The Pennsylvania State University

The Graduate School

The Mary Jean and Frank P. Smeal College of Business

REAL ESTATE, INDUSTRY STRUCTURE AND SHAREHOLDER VALUE

A Dissertation in

Business Administration

by

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Submitted in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

August 2013

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Abstract

Recent studies suggest that real estate ownership by non-real estate firms negatively affects shareholder value. If this is indeed the case, then why do most of these firms elect to own substantial amounts of real estate? Borrowing from the industrial organization (IO) literature on capacity entry deterrence strategies, I argue that industry structure affects the impact of real estate ownership and shareholder value. Production capacity expansion often requires substantial real estate investment. In competitive industries where potential benefits from excess capacity strategies are competed away, firms saddled with substantial amounts of real estate are likely to suffer a value discount. On the other hand, since investments in additional capacity may insulate profit margins by deterring new entries, investors are likely to have a more favorable view of real estate ownership by firms operating in concentrated industries.

An important consideration is the concept of strategic (firm-specific) vs. generic real estate. Generic real estate is any real estate that can easily be deployed for other uses and therefore has a high resale value. A typical example is office space. In contrast, strategic real estate serves specific needs of the owner and, as a result, trades in thinner markets. Investments in strategic real estate therefore represent credible long-term commitment to the industry. Unlike generic real estate, strategic real estate is mostly owned. Real estate investments that are part of capacity strategies are more likely to be of that type.

The study provides empirical evidence on the relation between real estate and shareholder value through a comprehensive dataset spanning the 40-year period ending in 2010. Using a stock portfolio formation technique, it shows that the documented negative impact of real estate ownership on shareholder value is specific to competitive industries. On the contrary, in concentrated industries, real estate ownership does not necessarily have an adverse effect on firm value. This finding is robust to alternative measures of real estate ownership and industry classifications. Additionally, controlling for industry structure alleviates the crucial identification problem between real estate ownership and stock returns noted in previous studies.

Next, the study examines the effects of real estate ownership on stock risk at the firm level. This analysis comprises the estimation of firm level risk exposure yearly and the extent of cross-sectional variation explained by real estate ownership and industry structure. The final section of the paper analyzes the determinants of real estate ownership by non-real estate firms. In addition to the usual factors identified in the literature, it examines the contributions of market power and industry structure. This study is the first to highlight the potential role of industry structure in the impact of real estate ownership on shareholder value; thereby identifying a channel for further research.

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Acknowledgments

I am indebted to my dissertation chair, Brent W. Ambrose, for his guidance and support throughout the years. I am also extremely grateful for the continued support I received from my other department committee members, namely N. Edward Coulson, Austin J. Jaffe, and Jiro Yoshida. Finally, I thank my external committee member, Charles Cao.

The first chapter of this research benefited from internal seminar presentations at The Pennsylvania State University, as well as seminars at Federal Reserve Bank of Philadelphia (I thank Bob Hunt for his generous comments), University of Georgia, and University of Wisconsin - Madison. Dissertation funding support was generously provided by the Real Estate Research Institute (RERI).

Dedication

I dedicate my dissertation to my late father, Samba Diop, without whom I would not be here today, to my spouse and children (Arame, Pape and Hanna - I am sure you will make us proud!), and to my broad family. Thank you for your unconditional love and support.

1 Introduction

> *"The company generally owns the land and building or secures long-term leases for restaurant sites, which ensures long-term occupancy rights and helps control related costs... The company identifies and develops sites that offer convenience to customers and long-term sales and profit potential."* McDonald's Corporation

> *"We have more than 9,000 company-operated stores, almost all of which are leased. We also lease space in various locations worldwide for regional, district and other administrative offices, training facilities and storage."* Starbucks Corporation

What is the right real estate strategy for non-real estate firms? The above examples show two successful companies with starkly different approaches to real estate. Yet, it is often suggested, sometimes casually, that non-real estate firms should minimize real estate ownership and focus on core business activities.[1] Although this prescription appears to make a lot of sense, is it optimally applicable to or implementable by all firms? More fundamentally, do investors treat real estate ownership the same, irrespective of a firm's industry or competitive environment?

Real estate ownership likely reflects industry and firm characteristics as well as location. This study examines the impact of product market competition on the relation between real estate ownership and expected stock returns for non-real estate firms. Real estate ownership refers to direct ownership as well as indirect ownership through capitalized leases since both provide the same economic benefits. In this paper, real estate intensive firms are firms that own substantial amounts of real estate compared other productive assets.

The real estate owned by these firms, whose primary business is not directly related

[1] This recommendation largely stemmed from the rise of large, well-capitalized equity real estate investment trusts (REITs) in the 1990s. The main issue facing corporations is generally whether to own or lease real estate assets, particularly those suitable to a broad range of users (i.e., general-purpose as opposed to firm-specific real estate assets). Linneman, 1998, is an example of that literature.

to the development, investment, management, or financing of real estate, consists of real properties housing their productive activities. In this context, real estate strategy therefore is the leasing of or the purchase, management, and disposal of real estate assets with the objective to enhance the value of the firm's core businesses.[2] Generally, the acquisition of real estate, through leasing or purchase, by most firms is tantamount to securing a resource (similar to labor and capital) to meet future production objectives rather than expanding into the real estate business. Thus, market scope and output decisions, given a firm's product market strategy, should normally drive these investment decisions. The real estate intensity of a firm's production processes and the way through which that real estate is secured are at the discretion of management. These decisions must be given serious consideration because real estate investments affect operational and financial risks, and potentially impact market value since they have high opportunity costs and are not easily reversible in the short term when facing negative demand shocks.

