B.NM.NUMICOF* and *B.M.NUMAICOF*) investors.

Similar to previous results, both *B.NUMICOF* and *B.NUMAICOF* positively predict Q(t). While neither measure predicts variation in Green Street Qs, the estimated coefficients on both *B.M.NUMICOF* (columns 2 and 6) and *B.M.NUMAICOF* (columns 4 and 8) are positive and significant at the 1% or 5% levels. However, the coefficients on *B.NM.NUMICOF* and *B.NM.NUMAICOF* cannot be distinguished from zero. Overall, the results presented in Table 3-7 strongly suggest a value-enhancing role of cross-owners.

Our OLS estimates may be biased upward or downward due to omitted variables such as selection by investors and REIT managerial quality. For example, Hartzell et al. (2014) find that REIT value is negatively related to the degree of geographic diversification and that the diversification discount among REITs is lower for firms with more institutional ownership. To explain this finding, they suggest two competing hypotheses, selection versus monitoring. The selection hypothesis says that institutional investors select REITs with better managerial quality. In contrast, the monitoring hypothesis suggests that institutional investors exert monitoring on REIT investments and, therefore, REITs with higher institutional ownership tend to make better asset allocation decisions and are more likely to diversify. In the context of our study, if an omitted managerial quality variable is positively correlated with both firm value and cross-ownership, our OLS estimates may be biased upward. On the other hand, our OLS estimates may be biased downward if investors tend to cross-own firms with some unobserved characteristics (e.g., manager pursuing conservative investment strategies) that tend to be negatively correlated with firm value. In Section 4, we use a quasi-natural experiment of financial institution mergers to address these endogeneity concerns.

[30] We focus only on blockholders and do not compute *NUMICOF* for all 13f institutions because it would be approximately a constant equal to the total number of all REITs in our sample. Similar argument applies to *NUMAICOF*. For example, to calculate *B.NUMAICOF* we first calculate the number of REITs (other than REIT *i*) block-held by each cross-holding institution during a quarter and then average across all such institutions.

4. Difference-in-Differences (DID) Analysis Based on 13f Institution Mergers

As discussed above, it is possible that firm value, investment opportunities, and institutional ownership are correlated with omitted variables. For example, firms with better investment opportunities have higher firm value and, at the same time, are more attractive to institutional investors, resulting an upward bias in our ICO estimates. To address potential endogeneity concerns, we perform a DID analysis using mergers between institutional investors as a source of identification (He and Huang, 2017, and He et al., 2018). In a merger of two institutional investors, cross-held firms might experience an exogenous increase in cross-holdings when the merger counter-party cross-holds firms in the same industry. This DID design relies on the assumption that mergers among investors affect cross-ownership but are not driven by the expected performance of the portfolio firms. This is a plausible assumption because institutional investors typically merge for reasons unrelated to the performance and fundamentals of the firms in their portfolios (Jayaraman et al., 2002); investors can simply purchase shares in firms they find attractive; mergers are not required to gain exposure to these firms.[31]

Figure 1 illustrates the DID design using an example of a merger between Investor A and Investor B. After the merger, Investor B becomes a holder of Firm 1, which was not the case prior to the merger. Thus, Firm 1 is the treatment firm. The control firm (e.g., Firm 2) was cross-held by both investors prior to the merger and therefore does not experience a change in cross-ownership.[32, 33] This setting also requires that, before the merger, investor B cross-held at least one other peer firm (e.g., Firm 3).[34] Therefore, the treatment group includes firms that (1) were cross-held by one of the merging institutions before the merger and (2) were not cross-held by the other merging institution. The control group includes firms

[31] Lewellen and Lowry (2019) argue that this identification strategy might be problematic because institutional mergers are clustered around the financial crisis. However, the mergers in our sample are evenly distributed across years.

[32] As suggested by Holthausen at el. (1987) and Keim and Madhavan (1996), the acquiring institution usually holds the portfolios of the target institution for an extended period of time due to concerns about liquidity and transaction costs.

[33] Consider *NUMICO*, which is the number of unique investors that cross-hold the firm. Before the merger, there is only one cross holder (Investor A) for Firm 1; there are two cross holders (both A and B) for Firm 2. After the merger, both A and B cross hold Firm 1 while the number of cross-holders for Firm 2 does not change.

[34] This is to ensure that Firm 2 is cross-held by Investor B prior to the merger so the merger would not affect Firm 2's cross ownership.

that were cross-held by the same merging institution that also cross-holds the treated firm before the merger.

Using these criteria, we are able to identify 16 mergers of institutional investors from 1998 to 2012 that have the potential to affect the REIT ICO holdings.[35] These mergers affect 52 REITs and 415 firm-merger pairs. We include three years of data prior to the merger, the year of the merger, and the three-year period after the merger. We choose the seven-year window based on the trade-off between relevance and accuracy.[36] Our DID sample contains 2,905 (7 x 415) firm-years.

4.1 DID analysis using Traditional Q

As an initial exercise, Table 8 separates our outcome variable, Tobin's Q, into four categories corresponding to the pre- and post-merger period as well as the treatment and control group.[37] Prior to the merger, the treated firms (i.e., those held by only one of the two merging investors prior to the merger) have significantly lower traditional Qs (treated = 1.277; control = 1.364; difference = 0.088). However, the difference becomes statistically insignificant after the merger. The DID estimate (=0.071) is significant at 1% level, suggesting that an increase in ICO among threated firms that results from the merger is associated with higher firm values. We find that Q in the control group is always higher than the treatment group, both in pre- and post-merger periods. This result is consistent with the literature and our previous regression findings.

In our multivariate analysis, we estimate the following DID regression:

$$Q_{i,t,m} = \alpha + \gamma Treat \ \times Post + \delta Treat + \theta Post + Controls_{i,t-1} + \varphi_{i,m} + \varepsilon_{i,t,m} \tag{3}$$

where $Q_{i,t,m}$ is the contemporaneous traditional Q of firm *i* in merger m at time *t*; $Treat$ is an indicator variable that equals one for treated firms and zero for control firms; $Post$ is an indicator variable that equals one for the post-merger period, and zero otherwise; $Controls_{i,t}$

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[35] We begin with the list of mergers in He and Huang. As their event window ends in 2009, we extend our list using the SDC Mergers and Acquisition database. We require: (1) the merger to be between two 13F institutions or their parent firms with primary SIC codes in the 6000 to 6999 range; (2) the merger to be completed within one year after the initial announcement; and (3) the target institution stops filing 13F forms within one year after the completion of the deal.

[36] Choosing a long window may introduce noise; choosing a short window may fail to capture the meaningful changes in response to the merger. We re-run our tests using an alternative window of five years (i.e., two years prior, the merger year, and two years after) and find similar results.

[37] We base our analysis in this section on Tobin's Q. We are only able to identify six mergers using our Green Street sample.

includes the set of control variables used in our baseline regression model. Firm-merger fixed effects ($\varphi_{i,m}$) are included to control for time-invariant characteristics across firms within the same merger, as well as time-varying common time trends across mergers. The inclusion of firm-merger fixed effects forces identification through variation in firm values over time for the same firm in a given merger. A positive coefficient on γ would indicate that firm value increases for treated firms after a merger and, most importantly, this increase in firm value is caused by an increase in cross-ownership.

Column (1) of Table 9 shows our multivariate results for traditional Q. The estimated coefficient on *Treat×Post* is positive and statistically significant. This suggests that an exogenous increase in cross-ownership (through investor mergers) has a positive effect on REIT firm values post-merger. This treatment effect is also economically significant; treated firms, relative to control firms, experience a 10-percentage point increase in Tobin's Q in the post-merger period relative to the pre-merger period.

Overall, the results using a DID design based on a quasi-experiment of institutional investor mergers provide further support for a positive relation between ICO and firm value. Importantly, the DID results allow us to draw a stronger inference about the causal relation between cross-ownership and firm value.

4.2 How Does ICO Affect Firm Valuations?

Having established a positive relationship between cross-ownership and REIT firm value, we next investigate the channels through which cross-ownership affects firm behavior. The restrictive conditions under which REITs operate, such as dividend policy, corporate structure, and investment strategies shuts down many potential channels. To examine the remaining channels through which ICO could potentially enhance firm value, we replace *Traditional Q* with proxies for operating performance, asset acquisitions and dispositions, profitability, stock market liquidity, cost minimization, and financing.[38] Specifically, the alternative dependent variables we use in our DID analysis include: operating performance, measured by funds from operations divided by the book value of total assets (*FFO/TA*)[39]; property acquisitions and dispositions, measured by the ratio of the total dollar amount of

[38] We also re-estimate the panel regressions in Tables 3-7 using these alternative left-hand-side variables. These results are available from the authors upon request.
[39] FFO is equal to net income excluding gains and losses from sales of properties or debt restructuring, plus real estate depreciation and the amortization of other expenses.

acquisitions plus dispositions to the average value of real estate at the end of year *t* and *t-1* (*TRADING*) [40]; the dividend payout ratio, measured as preferred and common stock dividends plus share repurchases, divided by funds from operations (*PAYOUT*); the logarithm of Amihud's (2002) illiquidity (*ILLIQ*)[41]; total interest expenses divided by the book value of total assets (*INT/TA*); and the use of external financing (*FINANCING*).[42] For *TRADING*, we separately examine property acquisitions (*ACQ*) and dispositions (*PropTO*). We summarize variable sources and definitions in Appendix 1.

The estimated coefficient on *Treat×Post* (see equation (3)) is positive and significant at the 5% level when we use *FFO/TA* as the dependent variable (column (2)). This result suggests that an increase in ICO is associated with increased free cash flow and better operating performance, resulting in higher firm value. These results are consistent with Chung et al. (2012), who conclude that institutional ownership increases REIT firm efficiency, and Hardin et al. (2018), who find REITs with higher institutional ownership (by motivated investors) have better operating performance.