Departing from traditional event studies of market reactions to corporate real estate decisions, a number of recent studies have examined the equilibrium relation between real estate ownership and stock returns. The emerging conclusion from this literature is that investors require higher returns from real estate intensive firms (Brounen and al., 2005; Yu and Liow, 2009; Tuzel, 2010; Ling et al., 2010). Said differently, real estate appears to adversely affect shareholder value for non-real estate firms. Although possible endogeneity between real estate ownership and stock returns may render identification problematic, this seemingly negative effect of real estate ownership is supported by the widely-documented positive market reactions to corporate real estate divestitures, such as sale-leasebacks.[3]

[2]Corporate real estate investments driven by strategic purposes, such as marketing and corporate branding, fall under this category. However, real estate decisions may also be driven by portfolio diversification (return enhancement) considerations or even management's self-interests. Nourse, 1990, identifies three main approaches to managing corporate real estate. Real estate assets may be actively managed to meet core business objectives. In contrast, real estate management may be passive to the core business needs of the rest of the organization without being assigned any clear performance objectives. Finally, corporations, particulary those with strong cash flows, may embark in entrepreneurial real estate, in rare cases even establishing a real estate division whose primary objective is to seek profitable real estate investment opportunities.

[3]This endogeneity problem may have resulted in inconclusive results in the past. Recent studies deal

Despite this apparent adverse effect of real estate on shareholder value, real estate still represents a substantial portion of most corporate balance sheets. The real estate owned by non-real estate, nonfinancial corporations was valued at $7.76 trillion in 2010, accounting for roughly 28% of total assets (Figure 1).[4] This real estate is primarily comprised of production facilities, warehouses, office buildings, land, and retail outlets. The proportion of this real estate has certainly decreased over time from 42% of total assets in 1970 to 28% in 2010 based on market value. However, it still represents over 9 times the value of the assets owned by REITs, which have received far more attention from researchers. Given the documented negative impact of real estate on firm value, why do corporations still carry this considerable amount of real estate?

I argue that industry structure is a determinant factor of the amount of real estate used by firms in their production processes given available technologies. For firms operating in highly competitive markets, investors may negatively view excess production capacity or real estate investments geared toward facilitating rapid capacity expansions, unless such investments substantially lower production costs because of the associated increase in operating leverage and the lack of pricing power at the firm level. On the other hand, the reverse investor attitude may prevail in oligopolistic industries since the output flexibility conferred by capacity-increasing real estate investments may deter entries, consequently consolidating the incumbents' market power and protecting profit margins (Wenders, 1971; Spence, 1977; Eaton and Lipsey, 1979; Fudenberg and Tirole, 1984; Bulow et al., 1985).[5]

As noted earlier, there potentially exists an endogenous relation between real estate ownership and stock returns. This endogeneity certainly reflects itself at the industry level

with this problem by focusing on one industry (Brounen et al., 2005; Yu and Liow, 2009; Ling et al., 2010), by using a normalized measure of real estate intensity, or by adjusting returns at the industry level (Tuzel, 2010).

[4]Source: http://www.federalreserve.gov/releases/z1/20110310/

[5]Dixit and Pindyck, 1994, note that real estate has the potential of conferring options to grow operations. However, market competition substantially eliminates or erodes the value of real options (Grenadier, 2002; Novy-Marx, 2007). Therefore, real options theory also leads to the conclusion that real estate-intensive firms may fare much better in oligopolistic industries than in competitive industries.

since some economic activities are more real estate intensive than others. For example, car manufacturing generally requires more real estate than computer production. Real estate ownership and stock returns may also be simultaneously determined at the firm level as well through capital structure for example. Real estate intensive firms usually have higher leverage ratios, since real estate investments are capital intensive, and therefore may face higher costs of equity financing. Industry structure permits the disentangling, at least partially at the industry level, of the endogenous relation between real estate and stock returns. This study is the first to consider this dimension of industry structure.

The next section develops the framework proposed in this study and empirically tests its predictions on a large sample of non-real estate firms using a portfolio formation technique. For the 37-year period from 1973 to 2010, the documented positive relation between real estate ownership and stock returns, or the adverse effect of real estate ownership on firm value, is specific to competitive industries. In those industries, an investment strategy consisting of holding high-real estate stocks and shorting low-real estate stocks (thereafter referred to as the *High-Low* or the synthetic long real estate investment strategy) would have generated a significant positive average return during that period.[6] In concentrated industries, on the other hand, real estate ownership and stock returns are negatively related during the same time frame, resulting in the *High-Low* investment strategy generally generating a net loss. As further evidence of the strength of these relationships, the *High-Low* strategy generates positive (negative) alphas (i.e., average unexplained excess returns) in competitive (concentrated) industries, after controlling for conventional risk factors. These findings are robust to various measures of real estate ownership and industry concentration.

For non-real estate firms operating in concentrated industries, this evidence suggests that pursuing a low-real estate strategy is not necessarily in the shareholders' best interest.

[6]Similar to previous studies, the test is performed on ex-post stock returns. However, this documented correlation between real estate ownership and ex-post returns likely stems from the argued ex-ante relationship given the sample size and methodology used.

Obviously, intense competition requires nimbleness at all levels of the firm. At the extreme, firms facing cutthroat competition may be better off contracting out production in some cases. But this cannot be true in all competitive industries, let alone in non-competitive sectors, since a firm's strategic competitive advantages may be tied to firm-specific assets, including real estate.

However, market efficiency normally precludes consistent alphas. The basic argument that investors penalize real estate ownership in competitive industries must therefore imply a risk dimension, of real estate nature or otherwise, being priced by the market. It is possible that real estate alters exposure to conventional risk factors, introduces a separate real estate risk, or both. This question, which has not been fully addressed in the literature for the broader universe of all non-real estate firms, is covered later. Following the existing literature, the next section adopts a portfolio formation approach to explore the interaction between industry structure, real estate ownership, and shareholder value.

2 Real Estate Ownership and Shareholder Value

The stock return anomalies documented by Fama and French (FF), 1992, particularly the size and book-to-market premiums, have spawned a growing literature examining the link between corporate investment decisions and stock returns.[7] The knowledge gained from that literature has focused more attention on understanding the impact of real estate investments on expected returns, for real estate represents an important factor of production for most firms, accounting for a substantial portion of their balance sheets, but possesses special characteristics compared to other input factors.