Institutional investors monitor REITs' asset allocations, leading REITs to reallocate their portfolios based on the expected performance of certain markets (Ling et al., 2019; Hartzell et al., 2006). The positive and significant coefficient on *Treat×Post* in the *TRADING* equation (Column (3)) suggests that treated firms are associated with increased property acquisitions and dispositions. However, we find it is dispositions (Column (4)), rather than acquisitions (Column (5)), that produce the link between ICO and portfolio trading, suggesting that institutional cross-holders monitor firms primarily by evaluating the desirability of currently owned assets and by helping managers make decisions to dispose of properties with poor investment prospects.

Our finding of a disposition channel is new in the literature. Mühlhofer (2015) suggests it is harder for REIT managers to time dispositions, relative to acquisitions, due to the "safe harbor" rules that limit dispositions.[43] However, from the perspective of motivated

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[40] SNL sets the market value of real estate assets equal to the firm's total stock market capitalization, less the book value of all non-operational real estate assets.

[41] Amihud (2002) defines illiquidity as the daily volume price impact during year *t*.

[42] External financing is measured as the sum of net debt issues and net equity issues during year t+1, divided by beginning-of-year total assets. Net debt issuance is calculated as long-term debt issues minus long-term debt reduction, plus the change in current debt. Net equity issuance is calculated as the sale of common and preferred stock minus the purchase of common and preferred stock.

[43] Until 2008, REITs were required to hold = a property for at least four years; moreover, they could only sell 10% of the book value of their asset base within a given tax year. As of July 30, 2008, the minimum holding period was decreased to two years, with the rest of the rule unchanged, as part of the *Housing and Economic Recovery Act of*

investors, the analysis of currently owned properties is more straight-forward and actionable than providing input and feedback on potential investment opportunities, which would require the constant updating of soft information from the REIT management team.[44] Our focus on institutional cross-holders, instead of the REIT managers, provides evidence that cross-holders exert monitoring on the performance of existing assets. Our finding is consistent with Wiley (2013) who concludes it is difficult to observe whether "smart" REIT acquisitions have a traceable impact on firm value because it takes several quarters for cash flow changes to be realized. In addition, new acquisitions are often associated with increased capital expenditures. For dispositions, the asset sale results in a cash account delta that is immediate and observable.[45]

Hardin and Hill (2008) find a positive relation between dividend payout ratios and Tobin's Q, which they attribute to reduced asymmetric information. Similarly, Ghosh and Sun (2014) argue that REIT firm value is positively correlated with excess dividends because such dividends reduce the agency cost of free cash flow and the cost of external financing. We therefore investigate whether ICO enhances firm value through changes in dividend payout ratios and cash holdings. The estimated coefficient on *Treat×Post* in the *PAYOUT* regression (Column (6)) cannot be distinguished from zero, suggesting dividend policy does not explain the relation between ICO and firm value.

Several studies highlight the relations among institutional ownership, stock market liquidity and firm value (e.g., Dhar and Goetzman, 2006; Ciochetti et al., 2002; Hill et al., 2012; Cheung et al., 2015; Clayton and MacKinnon, 2003; Devos et al., 2013). In Column (7), the negative coefficient on *Treat×Post* in the *ILLIQ* equation is marginally significant, suggesting a weak relation between increased cross-ownership post-merger and decreased illiquidity.

2008. The *Protecting Americans from Tax Hikes (PATH) Act of 2015* further expanded the 10% limitation to 20%, provided that the aggregate basis or FMV of property sold by the REIT during the three-year period ending with the current tax year does not exceed 10% of the REIT's aggregate basis or FMV over the same three-year period.

[44] In practice, institutional investors have implemented intervening disposition decisions as an effective tool to enhance shareholder value. For example, in January 28, 2016, Land & Buildings (CIK: 0001442392) launched a campaign to push FelCor, a Texas-based REIT, to either sell its properties or the entire company to its competitors. Jonathan Litt, the founder of Land & Buildings stated: "…We believe FelCor must pursue a value-enhancing strategy that will significantly lower leverage, increase NAV per share and crystalize value through a sale of all or part of the Company. The status quo of poor capital allocation and poor balance sheet management is unacceptable and has led to sector-worst total shareholder returns over the trailing 10 years – demonstrating the urgent need for change at FelCor". Based on 13F filings, 10 of 17 firms owned by Land and Buildings in November 2015 were REITs.

[45] We thank Jon Wiley for this helpful comment.

Finally, we examine the relation between ICO and external financing based on two recent studies. Chen et al. (2018) study conventional firms and find that ICO enhances access to external financing and thereby increases investment opportunities. Pavlov et al. (2018) suggest that REIT managers are able to improve firm value by the financing choices they make in anticipation of future risks. However, the estimated coefficients on *Treat×Post* in the *INT/TA* and *FINANCING* regressions (Columns (8) and (9)) are both statistically insignificant. Therefore, the positive effect of ICO on firm value we document does not appear to be explained by increased monitoring of balance sheet strategies and decisions.

Taken together, these results suggest that the enhanced monitoring of asset allocation decisions primarily drives the positive relation between ICO and firm value. We also find no relation between ICO and stock returns (results untabulated). This is consistent with Aguilar et al. (2018) who find institutional ownership enhances REIT pricing efficiency, suggesting that the market accurately assesses the value of ICO, which is quickly capitalized into stock prices.

5. How Institutional Cross-holders Help REITs Make Better Asset Allocation Decisions?

After examining various channels through which ICO enhances firm value, we conclude that asset allocation is the most prominent driver. If the increased trading/turnover of REIT property portfolios is associated with strategic portfolio rebalancing brought on by increased cross-ownership, such trading behavior could be associated with increased firm value. In Table 10, we provide more direct evidence on how institutional cross-holders help REITs improve asset allocation decisions.

To examine whether properties held by REITs with higher ICO outperform those held by REITs with low ICO, we construct a novel measure of property portfolio returns (*PropRet*). We first calculate, for each REIT i in year t, the percentage of its property portfolio, based on book values, invested in each property type and in each MSA. Next, we match these portfolio allocations in each property type and MSA with the quarterly return on the corresponding NCREIF NPI property-MSA sub-indices; for example, the quarterly return on office properties in Dallas. These MSA NCREIF returns are then value-weighted by the percentage of the REIT's portfolio invested in each MSA. This is done separately each quarter for each property type owned by the REIT. From this quarterly private market portfolio return, we subtract the corresponding return on the national NCREIF NPI for the property type (or types) in which the firm invests. This produces the "excess" quarterly return on each REIT's property portfolio. Thus, we calculate each REIT's property portfolio return (*PropRet*) in each quarter as the average excess return across all MSAs where a REIT owns any property, weighted by the MSA-level total book value for each REIT-quarter. We repeat this process for each REIT in each quarter to produce an estimated times series of total returns on each REIT's underlying property portfolio.[46]

Finally, in each year we sort REITs into two subgroups based on the median of *PERICO*. We then compare the average or median *PropRet* for low- versus high-ICO REITs during year *t*+1. Results in Panel A of Table 10 reveal that property portfolio returns among REITs with high-ICO exceed excess returns among low-ICO REITs; both the mean and median differences are statistically significant at the 1% level. This property portfolio analysis is new to the literature.

We next examine whether REITs with high ICO are more likely to dispose of properties in poor-performing markets. We first identify every MSA in which REIT *i* disposed of a property in year *t*. We then rank the MSAs with any dispositions among all the MSAs in which REIT *i* owned property prior to the disposition using *PropRet* in year *t*+1. We normalize their rankings by the total number of MSAs to produce a relative ranking that ranges from 0 to 1.[47] Because a disposition can involve sell-offs in multiple MSAs, we take the average of relative rankings for all MSAs where REIT *i* sold any property during year *t* (*PerformD*), which is inversely related to property market performance. Lastly, we sort REITs into two subgroups based on the median of *PERICO*, and then compare the average or median *PerformD* for low- versus high-ICO REITs during year *t*+1. The results displayed in Panel B indicate that, relative to REITs in the "Low ICO" group, REITs in the "High ICO" group are more likely to sell properties in MSAs that subsequently underperform.

In sum, we find evidence that institutional cross-holders help REITs make better asset allocation decisions. In particular, REITs with higher cross-ownership have better performing portfolios and are more likely to dispose of properties in MSAs that subsequently underperform.

6. Institutional Cross-Ownership, Geographical Diversification, and Diversification Discount

6.1. Does Institutional Cross-Ownership Increase Geographical Diversification?

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[46] This process involves matching the property sub-type reported in SNL and NCREIF. We first match SNL sub-type with NCREIF sub-types. If an SNL sub-type does not match to any of the NCREIF sub-types, we use the corresponding NCREIF major property type as the primary link.

[47] Consider the following example. Suppose REIT A held properties in 5 MSAs in year *t* and it sold a few properties in MSA 1 during that year. If, based on the NCREIF returns during year *t*+1, MSA 1 ranked fourth among the 5 MSAs, then the relative ranking of MSA 1 is 0.8 (4/5).

If cross-holdings by institutional investors facilitate information sharing among investors and increased monitoring, we expect equity REITs with different ICO to pursue different portfolio allocation strategies. This conjecture builds upon Hartzell et al. (2014) who study the effect of institutional ownership on REIT geographic diversification. We extend their study by examining whether ICO affects the geographic diversification of REITs. We focus on the effects of changes in diversification on the *level* of ICO.