2.1 Literature Review

Academic corporate real estate research has notoriously lagged other areas of real estate research. Traditionally, the impact of real estate on firm value has largely been analyzed from a flow perspective using event studies to examine market reactions to acquisitions, leasing, divestitures, sale-leasebacks, and spin-offs of real estate assets. The main finding of that literature is that most firms poorly manage their real estate. Leasing and the disgorgement of real estate through sale-leasebacks and spin-offs often cause positive market reactions (Allen et al., 1993; Slovin et al., 1990; Rutherford, 1990). Similarly, the establishment of a separate real estate unit is favorably greeted by investors (Rutherford and Nourse, 1988). Rodriguez and Sirmans, 1996, present a detailed review of that earlier research.

However, a major drawback of event studies is that the event of interest must be large enough to significantly impact market value. Unfortunately, most corporate real estate transactions do not meet this size threshold. Furthermore, contagions from unrelated (past

[7] Important papers in this literature include Berk et al., 1999; Carlson et al., 2004; Aguerrevere, 2003; and Cooper, 2006. Berk et al. first link investment decisions to the riskiness of assets-in-place and expected returns. Carlson et al. relate the dynamics of operating leverage and expected returns. Cooper ties adjustment costs and investment irreversibility to the book-to-market premium.

and contemporaneous) events and any information conveyed through the announcement may obscure the price impact of the event of interest.[8] It is also difficult to generalize from event studies because they are often fraught with sample selection bias (Deng and Gyourko, 2000). In addition to these known drawbacks, event studies cannot directly address the question of the appropriateness of a firm's stock of real estate relative to its strategic business objectives. They are more suitable for the analysis of marginal real estate investment decisions made by firms.

Beside the limited insight gained from the event-study literature, little was known about the relation between real estate ownership and stock returns until Deng and Gyourko, 2000. For a large sample of industrial firms spanning the 10-year period from 1984 to 1993, Deng and Gyourko document a negative, moderately statistically significant relation between abnormal returns and real estate ownership, defined as the ratio of properties, plants, and equipment (PPE) to total assets (TA). But this effect was not economically significant, except for firms with high cost of capital (i.e., firms with betas higher than that of commercial real estate). Seiler et al., 2001, also find no evidence of diversification benefits through lower systematic risk or higher abnormal returns (alphas) from real estate ownership for a cross section of industries from 1985 to 1994. Similarly, Brounen and Eichholtz, 2005, find no systematic correlation between real estate ownership and abnormal returns for international non-real estate firms from 1992 to 2000. But they document a significant negative effect of real estate ownership on systematic risk. In summary, these early empirical studies provide no definite understanding of the effect of real estate on firm value, even though they indicate a negative correlation between real estate and systematic risk, which should not come as a surprise since real estate has generally a lower beta. The inconclusiveness of these studies may be due to the endogeneity problem discussed earlier and to the use of PPE as a proxy

[8] For example, it is possible that firms selling their real estate are under stress because of poor management that resulted in misaligned real estate and business strategies. In this instance, a substantial portion of announcement returns may stem from the resulting lower agency costs rather than the intrinsic values of transactions themselves.

for real estate in some studies. Deng and Gyourko find the ratio of PPE to TA to have a low cross-industry variance.

As a result of this identification problem, a number of studies restrict their analyses to retail firms, whose values are supposedly more sensitive to real estate investment decisions given the real estate intensity of the sector. For international retail firms, Brounen et al., 2005, document a significant positive relation between real estate and abnormal returns from 1993 to 2002 and also confirm the negative effect of real estate on market beta previously identified by Brounen and Eichholtz, 2005. Using a less conventional approach, Yu and Liow, 2009, also find real estate ownership to be associated with higher stock returns for international retail firms, but find no significant negative effect on systematic risk.[9] Although these findings are credible, they are not necessarily generalizable to other sectors.

Tuzel, 2010, extends the analysis to all non-real estate firms. Adopting the FF, 1992, portfolio formation approach, Tuzel documents a positive relation between real estate ownership, defined as the ratio of buildings and capital leases to PPE, and average excess and abnormal returns on real estate-sorted stock portfolios from 1971 to 2005. Furthermore, the synthetic long real estate investment strategy generates a significant average abnormal return of 3.6% per annum during that period. This result, which reinforces the findings of the cited event studies, is tantamount to stating that investors assign lower valuations to real estate intensive firms by requiring higher expected returns. The author argues that this positive relation stems from the operational inflexibility associated with real estate as a factor of production.

Assuming market efficiency, this positive relation between real estate ownership and expected returns implicitly implies the pricing of some risk directly or indirectly associated

[9]They engineer a pure-play retail counterpart for each firm as the residuals of the regression of the firm's returns on the residuals from the regression of the returns on a public real estate index on stock market returns to obtain a pure real estate return series. They then compare the distributional characteristics (median and standard deviation), betas, alphas, and Sharpe ratios of the initial (composite real estate and retail) return series to those of the pure-play retail series.

to real estate ownership. Ling et al., 2010, tackle that very question for retail firms by examining the sensitivity of systematic market risk and exposure to a real estate risk factor (proxied by the orthogonalized portion of total returns on retail REITs relative to market returns) to real estate ownership, measured by the ratio of PPE plus operating leases to TA plus operating leases. In individual time-series regressions, they find 16% (3%) of stocks to exhibit a significant positive (negative) sensitivity to real estate for the 10-year period from 1998 to 2008. Furthermore, pooled time-series regressions of estimated market betas on the real estate variable and other control variables reveal an insignificant relation between real estate and market beta. In contrast, they find the real estate betas to be positively and strongly affected by real estate ownership. These findings basically imply that the positive abnormal returns on retail stocks documented by Brounen et al., 2005, for example, may be related to real estate ownership.

Overall, this real estate literature documents a positive (negative) relation between real estate and stock returns (market value), despite the fact that real estate appears to have a negative impact on systematic market risk. The reviewed literature does not consider to what extent industry structure affects real estate ownership. This study adopts a similar approach as Tuzel, 2010, but introduces competition into the equation, arguing that real estate has the potential of enhancing shareholder value in concentrated industries since capacity decisions can be used to protect economic rents available to incumbents in those markets. This intuition is tested using a comprehensive sample of non-real estate, non-service firms given the paradigm through which the research question is framed.

2.2 Proposed Framework

Framing a general principle governing the relation between real estate ownership and stock returns is a complicated task. Industry characteristics are determinant factors of real estate use. But even at the industry level, it is not necessarily true that there exists a unique real estate strategy optimally applicable to all firms since location affects real estate decisions made by firms. Generally, the real estate used by corporations is of two natures: strategic (i.e., firm-specific) real estate and generic (i.e., general-purpose) real estate assets.[10] While there are valid strategic reasons why it may be optimal to own strategic real estate assets, local space markets often present firms with the option to own or lease general purpose real estate, particularly in the last two decades. Since the relative importance of these two categories of real estate likely varies across industries and firms depending on their technological choices, and since these two types of real estate do not necessarily affect shareholder value the same way, it may be hazardous to argue for one single theory describing the relation between real estate ownership and firm value.[11] At the end of the day, this becomes an empirical question.

Yet corporations, even the most adept at managing real estate, do not generally acquire real estate for the sole purpose of diversifying into real estate (Nourse and Roulac, 1993). How often does a computer producer buy an office building or a warehouse for the sole purpose of generating rental income for diversification purposes rather than securing space for its operations?[12] Therefore, this study approaches real estate as a factor of production, but a different one indeed compared to labor or equipment. Its bulkiness, high and asymmetric adjustment costs, and illiquidity limit the ability of firms to maintain an optimal level as demand fluctuates. This argument underlies the negative relation between real estate ownership and firm value documented by Brounen and al., 2005, and Tuzel, 2010, for instance.

But this cannot be the whole story. If real estate is 'bad', resulting in the market

[10] Whether or not a specific piece of real estate is play a strategic role for a firm may depend on its location attributes, the relationship that the firm wants to maintain with that real estate, or both. McDonald, for example, spends a lot of resources to identify store locations and may not necessary see nearly lots are close substitutes, whereas Starbucks appears to be more flexible in selecting store locations.

[11] For instance, Deng and Gyourko, 2000, the first study to address this important question, presents four possible scenarios describing how real estate might affect firm value.

[12] Even though purchasing rather than leasing real estate may in some instances reduce the volatility of operating cashflows, this secondary effect is unlikely to be the rationale behind the transaction.

punishing firms that own a lot of real estate regardless of their industry, then it is surprising that in equilibrium firms hold significant amounts of real estate, unless investors' aversion to real estate is driven by technological progress over time, which leaves some firms saddled with more real estate than they need. If this is the case, one would expect the market to naturally develop avenues for firms to rid themselves of burdening real estate assets. The fact of the matter is that REITs, which are thought to hold a competitive advantage in owning real estate, only gained eminence relatively recently and owe their existence in large part to government action.[13]

As noted, industry, technology, and location matter in real estate decisions made by firms. Although the impact of real estate on firm value is probably better identified at the industry level, I argue that industry structure, as proxied by industry concentration, should control for most of the endogeneity at the industry level by permitting the classification of industries into similar groups. Furthermore, industry structure likely plays a key role in corporate real estate strategies and that controlling for it should reveal the true nature of the relation between real estate ownership and firm value, for real estate investments generate different incentives in competitive and concentrated industries. Based on IO theory, capacity and output decisions may represent important strategic tools, particularly in oligopolistic markets. In competitive industries, capacity-increasing real estate investments are likely to yield marginal economic gains since firms have little to no pricing power. Consequently, real estate intensive firms may be perceived as riskier by investors because of their higher operating leverage and, therefore, may face higher costs of equity financing. In concentrated markets, on the other hand, investors may reward strategic capacity decisions aimed at creating or consolidating economic rents (as explained for example by Wenders, 1971; Spence, 1977; and Eaton and Lipsey, 1979; Fudenberg and Tirole, 1984; Bulow et al., 1985) through

[13]Incidently, the purpose of the tax act of 1960 establishing REITs is to facilitate the diversification of small investors into commercial real estate. Also, Figure 1 shows that the decrease in corporate real estate predated the new REIT era.

lower required equity returns.[14]

This form of entry deterrence consists of keeping excess capacity that could be deployed to expand production in order to eliminate potential profits from entry. If the strategy is successful (i.e., credibly perceived by potential entrants), the additional capacity should normally be left idle to continue enjoying the higher profit margins. However, it is possible that these additional capacity investments lead to a reshuffling of the industry later as an outcome of a second-stage game among incumbents since firms compete on the basis of accumulated capacity in the long run (Tirole, 1997).[15] The outcome of this second game is therefore likely to favor high-capacity firms due to their greater market power. Furthermore, firms undertaking these additional capacity investments may be bigger and therefore more diversified in terms of product mix and market presence. Even though additional real estate investments increase operating leverage, the resulting gain in market power may cause these firms to still be less risky than their smaller rivals.

Thus, capacity decisions, including real estate investments, may affect a firm's competitive position in the product market and ultimately its market value. Although investors may negatively view real estate ownership in competitive industries, where margins are relatively thin, they may assess such investments more positively in concentrated industries since they may help protect profit margins. I therefore argue that the negative effect of real estate ownership on firm value applies to competitive industries. In concentrated industries, real estate investments may fetch benefits that annihilate the negative effect resulting from the increase in operating leverage. The real options literature also offers arguments supportive

[14]Firms using more real estate may have lower productivity (Imrohoroglu and Tuzel, 2010) or may be more exposed to agency problems between managers and shareholders (Du et al., 2006). If one of these stories explains the negative effect of real estate on shareholder value, product market competition should therefore be irrelevant.