More specifically, we regress changes in geographic diversification over the next year on several ICO measures using the following specification:

$$\Delta GEODIV_{i,t+1} = \alpha + \beta ICO_{i,t} + \theta GEODIV_{i,t} + \tau Firm\ Controls_{i,t} + \omega^{r} Region\ Weights_{i,t} + \omega^{p} PropType\ Weights_{i,t} + \varepsilon_{i,t}\ . \tag{4}$$

Our outcome variable, $\Delta GEODIV_{i,t+1}$, is the annual change in geographic diversification. Our set of control variables, region and property type weights, and fixed effects are included in the estimation. A positive relationship between the level of ICO and changes in geographic diversification suggests that the monitoring associated with high ICO helps managers make decisions to re-allocate assets from markets with poor investment opportunities, even those markets that are close to home.

The results reported in Appendix 4 confirm this hypothesis. The estimated coefficients on *PERICO* and *NUMICO* are positive and significant; that is, ICO is positively related to increases in geographical diversification in the following year, even after controlling for institutional ownership and the initial *level* of diversification. This is consistent with the notion that REITs with higher ICO are more capable of diversifying due to enhanced monitoring and information sharing among cross-owners.

Because cross-holders could simply select REITs based on their observed diversification, we examine whether changes in geographic diversification explain subsequent changes in ICO. In untabulated results, we find no evidence that changes in geographic diversification explain subsequent changes in ICO. This result confirms and extends Hartzell et al.'s (2014) finding that institutional investors serve as monitors of REIT manager's decisions to diversify rather than selectively choosing better-managed firms whose managers are able to exploit diversification benefits. We also find no evidence that changes in ICO explain changes in geographic diversification, suggesting that it is the level of institutional holdings, rather than trading by institutional investors, that drives asset allocations.[48]

6.2. Does Institutional Cross-Ownership Mitigate the Diversification Discount?

If cross-holders facilitate more effective monitoring, which translates into better asset allocation decisions, we posit that the diversification discount is mitigated when REITs have higher ICO. To test this hypothesis, we estimate the following model:

$$Q_{i,t} = \alpha + \beta ICO_{i,t} + \theta GEODIV_{i,t} + \delta ICO_{i,t} \times GEODIV_{i,t} + \tau Firm\ Controls_{i,t} + \omega^r Region\ Weights_{i,t} + \omega^p PropType\ Weights_{i,t} + \varepsilon_{i,t}\ . \tag{5}$$

The setting of Equation (5) is similar to Equation (1) except that our test variable is the interaction between ICO and *GEODIV*. For simplicity, we show only results using *PERICO*. In Panel A of Table 11, columns (1) and (3), we report results that do not separate motivated from non-motivated investors. Due to the reduced sample size using Green Street Q, the interaction term cannot be distinguished from zero. However, when we separate motivated from non-motivated investors (columns (2) and (4)), we find positive and statistically significant coefficients on the interaction terms, suggesting a reduced diversification discount for REITs with motivated cross-owners. To gauge economic significance, we compare three REITs: a firm at the 25th percentile of *M.PERICO* (e.g., Ramco-Gershenson Properties Trust (Ticker: RPT)); a firm at the 50th percentile of *M.PERICO* (e.g., Healthcare Realty Trust Inc. (Ticker: HR)); and a firm at the 75th percentile of *M.PERICO* (e.g., Apartment Investment and Management Co. (Ticker: AIV)). The marginal effect of a one-standard-deviation increase in $GEODIV_{i,t}$ (from its mean) on firm value is -0.06 for RPT, -0.02 for HR, and only -0.01 for AIV, all else equal.

In Panel B of Table 11, we repeat the analysis using blockholdings and find even stronger evidence that geographic diversification increases firm value among firms with a larger percentage of motivated cross-owners. We find similar results when we use *NUMICO*, as reported in Appendix 5. Together, the results presented in Table 11 suggest that REITs with higher ICO exhibit lower discounts from geographic diversification. Consistent with

[48] The investment horizon of shareholders affects the degree to which REIT managers are monitored. Investors trade frequently usually have short investment horizon. Long-term investors have strong incentives to engage in monitoring while short-term investors do not monitor (see, Aguilar et al., 2018; An et al., 2016). In un-tabulated results, we classify investors using different investment horizons and find consistent results as using motivated versus non-motivated investors.

prior findings, the attenuation in the diversification discount only exists among firms with a larger contingent of motivated investors.

7. Conclusion

Our paper examines the relation between institutional cross-ownership (ICO) and firm values within the context of REITs. Using different ICO measures and alternative proxies for firm value, we document a consistently positive relation between ICO and firm value. Furthermore, we find that blockholders who cross-own several REITs exert a larger effect on firm values; moreover, only the "motivated" cross owners are associated with higher firm values. Our results using a DID design based on a quasi-experiment of institutional investor mergers provide further support for a positive relation between ICO and firm value.

How does ICO affect firm valuations? For conventional firms, ICO may affect firm valuation and performance in various ways, such as through product market competition, corporate governance, product innovation, mergers and acquisitions, financial reporting, and voluntary disclosure. Thus, it is difficult to accurately identify through which channel(s) cross-ownership affects firm value. However, the set of restrictive conditions under which REITs operate, such as dividend policies, corporate structure, and allowable investment strategies, shut down many potential channels. As a large proportion of the risk associated with CRE investments comes from market (MSA) and property selection, we expect the main driver of the positive relation between ICO and firm value is asset allocation decisions. Further analyses relying on the DID setting confirm this expectation. Using various proxies for operating performance, asset acquisitions and dispositions, profitability, stock market liquidity, cost minimization and financing, we find that firms which become cross-owned post-merger are more actively engaged in transactions in the underlying property markets, have higher profitability and greater stock liquidity, and therefore enjoy higher valuations.

How do institutional cross-holders help REITs make better asset allocation decisions? If the increased trading/turnover of REIT property portfolios is associated with strategic portfolio rebalancing brought on by increased cross-ownership, such trading behavior could be associated with increased firm value. Consistent with this expectation, we find that REITs with higher cross-ownership have better performing property portfolios and are more likely to rebalance their property portfolios by disposing of properties in markets that subsequently underperform. We also find that REITs with higher ICO are more likely to diversify in the next year because, in the presence of cross owners, REIT managers are able to make better asset allocation decisions.

Prior literature suggests that geographic diversification gives rise to market inefficiencies, which exacerbate the information asymmetry between managers and shareholders and is detrimental to firm values. However, we find that geographic diversification has less of a negative effect on firm values when the firm enjoys higher ICO, especially when firms have more block or motivated cross owners. Therefore, more efficient information production by cross-owners offsets the costs associated with geographic diversification, allowing the firm to expand in geographic complexity and enhance value.

Overall, our findings highlight the importance of understanding the relationship between institutional cross-ownership (ICO) and its implications for firm values. Using alternative specifications of Tobin's Q and different measures of ICO, we document a value-enhancing effect of ICO, which is largely explained by more efficient monitoring of corporate investment behavior.

References

Aguilar, Mike, Walter I. Boudry, and Robert A. Connolly, 2018, The Dynamics of REIT Pricing Efficiency, *Real Estate Economics* 46, 251–283.

An, Heng, Qun Wu, and Zhonghua Wu, 2016a, REIT Crash Risk and Institutional Investors, *Journal of Real Estate Finance and Economics* 53, 527–558.

An, Heng, Qun Wu, and Ting Zhang, 2016b, REIT Liquidity Management and Institutional Investors, *Journal of Real Estate Research* 38, 539–567.

Azar, José, Sahil Raina, and Martin C. Schmalz, 2016, Ultimate Ownership and Bank Competition. *Working Paper*.

Azar, José, Martin C. Schmalz, and Isabel Tecu, 2018, Anticompetitive Effects of Common Ownership, *Journal of Finance* 73, 1513–1565.

Backus, Matthew, Christopher Conlon, and Michael Sinkinson, 2019, Common Ownership in America: 1980-2017. *Working Paper*.

Berger, Philip G., and Eli Ofek, 1995, Diversification's effect on firm value, *Journal of Financial Economics*.

Borochin, Paul, Jie Yang, and Rongrong Zhang, 2018, Common Ownership Types and Their Effects on Innovation and Competition, *Working Paper*.

Brooks, Chris, Zhong Chen, and Yeqin Zeng, 2018, Institutional cross-ownership and corporate strategy: The case of mergers and acquisitions, *Journal of Corporate Finance* 48, 187–216.

Bushee, Brian J., 1998, The Influence of Institutional Investors on Myopic R & D Investment Behavior, *Accounting Review* 73, 305–333.

Bushee, Brian J., 2001, Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value? *Contemporary Accounting Research* 18, 207–246.

Campbell, Robert D., Milena Petrova, and C. F. Sirmans, 2003, Wealth Effects of Diversification and Financial Deal Structuring: Evidence from REIT Property Portfolio Acquisitions, *Real Estate Economics* 31, 347–366.

Capozza, Dennis R., and Paul J. Seguin, 1999, Focus, transparency and value: The REIT evidence, *Real Estate Economics* 27, 587–619.

Capozza, Dennis R., and Paul J. Seguin, 2003, Inside Ownership, Risk Sharing and Tobin's q-Ratios: Evidence from REITs, *Real Estate Economics* 31, 367–404.

Chan, Su Han, John Erickson, and Ko Wang, 2003, *Real Estate Investment Trusts, Structure, Performance, and Investment Opportunities*. Oxford University Press.

Chemmanur, Thomas J., Yao Shen, and Jing Xie, 2016, Innovation Beyond Firm Boundaries: Common Blockholders, Strategic Alliances, and Corporate Innovation, *Working Paper*.

Chen, Yangyang, Qingyuan Li, and Jeffrey Ng, 2018, Institutional Cross-Ownership and Corporate Financing of Investment Opportunities. *Working Paper*.

Cheung, William Mingyan, Richard Chung, and Scott Fung, 2015, The effects of stock liquidity on firm value and corporate governance: Endogeneity and the REIT experiment, *Journal of Corporate Finance* 35, 211–231.

Chiang, Kevin C.H., Rocki-Lee Dewitt, David Folkman, and Long Jiao, 2018, REIT Governance, Entrepreneurial Control, and Corporate Value, *Journal of Real Estate Research* 40, 241–265.

Chung, Richard, Scott Fung, and Szu-Yin Kathy Hung, 2012, Institutional Investors and Firm Efficiency of Real Estate Investment Trusts, *Journal of Real Estate Finance and Economics* 45, 171–211.

Ciochetti, Brian A., Timothy M. Craft, and James D. Shilling, 2002, Institutional investors' preferences for REIT stocks, *Real Estate Economics* 30, 567–593.

Clayton, J I M, and Greg Mackinnon, 2003, the Relative Importance of Stock, Bond and Real Estate Factors in.Pdf, *Journal of Real Estate Finance and Economics* 27, 39–60.

Cronqvist, Henrik, and Mattias Nilsson, 2001, Why Agency Costs Explain Diversification Discounts? *Real Estate Economics* 29, 85–126.

Denis, David J., Diane K. Denis, and Atulya Sarin, 1997, Agency Problems, Equity Ownership, and Corporate Diversification, *Journal of Finance* 52, 135–160.

Devos, Erik, Seow Eng Ong, and Andrew C. Spieler, 2007, Analyst activity and firm value: Evidence from the REIT sector, *Journal of Real Estate Finance and Economics* 35, 333–356.

Devos, Erik, Seow Eng Ong, Andrew C. Spieler, and Desmond Tsang, 2013, REIT Institutional Ownership Dynamics and the Financial Crisis, *Journal of Real Estate Finance and Economics* 47, 266–288.

Dhar, Ravi, and William N Goetzmann, 2006, Institutional Perspectives on Real Estate Investing, *Journal of Portfolio Management* 32, 106–116.

Downs, David H., 1998, The Value in Targeting Institutional Investors: Evidence from the Five-or-Fewer Rule Change, *Real Estate Economics* 26, 613–649.

Edmans, Alex, Doron Levit, and Devin Reilly, 2018, Governance Under Common Ownership, *Review of Financial Studies*.

Eichholtz, Piet, and Erkan Yönder, 2015, CEO Overconfidence, REIT Investment Activity and Performance, *Real Estate Economics* 43, 139–162.

Evans, Jocelyn D., Timothy Jones, and Garrett Mitchener, 2016a, An Ownership Framework for Managers' Accelerated SEO Decisions: The Importance of Connected Institutional Investors in the REIT Industry, *Journal of Real Estate Portfolio Management* 22, 159–178.

Evans, Jocelyn D, Timothy A Jones, and Glenn R Mueller, 2016b, When Passive Index Investors Engage in Activist Corporate Governance: The Existence of Correlated

Institutional Block Ownership within REIT Capital Markets, *Journal of Accounting and Finance* 16, 46.

Fich, Eliezer M., Jarrad Harford, and Anh L. Tran, 2015, Motivated Monitors: The Importance of Institutional Investors' Portfolio Weights. *Journal of Financial Economics* 118: 21–48.

Freeman, Kayla, 2018, The Effects of Common Ownership on Customer-Supplier Relationships. *Working Paper*.

Gentry, William, Charles Jones, and Christopher Mayer, 2003, Do Stock Prices Really Reflect Fundamental Values? The Case of REITs, *Working Paper*.

Ghosh, Chinmoy, C.F. Sirmans, 2003, Board Independence, Ownership Structure and Performance: Evidence from Real Estate Investment Trusts, *Journal of Real Estate Finance and Economics* 26, 287–318.

Ghosh, Chinmoy, C.F. Sirmans, 2006, Do Managerial Motives Impact Dividend Decisions in REITs? *Journal of Real Estate Finance and Economics* 32, 327–355.

Ghosh, Chinmoy, and Le Sun, 2014, Agency Cost, Dividend Policy and Growth: The Special Case of REITs. *Journal of Real Estate Finance and Economics*. Vol. 48.

Green Street Advisors, 2014, *Green Street Advisors' Glossary of Commercial Real Estate Terms*.

Han, Bing, 2006, Insider ownership and firm value: Evidence from real estate investment trusts, *Journal of Real Estate Finance and Economics* 32, 471–493.

Hardin III, William G, Gregory L Nagel, Kenneth D Roskelley, and Philip A Seagraves, 2017, Institutional Monitoring, Motivated Investors, and Firm Performance, *Journal of Real Estate Research* 39, 401–439.

Hardin, William, and Matthew D. Hill, 2008, REIT dividend determinants: Excess dividends and capital markets, *Real Estate Economics* 36, 349–369.

Hartzell, Jay C., and Laura T. Starks, 2003, Institutional Investors and Executive Compensation, *Journal of Finance* 58, 2351–2374.

Hartzell, Jay C, Libo Sun, and Sheridan Titman, 2006, The Effect of Corporate Governance on Investment: Evidence from Real Estate Investment Trusts, *Real Estate Economics* 34, 343–376.

Hartzell, Jay C., Libo Sun, and Sheridan Titman, 2014, Institutional investors as monitors of corporate diversification decisions: Evidence from real estate investment trusts, *Journal of Corporate Finance* 25, 61–72.

He, Jie, and Jiekun Huang, 2017, Product market competition in a world of cross-ownership: Evidence from institutional blockholdings, *Review of Financial Studies* 30, 2674–2718.

He, Jie, Jiekun Huang, and Shan Zhao, 2018, Internalizing Governance Externalities: The Role of Institutional Cross-Ownership. *Working Paper*.

Hill, Matthew D., G. Wayne Kelly, and William G. Hardin, 2012, Market Value of REIT Liquidity, *Journal of Real Estate Finance and Economics* 45, 383–401.

Holthausen, Robert W., Richard W. Leftwich, and David Mayers, 1987, The effect of large block transactions on security prices: A cross-sectional analysis, *Journal of Financial Economics* 19, 237–267.

Jung, Michael J., 2013, Investor overlap and diffusion of disclosure practices, *Review of Accounting Studies* 18, 167–206.

Kang, Jun Koo, Juan Luo, and Hyun Seung Na, 2018, Are institutional investors with multiple blockholdings effective monitors? *Journal of Financial Economics* 128, 576–602.

Keim, Donald B., and Ananth Madhavan, 1996, The Upstairs Market for Large-Block Transactions: Analysis and Measurement of Price Effects, *Review of Financial Studies* 9, 1–36.

Kini, Omesh, Sangho Lee, and Mo Shen, 2018, Common Institutional Ownership and Product Market Threats. *Working Paper*.

Lang, Lariy H P, and René M Stulz, 1994, Tobin's Q, Corporate Diversification and Firm Performance, *Journal of Political Economy* 102, 1248–1280.

Lewellen, Katharina, and Michelle Lowry, 2019, Does common ownership really increase firm coordination? *Working Paper*.

Ling, David C, Andy Naranjo, and Benjamin Scheick, 2018, There's No Place Like Home: Local Asset Concentration, Information Asymmetries and Commercial Real Estate Returns. *Working Paper*.

Ling, David C, Chongyu Wang, and Tingyu Zhou, 2019, The Geography of Real Property Information and Investment: Firm Location, Asset Location, and Institutional Ownership, *Real Estate Economics* forthcoming.

López, Ángel L., and Xavier Vives, 2017, Overlapping Ownership, R&D Spillovers, and Antitrust Policy. *Working Paper*.

Ott, Steven H, Timothy J Riddiough, and Ha-chin Yi, 2005, Investment and Investment Performance : Evidence from the REIT Sector, *Real Estate Economics* 33, 203–235.

Park, Jihwon, Jalal Sani, Nemit Shroff, and Hal D. White, 2018, Disclosure Incentives When Competing Firms Have Common Ownership. *Working Paper*.

Pavlov, Andrey, Eva Steiner, and Susan Wachter, 2018, REIT Capital Structure Choices: Preparation Matters, *Real Estate Economics* 46, 160–209.

Pawliczek, Andrea, and A. Nicole Skinner, 2018, Common Ownership and Voluntary Disclosure. *Working Paper*.

Semov, Svetoslav, 2017, Common Ownership, Competition and Firm Financial Policy. *Working Paper*.

Servaes, Henri, 1996, The value of diversification during the conglomerate merger wave, *Journal of Finance*.

Villalonga, Belen, 2004, Diversification Discount or Premium? New Evidence from the Business Information Tracking Series, *Journal of Finance* 59, 479–506.

Wang, Chongyu, and Tingyu Zhou, 2017, The Cost of Staying Close to Home: Evidence from Asset Sell-offs by Real Estate Investment Trusts. *Working Paper.*

Figure 1: Difference-in-Difference (DID) Design

This figure illustrates the difference-in-difference (DID) design using an example of a merger between Investor A and Investor B. The treatment firm (Firm 1) is cross-held by Investor A but is not cross-held by Investor B before the merger. Prior to the merger, Investor B owns shares in both Firm 2 and at least one other same-industry firm (e.g., Firm 3). The control firm (Firm 2) is cross-held by both investors prior to the merger and therefore does not experience a change in cross-ownership. In this setting, Firm 1, the treatment firm is now cross-held by investors A and B as a result of the merger. Thus, Firm 1 has experienced an exogenous increase in cross-ownership because of the merger.