[15]In the event the burden of the capacity expansion is not evenly shared, firms saddled with unutilized capacity would bear the costs of entry deterrence whereas the benefits would accrue to all incumbent firms. This potential free-rider problem would deter the use of capacity as entry deterrent in the first place, unless an output re-adjustment takes place in the long run.

of this view.[16]

Industry structure should matter more for strategic than generic real estate. Independent of industry structure, the ownership of that real estate has the potential to negatively affect shareholder value, if leasing is a cheaper alternative, since generic real estate does not confer any competitive advantage. In contrast, the impact of strategic real estate on firm value should vary with industry structure, negatively affecting firm value only in competitive industries. Basically, this reversing effect of real estate ownership on shareholder value stems from the importance of strategic real estate, relative to general-purpose real estate assets, in corporate balance sheets. Figure 1 shows that the real estate owned by non-farm, nonfinancial firms are mostly of non-residential nature, hence likely firm specific.

2.3 Other Relevant Literature

This section reviews the relevant non-real estate literature, namely the IO literature dealing with strategic capacity and output decisions in oligopolistic industries and the product market competition literature.

[16]Real estate, especially land, can be viewed as real options since it provides firms with opportunities to acquire additional production capacity (Titman, 1985; Dixit and Pindyck, 1994). The ability of a firm to choose the timing of irreversible investments becomes valuable with uncertainty. But market structure affects the value of real options. Competition erodes the value of the option to wait embodied in real options as firms strategically rush to exercise their options to avoid preemption from rivals (Grenadier, 2002); Novy-Marx, 2007, argues that this prediction is based on simplifying assumptions. Even though perfect competition may not exist, competition certainly decreases the value of growth options, even in the world of Novy-Marx. Consequently, the value of firms operating in competitive markets reflect almost entirely that of assets in place. On the other hand, real options embodied in real estate may represent a significant portion of the value of firms operating in non-competitive industries. The fact that options have higher betas than assets in place does not necessary lead to a higher systematic risk in oligopolistic industries compared to firms in competitive industries, for the systematic risk associated with assets in place is substantially higher in competitive markets (Aguerrevere, 2009).

2.3.1 IO Literature

Firms operating in competitive industries technically have no market power and consequently are unable to sustainably earn economic rents since opportunities to generate above-normal profits as demand grows quickly evaporate with additional supply from new entrants. In these industries it is then crucial that incumbent firms avoid the burden of carrying excess capacity, which increases operating leverage and the volatility of operating earnings.

In contrast, concentrated industries present incumbent firms with opportunities to earn above-normal profits and it is in the best interest of these firms to protect these rents from the threat of new entry by erecting entry barriers or adopting strategic behaviors aimed at thwarting off potential new competitors (Tirole, 1997).[17] Capacity and capital investment decisions, along with output strategies, can be used for that purpose. Since such investments are irreversible for the most part in the short run, they represent preemptive commitments to the industry and become consequently credible threats to potential entrants. Wenders, 1971, and Spence, 1977, argue that an excess capacity strategy can be used in oligopolistic markets to prevent new entries and protect oligopolistic pricing. Eaton and Lipsey, 1979, further show that even if demand growth is foreseen, it always pays existing firms to add capacity before that growth materializes. Dixit, 1980 argues that as long as the rule of the post-entry game are understood by all firms, then capacity investments help deter entry. This form of entry deterrence becomes even more potent if output prices react quickly to supply relative to the time it takes investments from new entrants to become productive. However, Spulber, 1981, shows that, if one considers the post-entry game, the success of excess capacity or high-output strategies depends on market power and cost relative to marginal returns at the entry-deterring outputs. Finally, the contributions by Fudenberg and Tirole, 1984, and Bulow et al., 1985, settle the debate in favor of Spence, 1977.

[17] Entry barriers can also stem from regulations or industry structure (i.e., economies of scale or large initial capital requirements). The argument developed in this paper is consistent with entry barriers resulting from the strategic behavior of incumbent firms.

Both the level of excess capacity maintained and the ability to quickly ramp up production allow incumbent firms to protect economic rents in oligopolistic industries. These strategic investment and operating decisions may arise as an equilibrium outcome in those industries, resulting in investors naturally assessing the cashflows of firms adopting such strategies less risky, as discussed in the next section. Highlighting the importance of capacity decisions, Tirole, 1997, notes that although competition (if any) determines market prices in the short run, in the longer run firms compete through the accumulation of productive capacity. Competition and the resulting capacity game therefore may impact, at equilibrium, returns required by equity investors by affecting the riskiness of operating cashflows.

2.3.2 Product Market Competition Literature

Product market competition is found to be a determinant factor of corporate governance since it impacts managerial incentives, hence the agency problems between managers and shareholders (Hart, 1983; Scharfstein, 1988; Karuna, 2007; Giroux and Mueller, 2011). The link between corporate governance and the propensity to undertake real estate investments has been established by Du et al., 2006, and Sing and Sirmans, 2008, but this dimension of product market competition is not explored here. Also, output decisions and product market behavior have been linked to capital structure (Brander and Lewis, 1986, 1988; Chevalier, 1995). By increasing leverage, real estate may therefore affect firm behavior in product markets. This characteristic of real estate may be responsible for some of the endogeneity between real estate ownership and returns at the firm level.

Product market competition has also been identified as one of the drivers of the increase in firm-level volatility documented by Campbell et al., 2001. Irvine and Pontiff, 2008, document a significant positive trend in the idiosyncratic volatility of firm-level earnings, cashflows, and sales, largely due to increased competition. As noted by Gaspar and Massa, 2004, a high degree of market power also lowers information uncertainty for investors and return volatility. Peress, 2010, proposes a theoretical model showing that firms can use their monopoly power to pass on shocks to customers, thereby insulating profits. As far as market risk is concerned, Aguerrevere, 2009, shows that the effect of competition on individual firms' exposure to systematic risk is conditional on demand at the industry level and that systematic risk generally increases with competition even if installed capacity is not sufficient to accommodate current demand.

Hou and Robinson, 2006, present strong empirical evidence of the impact of product market competition on stock returns. They document an inverse correlation between industry concentration and average returns, even after controlling for the size, book-to-market, and momentum risk factors. For the period from 1963 to 2001, firms operating in competitive industries generated adjusted monthly returns that are 0.36% higher, on average, than those earned by firms in concentrated industries.[18] This inverse relation evidences itself in industry portfolios as well. Hou and Robinson further show that the documented return differential, which does not stem from differences in unexpected cashflow shocks between competitive and concentrated industries, remains a persistent feature of stock returns since the great depression. They argue that this return differential is consistent with the view that innovation (distress) risk, which is more pronounced in competitive industries, is a priced source of risk. Barriers to entry in highly concentrated industries may, all else equal, insulate incumbent firms from non-diversifiable, aggregate demand shocks.

In summary, industry structure affects strategic operating decisions, which in turn impact of operating cashflows. This establishes the link between industry structure, capacity decisions, and stock returns that is at the crux of this paper.

[18] Adjusted returns are calculated by subtracting the return on a characteristic-based benchmark from each firm's return.

2.4 Methodology

This study extends Hou and Robinson, 2006, and Tuzel, 2010. It links stock returns to real estate ownership, while taking into consideration industry concentration. I argue that in competitive industries, incumbent firms cannot credibly use an excess capacity strategy to deter entries because the industry structure does not allow for the emergence of economic rents. Excluding the possibility of local market monopolies, investments in unproductive capacity (via real estate or otherwise) therefore ultimately hurt shareholder value, leading ex ante to a positive relation between real estate ownership and stock returns. In concentrated industries, on the other hand, it may be optimal to maintain unutilized productive capacity to deter entries and protect profit margins.

2.4.1 Portfolio Formation

The analysis of the effect of industry structure on the relation between real estate ownership and stock returns is performed by comparing the performance of real estate stock portfolios of firms operating in competitive and concentrated industries. Following Hou and Robinson, the industries are classified into quintiles according to their concentration levels defined as:

$$H_i = \sum_{j=1}^{J} S_{ij}^2$$

H_i, industry i's concentration Herfindahl, depends on the number of firms (J) in the industry and the firms' respective market shares (S_{ij}). Consequently, the Herfindahl index decreases with competition, a large value of the index being indicative of an industry dominated by few large firms (therefore a concentrated industry) and a low index value implying a competitive industry made up of many firms of similar sizes. This calculation is performed annually, possibly resulting in some industries changing concentration groups over time due to increased competition or industry consolidations. As is common in the literature, a firm's market share is primarily measured by the ratio of net sales to aggregate industry net sales. Every year, each industry is assigned the average of the last three years' index values since changes in industry concentrations are likely to be gradual. The industries are then sorted into concentration quintiles, with the industries in the low and high concentration quintiles classified as the competitive and concentrated industry groups, respectively.

Next, the firms in these two concentration groups are separately sorted into decile portfolios according to their real estate (ownership) intensities (REIs), defined as the ratio of real estate assets to PPE assets, with the firms in the bottom and top deciles classified as the low and high real estate portfolios. This classification is also performed annually and the performance of the resulting portfolios is then tracked over the next twelve months before the deck is re-shuffled again and new portfolios are formed following the same double sorting along industry concentration and real estate ownership.

2.4.2 Portfolio Performance Measurement

After sorting firms according to industry concentration and real estate ownership, the study next compares the average excess returns (over the risk-free rate) and industry-adjusted returns (averages of individual firm returns minus average returns of firms in the same industry) on the resulting portfolios. If industry concentration and real estate ownership are not determining pricing factors, there should technically be no significant differences between the portfolios' average returns. As argued, however, average portfolio returns are expected to increase with real estate ownership in competitive industries, resulting in a positive average return on the *High-Low* investment strategy consisting of going long the stocks of high real estate firms and shorting those of low real estate firms. On the other hand, average portfolio returns in concentrated industries are not expected to increase with real estate ownership. Consequently, the average return on the *High-Low* investment strategy should now be non-positive, in contrast to the predicted positive outcome in competitive industries.

However, the finding of significant portfolio return differences should not be automatically construed as evidence that investors price some risk tied to real estate, for real estate ownership may just affect exposure to conventional risk factors. The next step of the analysis therefore considers how much of the portfolios' excess returns are not explained by exposure to conventional risk factors and the extent to which these unexplained returns are related to real estate ownership by estimating the following 3-factor market model for each real estate sorted portfolio.[19]

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i^m \cdot (r_{m,t} - r_{f,t}) + \gamma_i \cdot smb_t + \delta_i \cdot hml_t + \varepsilon_{i,t} \qquad (1)$$

The dependent variable is the portfolio's return in month t ($r_{i,t}$) minus and the risk-free rate ($r_{f,t}$), with the righthand-side pricing factors being the excess market return ($r_{m,t} - r_{f,t}$) and the returns on the FF size portfolio (smb_t) and book-to-market risk portfolios (hml_t). Therefore, α_i measures the portfolio's alphas or average unexplained excess returns ($AUER$) during the study period, with the coefficients β_i, γ_i, and δ_i representing its market beta and its size and book-to-market betas and $\varepsilon_{i,t}$ being the error term.

If model 1 properly accounts for all risk factors priced by the market, the estimated $AUER$ should be statistically undistinguishable from zero. Otherwise, it would be technically impossible to reject the possibility that industry structure and real estate ownership might have affected portfolio returns. It is expected that the portfolios' estimated $AUER$ will be non-decreasing with real estate ownership in competitive industries, resulting in the *High-Low* investment strategy yielding a non-negative $AUER$. Also, the predicted non-positive relation between real estate ownership and stock returns in concentrated industries should manifest itself in the portfolios' $AUER$, leading the *High-Low* investment strategy to produce a non-positive alpha.