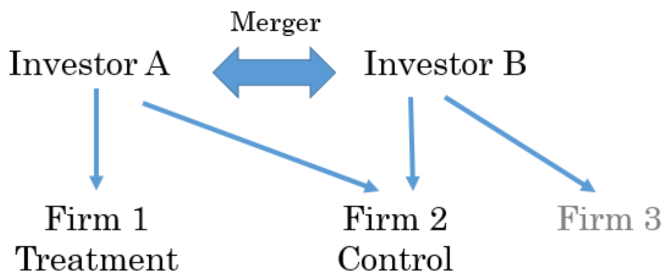

Table 1: Summary Statistics for Measures of Replacement Cost

This table shows mean asset value (in million USD) for a sample of REITs from 1995-2015. Columns (1)-(2) cover our sample of equity REITs prior to merging with ownership data from Thomson Reuters. Column (3)-(4) contain information on our main regression sample. Column (5)-(7) display statistics for our sample after merging with Green Street data. The number of firm-year observations is shown within parentheses. See Table A1 for variable definitions.

	Depreciated book value Prior to Thomson Reuters merge (1)	Non-depreciated book value Prior to Thomson Reuters merge (2)	Depreciated book value After Thomson Reuters merge (3)	Non-depreciated book value After Thomson Reuters merge (4)	Depreciated book value After Green Street merge (5)	Non-depreciated book value After Green Street merge (6)	Market Value of Assets (GS) Green Street sample (7)
All	3,323	3,886	4,081	4,412	6,274	6,931	9,501
# Firm Year Obs	(1,865)	(1,865)	(1,317)	(1,317)	(662)	(662)	(662)
UPREIT							
UPREIT	3,650	4,276	4,410	4,787	6,598	7,290	10,023
# Firm Year Obs	(1,528)	(1,528)	(1,097)	(1,097)	(609)	(609)	(609)
Non-UPREIT	1,841	2,118	2,441	2,544	2,550	2,813	3,510
# Firm Year Obs	(337)	(337)	(220)	(220)	(53)	(53)	(53)
Property Types							
Residential	3,543	4,291	3,493	3,840	5,646	6,451	9,119
# Firm Year Obs	(308)	(308)	(102)	(102)	(53)	(53)	(53)
Office	4,094	4,635	4,436	4,710	6,560	7,127	9,068
# Firm Year Obs	(259)	(259)	(356)	(356)	(203)	(203)	(203)
Retail	3,450	4,085	4,231	4,679	6,518	7,255	11,546
# Firm Year Obs	(408)	(408)	(413)	(413)	(237)	(237)	(237)
Industrial	3,904	4,395	5,068	5,475	7,038	7,768	7,754
# Firm Year Obs	(217)	(217)	(111)	(111)	(58)	(58)	(58)
Other	2,662	3,128	3,371	3,589	5,128	5,675	7,022
# Firm Year Obs	(673)	(673)	(335)	(335)	(111)	(111)	(111)

Table 2: Summary Statistics of Institutional Cross-ownership of REITs

This table shows mean, standard deviation (SD), and median for a sample of 1,341 firm-year observations from 1995-2015 prior to merging with Green Street data. See Table A1 for variable descriptions.

	Mean	SD	Median
Dependent Variables			
Traditional Q(t)	1.322	0.321	1.258
Green Street Q(t)	1.022	0.092	1.014
Cross-ownership			
PERICO	0.608	0.299	0.672
M.PERICO	0.115	0.173	0.036
NM.PERICO	0.498	0.264	0.521
NUMICO	130	94	117
M.NUMICO	7.2	16.9	1.5
NM.NUMICO	122.8	82.8	114.8
Block Cross-ownership			
B.PERICO	0.188	0.132	0.182
B.M.PERICO	0.146	0.117	0.138
B.NM.PERICO	0.049	0.064	0.050
B.NUMICO	2.2	1.6	2.0
B.M.NUMICO	0.51	0.93	0.0
B.NM.NUMICO	1.7	1.5	1.5
Control Variables			
IO	0.620	0.302	0.683
GEODIV	-0.223	0.256	-0.112
PropDIV	-0.846	0.207	-0.965
UPREIT	0.834	0.372	1
LOGSIZE	7.651	1.197	7.727
LEVERAGE	0.604	0.248	0.563
EBITDA/TA	0.108	0.129	0.100
TURNOVER	0.135	0.140	0.098

Table 3: Regression Results on the Impact of Cross-Ownership on Contemporaneous Firm Value

This table shows the results of OLS regression analysis. *Traditional Q(t)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*. *Green Street Q(t)* is the sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*. *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *M.PERICO* (*NM.PERICO*) is the sum of motivated (non-motivated) cross-holding institutions' percentage holdings in firm *i* in year *t*. *NUMICO* is the logarithm of the number of unique institutions that cross-hold firm *i* in year *t*. *M.NUMICO* (*NM.NUMMICO*) is the logarithm of the number of unique motivated (non-motivated) institutions that cross-hold firm *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Traditional Q(t)				*Green Street Q(t)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PERICO	0.352*				0.148			
	(1.66)				(1.36)			
M.PERICO		0.642**				0.148		
		(2.59)				(1.34)		
NM.PERICO		0.047				0.029		
		(0.21)				(0.26)		
NUMICO			0.042**				0.011*	
			(2.23)				(1.75)	
M.NUMICO				0.114***				0.027***
				(4.94)				(4.69)
NM.NUMICO				0.020				0.004
				(1.02)				(0.65)
IO	-0.187	0.012	-0.010	-0.083	-0.141	-0.061	-0.042	-0.067**
	(-0.90)	(0.05)	(-0.10)	(-0.88)	(-1.29)	(-0.55)	(-1.19)	(-2.02)
GEODIV	-0.171**	-0.179**	-0.186**	-0.193**	0.019	0.016	0.013	0.009
	(-2.00)	(-2.03)	(-2.17)	(-2.18)	(0.96)	(0.79)	(0.63)	(0.47)
PropDIV	0.151	0.137	0.114	0.101	0.058**	0.052**	0.045*	0.038
	(1.62)	(1.53)	(1.18)	(1.07)	(2.44)	(2.18)	(1.81)	(1.59)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.324	0.365	0.333	0.379	0.485	0.503	0.490	0.519
# of Observations	1,341	1,341	1,341	1,341	723	723	723	723

Table 4: Regression Results on the Impact of Cross-Ownership on Firm Value in Year (*t*+1)

This table shows the results of OLS regression analysis. *Traditional Q(t+1)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*+1. *Green Street Q(t+1)* is the sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*+1. *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *M.PERICO* (*NM.PERICO*) is the sum of motivated (non-motivated) cross-holding institutions' percentage holdings in firm *i* in year *t*. *NUMICO* is the logarithm of the number of unique institutions that cross-hold firm *i* in year *t*. *M.NUMICO* (*NM.NUMMICO*) is the logarithm of the number of unique motivated (non-motivated) institutions that cross-hold firm *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Traditional Q(t+1)				*Green Street Q(t+1)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PERICO	0.435**				0.273***			
	(2.15)				(3.05)			
M.PERICO		0.705***				0.338***		
		(2.82)				(3.71)		
NM.PERICO		0.164				0.224**		
		(0.71)				(2.35)		
NUMICO			0.038**				0.007	
			(2.01)				(0.99)	
M.NUMICO				0.101***				0.025***
				(4.10)				(4.12)
NM.NUMICO				0.019				0.001
				(0.97)				(0.09)
IO	-0.253	-0.079	0.022	-0.044	-0.273***	-0.260**	-0.031	-0.057
	(-1.31)	(-0.36)	(0.20)	(-0.44)	(-2.92)	(-2.63)	(-0.80)	(-1.57)
GEODIV	-0.166*	-0.174**	-0.179**	-0.188**	0.028	0.025	0.024	0.021
	(-1.96)	(-2.01)	(-2.11)	(-2.14)	(1.29)	(1.15)	(1.10)	(0.95)
PropDIV	0.126	0.109	0.092	0.075	0.033	0.027	0.026	0.019
	(1.31)	(1.17)	(0.92)	(0.77)	(1.34)	(1.11)	(0.99)	(0.74)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.348	0.380	0.354	0.388	0.457	0.474	0.453	0.479
# of Observations	1,302	1,302	1,302	1,302	695	695	695	695

Table 5: Regression Results on the Impact of Cross-Ownership by Blockholders on Contemporaneous Firm Value

This table shows the results of OLS regression analysis. *Traditional Q(t)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*. *Green Street Q(t)* is sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*. *B.PERICO* is the sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*. *B.M.PERICO* (*B.NM.PERICO*) is the sum of all cross-holding motivated (non-motivated) blockholders' percentage holdings in REIT *i* in year *t*. *B.NUMICO* is the logarithm of the number of unique common blockholders that cross-hold REIT *i* in year *t*. *B.NUMAICOF* is the logarithm of the number of REITs block-held by the average cross-holding institution in year *t*. *B.M.NUMICO (B.NM.NUMICO)* is the logarithm of the number of unique motivated (non-motivated) blockholders that cross-hold REIT *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Traditional Q(t)				*Green Street Q(t)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B.PERICO	0.484**				0.185*			
	(2.23)				(1.81)			
B.M.PERICO		1.011***				0.188**		
		(3.65)				(2.37)		
B.NM.PERICO		0.138				0.020		
		(0.64)				(0.22)		
B.NUMICO			0.184***				0.027*	
			(4.79)				(1.76)	
B.M.NUMICO				0.247***				0.045***
				(5.09)				(2.98)
B.NM.NUMICO				0.082**				0.002
				(2.38)				(0.15)
IO	-0.398**	-0.253	-0.617***	-0.444***	-0.195*	-0.097	-0.125**	-0.098*
	(-2.03)	(-1.31)	(-3.82)	(-3.02)	(-1.90)	(-1.20)	(-2.01)	(-1.71)
GEODIV	-0.161*	-0.157*	-0.182**	-0.171*	0.021	0.019	0.016	0.016
	(-1.88)	(-1.78)	(-2.16)	(-1.94)	(1.07)	(0.95)	(0.84)	(0.83)
PropDIV	0.118	0.115	0.110	0.109	0.055**	0.049**	0.051**	0.046*
	(1.25)	(1.26)	(1.21)	(1.23)	(2.31)	(2.03)	(2.04)	(1.86)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.314	0.339	0.332	0.353	0.490	0.498	0.490	0.509
# of Observations	1,341	1,341	1,341	1,341	723	723	723	723