[19] These unexplained excess returns are traditionally referred to as abnormal returns or Jensen's alphas in traditional investment performance analysis and often attributed to the fund manager's superior asset allocation or stock selection skills. In this instance, these alphas are believed to stem from pricing factors not included in the model. Therefore, a high alpha implies a lower market value.

As a word of caution, an insignificant $AUER$ does not necessary imply that real estate ownership does not affect stock returns since it is possible that it affects one of the portfolios' risk-factor loadings. This is a downside of focusing solely on alphas. This portfolio approach is not the most adequate method of accessing the effects of real estate ownership and industry structure on stock risk. These questions are tackled in the micro firm-level analysis that follows.

2.5 Study Sample

This section describes the data and the main variables used in this empirical study and also discusses the average characteristics of firms at the industry-group and portfolio levels.

2.5.1 Sample Selection

The initial sample consists of U.S. firms with SICs between 2000 and 5999 listed on NYSE, AMEX, and NASDAQ between January 1970 and December 2010 that are at the intersection of the Center for Research in Security Prices (CRSP) monthly return file and the merged Compustat annual industrial accounting database. Therefore, the study excludes REITs, construction, financial services, mining and oil, agriculture, services, and healthcare.[20] The sample is further restricted to ordinary common shares (CRSP share codes 10 or 11). The CRSP stock return and Compustat accounting data are matched following FF, 1992, to ensure that the accounting data are available prior to the return data they are meant to explain. Hence, each firm's monthly stock returns from July of year t to June of year $t+1$ are linked to its accounting data of year $t-1$, resulting in at least a 6-month lag of returns relative to the corresponding accounting data.

[20] The choice of 1970 as the starting date reduces a potential bias towards large firms since NASDAQ firms were added to CRSP in 1973. Also, Compustat's PPE component accounts were sparsely populated prior to 1970.

Following Hou and Robinson, 2006, firms are assigned to industries at the end of June according to the first three digits of their Compustat SICs.[21] Then, the industries' concentration Herfindahls are computed using net sales as explained previously.[22] Only industries with at least three firms are kept and classified into concentration quintiles based on their average concentration Herfindahls over the last three years.[23] This 3-year smoothing explains why the analysis covers the 37-year period from July 1973 to June 2010. Again, the industry classification occurs at the end of June and the resulting industry quintiles are kept for the next twelve months from July to June.

Next, the firms forming the low and high concentration industry groups (i.e., firms in the competitive and concentrated industries) are separately classified into portfolios according to the firms' real estate ownership intensity (REI). This second classification also takes place at the end of June with the performance of the resulting portfolios tracked over the next twelve months. Compustat breaks down PPE into buildings, machinery and equipment, capitalized leases, land and improvements, construction in progress, natural resources, and others. Following Tuzel, 2010, buildings and capitalized leases, the largest components of PPE and the closest to production capacity, are therefore the primary measure of real estate ownership used in this study.[24] A firm's real estate ownership intensity is therefore the ratio of buildings and capitalized leases to PPE.[25] Again, this double classification of firms along industry groups and real estate intensity is performed annually.

[21]Although the Compustat and CRSP SICs do not perfectly match (Kahle and Walking, 1996), the outcome of the analysis is not affected if CRSP SICs are used instead. The robustness section discusses the results based on 2-digit SICs and the FF industry classifications.

[22]The industry concentrations do not reflect imports from non-US listed firms. But since they include exports by US firms, the net effect is smaller.

[23]However, Table 1 and unreported robustness checks show this smoothing to be inconsequential.

[24]The robustness section discusses results based on other measures of real estate intensity.

[25]Since Compustat only reports PPE accounts net of depreciations prior to 1985, net figures are used to compute *REI*s for those years, with gross figures used after 1985.

2.5.2 Data

The final sample consists of 7,736 industrial firms, representing 171 industries based on the firms' 3-digit Compustat SICs. The data set spans 37 years from 1973 to 2010 and consists of 71,885 firm-years, 1,943 firms per year on average. Table 1 summarizes the distributional characteristics of the industries' concentration Herfindahls based on net-sales (*Hsales*), total assets (*Hassets*), and their 3-year moving averages ($Hsales\_ma$ and $Hassets\_ma$). These distributions are slightly positively skewed with a mean $Hsales$ of 0.36 and a median of 0.33. Despite the exclusion of industries with less than three firms and independent of the measurement method, the industry concentrations vary considerably, ranging from 0.04, which is indicative of a highly competitive industry, to 0.99, which indicates a highly concentrated industry. Table 1 shows that anyone of these four measures should adequately capture the variations in industry concentrations of the sample.

These distributions did not remain constant over time as Table 1 might suggest. Figure 2 depicts the time series of mean and median industry concentrations from 1973 to 2010. Overall, these first moments remained interlocked, closely moving together, but vary considerably over time. For example, average $Hsales$ increased from a low 0.29 in 1976 to 0.42 in 1990. Generally, figure 2 shows an upward trend in industry concentrations, underpinned by two distinct waves. The first wave that started in mid 1970s and crested in the earlier 1990s was the strongest, resulting in average industry concentrations increasing by almost 50%. The last decade witnessed a milder increase in industry concentrations of roughly 20%.[26] In addition to the cross-sectional variations described earlier, these time-series variations should facilitate the identification of the role of industry structure in the interaction between real estate ownership and stock returns.

[26] The first wave coincided with the expansion of hostile takeovers, partly caused by an important surge in debt financing (particularly, junk bonds) that collapsed as the economy went into recession in the early 1990s (Carney, 2009; Lipton, 2006). The latter wave was partly driven by globalization, the rise in commodity prices, low interest rates, shareholder activism, hedge funds, and the tremendous growth in private equity funds (Lipton, 2006). However, this recent surge in industry concentration domestically may also be due to the growth in imports.