Table 6: Regression Results on the Impact of Cross-Ownership by Blockholders on Firm Value in Year (*t*+1)

This table shows the results of OLS regression analysis. *Traditional Q(t+1)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*+1. *Green Street Q(t+1)* is sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*+1. *B.PERICO* is the sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*. *B.M.PERICO* (*B.NM.PERICO*) is the sum of all cross-holding motivated (non-motivated) blockholders' percentage holdings in REIT *i* in year *t*. *B.NUMICO* is the logarithm of the number of unique common blockholders that cross-hold REIT *i* in year *t*. *B.NUMAICOF* is the logarithm of the number of REITs block-held by the average cross-holding institution in year *t*. *B.M.NUMICO (B.NM.NUMICO)* is the logarithm of the number of unique motivated (non-motivated) blockholders that cross-hold REIT *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Traditional Q(t+1)				*Green Street Q(t+1)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B.PERICO	0.428*				0.302***			
	(1.74)				(3.11)			
B.M.PERICO		0.858***				0.306***		
		(2.97)				(3.11)		
B.NM.PERICO		0.125				0.171*		
		(0.50)				(1.76)		
B.NUMICO			0.180***				0.025	
			(4.33)				(1.58)	
B.M.NUMICO				0.214***				0.044***
				(4.50)				(2.72)
B.NM.NUMICO				0.074**				0.002
				(2.01)				(0.16)
IO	-0.293	-0.161	-0.546***	-0.335**	-0.322***	-0.248**	-0.138*	-0.116*
	(-1.34)	(-0.75)	(-3.16)	(-2.22)	(-3.34)	(-2.63)	(-1.95)	(-1.74)
GEODIV	-0.152*	-0.149*	-0.173**	-0.161*	0.029	0.027	0.024	0.023
	(-1.78)	(-1.71)	(-2.06)	(-1.85)	(1.33)	(1.23)	(1.12)	(1.10)
PropDIV	0.095	0.089	0.087	0.084	0.026	0.020	0.026	0.020
	(0.97)	(0.95)	(0.93)	(0.91)	(1.09)	(0.82)	(1.01)	(0.80)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.335	0.351	0.352	0.362	0.466	0.472	0.458	0.477
# of Observations	1,302	1,302	1,302	1,302	695	695	695	695

Table 7: Regression Results on the Impact of Cross-Ownership on Contemporaneous Firm Value Using Alternative Cross-ownership Measures

This table shows the results of OLS regression analysis. *Traditional Q(t)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*. *Green Street Q(t)* is sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*. *B.NUMICOF* the logarithm of the number of REITs that share any common institutional blockholder with the REIT *i* in year *t*. is the logarithm of the number of unique institutions that cross-hold firm *i* in year *t*. *B.M.NUMICOF (B.NM.NUMICOF)* the logarithm of the number of REITs that share any common institutional blockholder with the REIT *i* in year *t*. *B.NUMAICOF* is the logarithm of the number of REITs block-held by the average cross-holding institution in year *t*. *B.M.NUMAICOF* (*B.NM.NUMAICOF*) is the logarithm of the number of REITs block-held by the average motivated (non-motivated) cross-holding institution in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Traditional Q(t)				*Green Street Q(t)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B.NUMICOF	0.043***				0.002			
	(2.94)				(0.30)			
B.M.NUMICOF		0.066***				0.010**		
		(4.81)				(2.21)		
B.NM.NUMICOF		0.009				-0.006*		
		(0.81)				(-1.69)		
B.NUMAICOF			0.032**				0.001	
			(2.24)				(0.18)	
B.M.NUMAICOF				0.048***				0.008**
				(4.33)				(2.13)
B.NM.NUMAICOF				-0.002				-0.008**
				(-0.19)				(-2.62)
IO	-0.260*	-0.184	-0.120	-0.105	-0.041	-0.039	-0.035	-0.036
	(-1.74)	(-1.37)	(-0.93)	(-0.88)	(-0.92)	(-0.90)	(-0.93)	(-0.97)
GEODIV	-0.176**	-0.167*	-0.172**	-0.161*	-0.017	-0.015	-0.017	-0.015
	(-2.10)	(-1.88)	(-2.05)	(-1.83)	(-0.88)	(-0.79)	(-0.88)	(-0.80)
PropDIV	0.099	0.099	0.100	0.098	0.054**	0.047*	0.055**	0.046*
	(1.05)	(1.11)	(1.05)	(1.09)	(2.07)	(1.93)	(2.08)	(1.92)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.324	0.353	0.318	0.342	0.485	0.509	0.485	0.507
# Observations	1,341	1,341	1,341	1,341	723	723	723	723

Table 8: Univariate Difference-in-difference (DID) Tests

This table shows univariate statistics on difference-in-difference (DID) tests using institutional investor mergers. It compares differences in traditional Tobin's Q between firms that are cross-held by both merging institutions (*control group*) prior to the merger and those first held by only one of the merging institutions (*treated group*) premerger. See Table A1 for variable descriptions.

	N	Q	SE	t-stat	p-value
Pre-mergers					
Control	788	1.364			
Treated	872	1.277			
Diff		-0.088	0.014	-6.32	0.000***
Post- mergers					
Control	591	1.318			
Treated	654	1.301			
Diff		-0.017	0.016	1.06	0.291
Diff-in-Diff	2,905	0.071	0.021	3.34	0.001***

Table 9: Regression Results on Difference-in-differences (DID) Tests

This table shows regression results on difference-in-differences (DID) tests using institutional investor mergers. *TREAT* is a dummy that equals one for treatment firms and zero for control firms. *POST* is a dummy that equals one for the post-merger period and zero for the pre-merger period. Dependent variables include firm value proxy, *Traditional Q(t)*, in Column (1) and a range of the potential channels through which ICO enhances firm value in Columns (2)-(9). See Table A1 for variable descriptions. Firm-merger fixed effects are included in the regression. Standard errors are clustered at merger level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Q	*FFO/TA*	*TRADING*	*PropTO*	*ACQ*	*PAYOUT*	*ILLIQ*	*INT/TA*	*FINANCING*
TREAT × POST	0.100**	0.240**	0.041**	0.010**	0.022	0.047	-0.005*	-0.030	0.026
	(2.03)	(2.25)	(1.93)	(2.12)	(1.13)	(1.08)	(-1.78)	(-0.61)	(1.58)
POST	-0.033	-0.126	0.018*	-0.011**	-0.056***	-0.145***	0.006***	0.167***	0.061*
	(-0.93)	(-1.59)	(1.71)	(-1.92)	(-3.47)	(-3.21)	(3.08)	(3.43)	(1.81)
IO	0.531***	-0.105	0.099***	0.040***	0.144***	0.330***	-0.043***	-0.244*	0.341**
	(4.42)	(-1.64)	(3.45)	(4.96)	(5.01)	(7.12)	(-3.01)	(-2.11)	(2.92)
GEODIV	-0.231**	2.839**	-0.235**	0.040	0.084	-0.984	-0.101	-1.046	0.495
	(-2.63)	(2.58)	(-2.15)	(0.85)	(0.64)	(-1.15)	(-1.09)	(-1.74)	(1.32)
PropDIV	-0.207	-2.234**	-0.235***	-0.033	-0.151**	0.385	-0.011	-1.022**	-0.481*
	(-1.60)	(-2.51)	(-3.39)	(-0.72)	(-2.35)	(1.33)	(-0.81)	(-2.78)	(-1.81)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Mergers FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.699	0.770	0.433	0.465	0.418	0.372	0.391	0.841	0.282
# Observations	2,905	2,656	2,756	2,756	2,756	2,656	2,877	2,905	2,905

Table 10: Cross-ownership and Property Market Performance

This table shows the relation between cross-ownership (ICO) of REITs and the property returns in the markets where REITs' underlying assets are located. REIT firm-year observations are divided into two groups, "High ICO" includes observations with PERICO above median and "Low ICO" include observations with PERICO below median. In Panel A, property portfolio return is measured by *PropRet*, which is calculated as the average excess returns across all MSAs where a REIT owns any property, weighted by MSA-level total adjusted costs for each REIT-quarter. In Panel B, market performance with property dispositions is measured by *PerformD*, which is calculated as the average relative rankings across all MSAs where a REIT dispose of any property.

Panel A: ICO and Property Portfolio Return (*PropRet*)

	N	Mean	*t*-stat	Median	*z*-stat
High ICO	2,388	-0.03		-0.12	
Low ICO	2,392	-0.17		-0.19	
Difference		*0.14*	*4.18*	*0.07*	*3.53*

Panel B: ICO and Market Performance with Property Dispositions (*PerformD*)

	N	Mean	*t*-stat	Median	*z*-stat
High ICO	1,564	0.563		0.546	
Low ICO	1,596	0.545		0.528	
Difference		*0.018*	*2.40*	*0.018*	*2.40*

Table 11: Regression Results on Diversification Discount and Cross-ownership of REITs

This table shows the results of OLS regression analysis. *Traditional Q(t)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*. *Green Street Q(t)* is the sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*. *GEODIV* is the negative of Herfindahl Indexes of each REIT's property weights across metropolitan statistical areas (MSA) in year *t*. In Panel A, *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *M.PERICO* (*NM.PERICO*) is the sum of motivated (non-motivated) cross-holding institutions' percentage holdings in firm *i* in year *t*. In Panel B, *B.PERICO* is the sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*. *B.M.PERICO* (*B.NM.PERICO*) is the sum of all cross-holding motivated (non-motivated) blockholders' percentage holdings in REIT *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Diversification Discount and Cross-ownership

	Traditional Q(t)		*Green Street Q(t)*	
	(1)	(2)	(3)	(4)
PERICO	0.523**		0.158	
	(2.39)		(1.44)	
*PERICO*GEODIV*	0.587***		0.063	
	(2.67)		(1.06)	
M.PERICO		0.822***		0.160
		(3.17)		(1.46)
*M.PERICO*GEODIV*		1.053***		0.186**
		(3.09)		(2.01)
NM.PERICO		0.155		0.015
		(0.66)		(0.13)
*NM.PERICO*GEODIV*		0.316		-0.004
		(1.37)		(-0.07)
IO	-0.228	-0.021	-0.141	-0.049
	(-1.10)	(-0.09)	(-1.28)	(-0.45)
GEODIV	-0.472***	-0.395**	-0.020	-0.007
	(-2.79)	(-2.26)	(-0.51)	(-0.19)
PropDIV	0.171*	0.153*	0.060**	0.053**
	(1.85)	(1.71)	(2.51)	(2.22)
Controls	Yes	Yes	Yes	Yes
Weights	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.345	0.383	0.487	0.510
# of Observations	1,341	1,341	723	723

Panel B: Diversification Discount and Cross-ownership by Blockholders

	Traditional Q(t)		*Green Street Q(t)*	
	(1)	(2)	(3)	(4)
B.PERICO	0.815***		0.219**	
	(3.54)		(2.03)	
*B.PERICO*GEODIV*	1.172***		0.151	
	(2.80)		(1.29)	
B.M.PERICO		1.475***		0.245***
		(5.39)		(2.72)
*B.M.PERICO*GEODIV*		2.164***		0.329**
		(3.74)		(2.38)
B.NM.PERICO		0.342		0.014
		(1.45)		(0.15)
*B.NM.PERICO*GEODIV*		0.480		-0.005
		(1.12)		(-0.04)
IO	-0.433**	-0.331*	-0.195*	-0.096
	(-2.30)	(-1.86)	(-1.87)	(-1.16)
GEODIV	-0.359***	-0.316**	-0.011	-0.008
	(-2.76)	(-2.36)	(-0.35)	(-0.27)
PropDIV	0.138	0.128	0.056**	0.049**
	(1.47)	(1.42)	(2.34)	(2.04)
Controls	Yes	Yes	Yes	Yes
Weights	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.330	0.359	0.493	0.506
# of Observations	1,341	1,341	723	723

Institutional Cross-Ownership and Firm Value:

Evidence from Real Estate Investment Trusts

Online Appendices

Appendix 1: Variable Definitions

Variable	Source	Definition
Asset Values		
Depreciated book value	COMPUSTAT	The book value of assets (in million USD)
Non-depreciated book value	SNL	The book value of assets plus the accumulated depreciation (in million USD)
Market value of assets	Green Street	The sum of net asset value and the market value of total liabilities (in million USD)
Dependent Variables		
Traditional $Q_{i,t}$	COMPUSTAT	The ratio of the market value of equity plus the book value of debt to the book value of assets in year t
Traditional $Q_{i,t+1}$	COMPUSTAT	The ratio of the market value of equity plus the book value of debt to the book value of assets in year $t+1$
Green Street $Q_{i,t}$	Green Street	The ratio of the market value of common equity, operating partnership units, in-the-money options, and total liabilities to the sum of net asset value and the market value of total liabilities in year t
Green Street $Q_{i,t+1}$	Green Street	The ratio of the market value of common equity, operating partnership units, in-the-money options, and total liabilities to the sum of net asset value and the market value of total liabilities in year $t+1$
Non-depreciated $Q_{i,t}$	SNL	The ratio of the market value of equity plus the book value of debt and the accumulated depreciation to the non-depreciated book value of assets in year t
Non-depreciated $Q_{i,t+1}$	SNL	The ratio of the market value of equity plus the book value of debt and the accumulated depreciation to the non-depreciated book value of assets in year $t+1$
INT/TA	SNL	The ratio of interest expenses to the book value of assets in year t
TRADING	SNL	The ratio of the dollar amount of properties bought and sold by REIT i to the average of real estate values in year t and $t-1$. Real estate value is defined as the total market-value capitalization, less the book value of all non-operational real estate assets
ACQ	SNL	The ratio of the aggregate contractual gross sales price of operating properties purchased by REIT i to the average of real estate values in year t and $t-1$
PropTO	SNL	The ratio of the aggregate contractual gross sales price of operating properties sold by REIT i to the average of real estate values in year t and $t-1$
FFO/TA	SNL	The ratio of funds from operations (FFO) to the book value of assets in year t
PAYOUT	SNL, COMPUSTAT	Cash dividends paid (Preferred stock dividends (DVP) + common stock dividends (DVC) + purchase of common and preferred stock (PRSTKC)) as a percentage of funds from operations (FFO) in year t
ILLIQ	SNL	The logarithm of daily volume price impact during year t
FINANCING	COMPUSTAT	Net total funding rate during year t (Lee et al., 2018), (Sale of common and preferred stock (SSTK) – purchase of common and preferred stock (PRSTKC) + long-term debt issuance (DLTIS) – long-term debt reduction (DLTR))/total assets (AT)
PropRet	SNL, NCREIF	Property portfolio return or the average of excess NCREIF return across all metropolitan statistical areas (MSA) and matched property types, weighted by total adjusted costs in year t
PerformD	SNL, NCREIF	The average of relative rankings across all metropolitan statistical areas (MSA) where REIT i sold off any property during year t

Appendix 1 (con't)

Cross-ownership Variables

Based on percentage of cross-ownership

$PERICO_{i,t}$	Thomson Reuters	The sum of all cross-holding institutions' percentage holdings in REIT *i* in year *t*
$M.PERICO_{i,t}$	Thomson Reuters	The sum of motivated cross-holding institutions' percentage holdings in REIT *i* in year *t*
$NM.PERICO_{i,t}$	Thomson Reuters	The sum of non-motivated cross-holding institutions' percentage holdings in REIT *i* in year *t*
$B.PERICO_{i,t}$	Thomson Reuters	The sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*
$B.M.PERICO_{i,t}$	Thomson Reuters	The sum of all motivated cross-holding blockholders' percentage holdings in REIT *i* in year *t*
$B.NM.PERICO_{i,t}$	Thomson Reuters	The sum of all non-motivated cross-holding blockholders' percentage holdings in REIT *i* in year *t*

Based on number of cross-owners

$NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique institutions that cross-hold REIT *i* in year *t*
$M.NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique motivated institutions that cross-hold REIT *i* in year *t* An institution is classified as a motivated investor of REIT *i* if REIT *i*'s portfolio weight is ranked in the top decile of the institution's overall portfolio.
$NM.NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique non-motivated institutions that cross-hold REIT *i* in year *t* An institution is classified as a non-motivated investor of REIT *i* if REIT *i*'s portfolio weight is not in the top decile of the institution's overall portfolio.
$B.NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique common blockholders that cross-hold REIT *i* in year *t*
$B.M.NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique common motivated blockholders that cross-hold REIT *i* in year *t*
$B.NM.NUMICO_{i,t}$	Thomson Reuters	The logarithm of the number of unique common non-motivated blockholders that cross-hold REIT *i* in year *t*

Based on the percentage of REITs

$B.DICO_{i,t}$	Thomson Reuters	A dummy variable that equals one if REIT *i* shares any common institutional blockholder with other REITs in at least one of the four quarters in a fiscal year and zero otherwise
$B.NUMICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs that share any common institutional blockholder with the REIT *i* in year *t*
$B.NUMAICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs block-held by the average cross-holding institution of REIT *i* in year *t*
$B.M.NUMICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs that share any common motivated institutional blockholder with the REIT *i* in year *t*
$B.M.NUMAICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs block-held by the average motivated cross-holding institution of REIT *i* in year *t*
$B.NM.NUMICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs that share any common non-motivated institutional blockholder with the REIT *i* in year *t*
$B.NM.NUMAICOF_{i,t}$	Thomson Reuters	The logarithm of the number of REITs block-held by the average non-motivated cross-holding institution of REIT *i* in year *t*

Appendix 1 (con't)

Control Variables		
$IO_{i,t}$	Thomson Reuters	The ratio of the number of shares held by institutional investors to the total number of shares outstanding of firm i in quarter t
$GEODIV_{i,t}$	SNL	The negative of Herfindahl Indexes of each REIT's property weights across metropolitan statistical areas (MSA) in year t
$TypeDIV_{i,t}$	SNL	The negative of Herfindahl Indexes of each REIT's property weights in each of the five property types, including office, multi-family, industrial, retail, and others in year t
$UPREIT_{i,t}$	SNL	A dummy variable equals 1 if a REIT is a UPREIT or DownREIT
$LOGSIZE_{i,t}$	COMPUSTAT	The logarithm of the annual reported book value of total assets (AT)
$LEVERAGE_{i,t}$	COMPUSTAT	Sum of total long-term debt and debt in current liabilities divided by total assets
$EBITDA/TA_{i,t}$	SNL	The ratio of EBITDA to book value of total assets
$TURNOVER_{i,t}$	CRSP	The ratio of the stock volume to the shares outstanding as of December in year t
$\varphi_{l,t}$	SNL	Regional weights, varying by firm-year
$\varphi_{ppty,t}$	SNL	Property-type weights, varying by firm-year
φ_t		Year fixed effects

Appendix 2: Regression Results on Non-Depreciated Q and Motivated Cross-ownership of REITs

This table shows the results of OLS regression analysis. The dependent variable in Columns 1-4 (5-8), *Non-depreciated Q(t)* (*Non-depreciated Q(t+1)*). *Non-depreciated Q(t)* (*Non-depreciated Q(t+1)*) equals to the market value of equity plus the book value of debt and accumulated depreciation, all divided by the non-depreciated book value of assets in year *t* (*t+1*). *NUMICO* is the logarithm of the number of unique institutions that cross-hold firm *i* in year *t*. *M.NUMICO* (*NM.NUMMICO*) is the logarithm of the number of unique motivated (non-motivated) institutions that cross-hold firm *i* in year *t*. *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *M.PERICO* (*NM.PERICO*) is the sum of motivated (non-motivated) cross-holding institutions' percentage holdings in firm *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Non-depreciated Q(t)				*Non-depreciated Q(t+1)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PERICO	0.454**				0.432**			
	(2.13)				(2.46)			
M.PERICO		0.636***				0.651***		
		(2.81)				(3.06)		
NM.PERICO		0.142				0.196		
		(0.66)				(0.97)		
NUMICO			0.032*				0.027	
			(1.95)				(1.59)	
M.NUMICO				0.098***				0.087***
				(5.04)				(4.37)
NM.NUMICO				0.013				0.011
				(0.75)				(0.61)
IO	-0.318	-0.096	0.001	-0.061	-0.294*	-0.139	0.023	-0.034
	(-1.51)	(-0.45)	(0.02)	(-0.76)	(-1.70)	(-0.70)	(0.25)	(-0.40)
GEODIV	-0.145**	-0.151**	-0.159**	-0.162****	-0.138*	-0.145*	-0.148**	-0.156**
	(-2.05)	(-2.07)	(-2.23)	(-2.20)	(-1.87)	(-1.93)	(-2.00)	(-2.04)
PropDIV	0.161**	0.145*	0.131	0.117	0.130	0.115	0.105	0.090
	(2.00)	(1.88)	(1.57)	(1.43)	(1.59)	(1.45)	(1.22)	(1.07)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.357	0.392	0.361	0.405	0.357	0.386	0.359	0.393
# of Observations	1,317	1,317	1,317	1,317	1299	1299	1299	1299

Appendix 3: Regression Results on Non-Depreciated Q and (Motivated) Block Cross-ownership of REITs

This table shows the results of OLS regression analysis. The dependent variable in Columns 1-4 (5-8), *Non-depreciated Q(t)* (*Non-depreciated Q(t+1)*). *Non-depreciated Q(t)* (*Non-depreciated Q(t+1)*) equals to the market value of equity plus the book value of debt and accumulated depreciation, all divided by the non-depreciated book value of assets in year *t* (*t+1*). *B.NUMICO* is the logarithm of the number of unique common blockholders that cross-hold REIT *i* in year *t*. *B.NUMAICOF* is the logarithm of the number of REITs block-held by the average cross-holding institution in year *t*. *B.M.NUMICO (B.NM.NUMICO)* is the logarithm of the number of unique motivated (non-motivated) blockholders that cross-hold REIT *i* in year *t*. *B.PERICO* is the sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*. *B.M.PERICO* (*B.NM.PERICO*) is the sum of all cross-holding motivated (non-motivated) blockholders' percentage holdings in REIT *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Non-depreciated Q(t)				*Non-depreciated Q(t+1)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B.PERICO	0.358**				0.338*			
	(2.06)				(1.74)			
B.M.PERICO		0.826***				0.718***		
		(3.59)				(2.99)		
B.NM.PERICO		0.070				0.077		
		(0.40)				(0.39)		
B.NUMICO			0.149***				0.148***	
			(4.81)				(4.34)	
B.M.NUMICO				0.204***				0.181***
				(4.98)				(4.52)
B.NM.NUMICO				0.061**				0.058*
				(2.16)				(1.87)
IO	-0.294*	-0.178	-0.500***	-0.347***	-0.250	-0.137	-0.469***	-0.289**
	(-1.88)	(-1.15)	(-3.83)	(-2.94)	(-1.40)	(-0.76)	(-3.27)	(-2.27)
GEODIV	-0.137*	-0.133*	-0.156**	-0.145**	-0.128*	-0.125*	-0.145**	-0.135*
	(-1.93)	(-1.83)	(-2.23)	(-1.99)	(-1.73)	(-1.67)	(-1.98)	(-1.79)
PropDIV	0.134	0.129	0.129	0.124	0.104	0.099	0.100	0.095
	(1.64)	(1.65)	(1.62)	(1.61)	(1.26)	(1.24)	(1.25)	(1.22)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ppty Type weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.346	0.370	0.361	0.382	0.346	0.362	0.361	0.372
# of Observations	1,317	1,317	1,317	1,317	1,299	1,299	1,299	1,299

Appendix 4: Change of Geographic Diversification and Cross-ownership of REITs

This table shows the results of OLS regression analysis. The dependent variable, *GEODIV(+)*, indicates an increase in geographic diversification from year *t* to *t+1*. *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *NUMICO* is the logarithm of the number of unique institutions that cross-hold firm *i* in year *t*. See Table A1 for variable descriptions. Control variables are the same as in Table 5 and suppressed. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	GEODIV(+)	*GEODIV(+)*
PERICO	2.694***	
	(4.07)	
NUMICO		0.123*
		(1.68)
IO	-2.656***	0.092
	(-3.79)	(0.24)
GEODIV	-8.626***	-9.299***
	(-11.99)	(-12.74)
PropDIV	-0.177	0.154
	(-0.29)	(0.25)
Controls	Yes	Yes
Regional weights	Yes	Yes
Ppty Type weights	Yes	Yes
Year FE	Yes	Yes
Chi-square	287.765	283.947
# of Observations	1,211	1,211

Appendix 5: Regression Results on Diversification Discount and Cross-ownership of REITs

This table shows the results of OLS regression analysis. *Traditional Q(t)* is the market value of equity shares plus the book value of debt divided by the book value of assets in year *t*. *Green Street Q(t)* is the sum of the market value of common equity, operating partnership units, in-the-money options, and total liabilities divided by the sum of the market value of the underlying assets in year *t*. *GEODIV* is the negative of Herfindahl Indexes of each REIT's property weights across metropolitan statistical areas (MSA) in year *t*. In Panel A, *PERICO* is the sum of all cross-holding institutions' percentage holdings in firm *i* in year *t*. *M.PERICO* (*NM.PERICO*) is the sum of motivated (non-motivated) cross-holding institutions' percentage holdings in firm *i* in year *t*. In Panel B, *B.PERICO* is the sum of all cross-holding blockholders' percentage holdings in REIT *i* in year *t*. *B.M.PERICO* (*B.NM.PERICO*) is the sum of all cross-holding motivated (non-motivated) blockholders' percentage holdings in REIT *i* in year *t*. See Table A1 for variable descriptions. The regional weights, property type weights and year fixed effects are included in the regression. Standard errors are clustered at firm level. The numbers in parentheses are *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Diversification Discount and Cross-ownership

	Traditional Q(t)		*Green Street Q(t)*	
	(1)	(2)	(3)	(4)
NUMICO	0.050**		0.013*	
	(2.60)		(1.94)	
*NUMICO*GEODIV*	0.054		0.014	
	(1.23)		(1.63)	
M.NUMICO		0.133***		0.030***
		(5.59)		(4.61)
*NUMICO*GEODIV*		0.128***		0.022**
		(2.95)		(2.39)
NM.NUMICO		0.017		0.004
		(0.91)		(0.69)
*NM.NUMICO*GEODIV*		-0.018		0.005
		(-0.36)		(0.52)
IO	0.001	-0.083	-0.041	-0.066**
	(0.01)	(-0.88)	(-1.17)	(-2.05)
GEODIV	-0.389*	-0.230	-0.046	-0.036
	(-1.93)	(-1.03)	(-1.19)	(-1.00)
PropDIV	0.133	0.107	0.052**	0.043*
	(1.33)	(1.10)	(2.06)	(1.73)
Controls	Yes	Yes	Yes	Yes
Weights	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.336	0.389	0.493	0.525
# of Observations	1,341	1,341	723	723

Panel B: Diversification Discount and Cross-ownership by Blockholders

	Traditional Q(t)		*Green Street Q(t)*	
	(1)	(2)	(3)	(4)
B.NUMICO	0.224***		0.034**	
	(5.32)		(2.04)	
*B.NUMICO*GEODIV*	0.208**		0.040	
	(2.08)		(1.39)	
B.M.NUMICO		0.331***		0.059***
		(6.22)		(3.62)
*B.M.NUMICO*GEODIV*		0.429***		0.074***
		(3.82)		(2.73)
B.NM.NUMICO		0.104***		0.003
		(2.90)		(0.28)
*B.NM.NUMICO*GEODIV*		0.041		-0.001
		(0.42)		(-0.03)
IO	-0.587***	-0.505***	-0.119*	-0.108*
	(-3.75)	(-3.65)	(-1.93)	(-1.90)
GEODIV	-0.369***	-0.300**	-0.027	-0.016
	(-2.67)	(-2.21)	(-0.78)	(-0.50)
PropDIV	0.128	0.120	0.053**	0.045*
	(1.40)	(1.36)	(2.13)	(1.85)
Controls	Yes	Yes	Yes	Yes
Weights	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.341	0.373	0.493	0.518
# of Observations	1,341	1,341	723	723