2.5.3 Characteristics of Industry Groups

Tables 2 and 3 summarize the characteristics of the competitive and concentrated industry groups based on the firms 3-digit SICs and net sales.This classification produces on average industry concentration quintiles made up of 26 or 27 business sectors.[27] With an average Herfindahl of 0.66, the concentrated industries are roughly 4 times less competitive than the competitive industries, whose average Herfindahl is only 0.14 (first column of Table 2). The difference between these two industry groups is even more pronounced at the firm level. On average, firms in the concentrated industry group have 30 times more market power (defined as the square of the ratio of sales to total industry sales) than those in the competitive industry group, which is also reflected in the disproportionate number of firms in the two groups (fourth column of Table 2). The tests of difference in means reported in last row of the table unequivocally reject the equality of the two groups' average industry concentrations and market power. This difference between the competitive and concentrated industry groups is further highlighted in Figure 3. The gap between the two groups never narrows and both time series display the two waves of industry consolidation discussed earlier, even though their effects on the competitive industry group were understandably milder.[28] Again, given the significant difference in industry structure between these two groups, a comparative analysis of the effects of real estate ownership on stock returns in these groups should normally provide valuable insights on the role of competition, if any.

Table 3 shows that as the number of firms decreases with industry concentration, average firm size (in terms of sales, total assets (TA), or market value of equity (MV), in 2010 U.S. dollars) generally increases. On average, the firms in the concentrated industries have twice more sales and assets than those in the competitive industries. However, their market values are only 1.5 times larger on average. Consequently, book-to-market (BM) generally

[27]The list of competitive and concentrated industries is in the appendix.

[28]An alternative classification of industries using fixed concentration thresholds should therefore not materially affect the analysis.

increases with industry concentration.[29] Tobin Q, the inverse of *BM*, therefore decreases with industry concentration reflecting the fact that firms in competitive industries are more growth-oriented since they have more incentives to undertake value-enhancing innovations (Hou and Robinson, 2006). As noted in the literature review, product market competition also affects capital structure decisions (Brander and Lewis, 1986, 1988; Chevalier, 1995). Both leverage (*LEV*) and long-term debt ratio (*LTDR*) increase with industry concentration.[30] Since firms operating in concentrated industries are larger and have lower cashflow volatility than firms in competitive industries, they are better able to accommodate higher levels of debt financing (Myers, 1984, Myers and Majluf, 1984; Jensen, 1986; Jensen and Meckling, 1976).

Table 3 clearly reveals significant differences in size, market value, and capital structure between firms in the concentrated and competitive industry groups, as evidenced by the tests of difference in means in the last row of the table. These differences should also be reflected in the firms' stock performance. The concentration groups also differ with regard to the ownership of real estate and other productive assets (last four columns of table 3). The real estate variables *REI1* and *REI2* (defined in the footnote) show firms in the concentrated industries to own less real estate than competitive firms, with the reverse being true for *REI3*, which excludes leases.[31] This finding shows, as expected, that firms operating in concentrated industries tend to use leasing less than firms in competitive industries, probably due to a higher proportion of firm-specific real estate assets in their balance sheets, stronger cash flows, or both. Also, these firms are generally more capital-intensive as evidenced by their higher *PPEI*, the ratio of PPE to TA. These small differences in asset intensities are not

[29] *BM* is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to *MV*.

[30] *LEV* is the ratio of book value of total liabilities (TA minus book equity) to total market value of firm (*MV* plus book value of total liabilities). *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt.

[31] Again, *REI1*, *REI2*, and *REI3* are respectively the ratio of buildings and capitalized leases to PPE; the ratio of buildings, capitalized leases, construction in progress, and land to PPE; and the ratio of buildings and land to PPE.

surprising.

2.5.4 Characteristics of Real Estate Stock Portfolios

Table 4 presents the average characteristics of firms in the low and high real estate portfolios in the concentrated and the competitive industry groups. This portfolio classification is based on *REI1*, the ratio of buildings and capitalized leases to PPE. Whether measured by sales, assets, or market value, the average size of high real estate firms in competitive industries is roughly 2 to 3 times larger than that of their low real estate counterparts. The difference in firm size is even more pronounced in concentrated industries, where high real estate firms are on average 8.6 times larger in terms of sales than low real estate firms. As noted in the previous section, the firms in concentrated industries are generally larger, have higher book-to-market, and are more levered, as evidenced in the t-statistics of the cross-industry tests of difference in means in table 4.

A comparison of average firm sizes in concentrated industries in tables 3 and 4 also reveals real estate to be increasing with size in those industries. In contrast, competitive industries fail to show a similar pattern, probably due to greater heterogeneity within that group of firms. In addition, table 4 shows a striking difference in real estate ownership (*REI1*, *REI2*, or *REI3*) and capital asset ownership (*PPEI*) between the portfolios. Even though high real estate firms hold on average 7.7 to 22 times more real estate than their low real estate counterparts in both concentration groups (depending on the measure used), they are only about twice more capital intensive in competitive industries, with no perceptible difference in capital intensity in concentrated industries.

In summary, table 4 highlights two important points. First, the characteristics of firms in the competitive and concentrated industry groups are not the same. The competitive group is largely composed of smaller, growth firms. Also, within each group, the low real estate firms are smaller, more growth-oriented, and less levered than their high real estate counterparts. These noticeable differences in average firm characteristics should normally be reflected in the performance of the portfolios as well.

2.6 Main Findings

This section discusses the return characteristics of the real estate portfolios and the *High-Low* (synthetic long real estate) investment strategy consisting of shorting the stocks of low real estate firms and simultaneously buying those of high real estate firms. The analysis separately covers the competitive and concentrated industry groups to assess the extent to which industry structure may be a determinant factor in the relation between real estate ownership and stock returns.

2.6.1 Average Excess Returns

Levered Returns:

Tables 5 and 6 present levered excess and industry-adjusted returns earned by the real estate-sorted decile stock portfolios and the *High-Low* investment strategy in competitive and concentrated industries during the 444-month period from July 1973 to June 2010.[32] The equally-weighted and value-weighted average levered excess portfolios returns in competitive industries (i.e., *ew_exret* and *vw_exret* in top half of Table 5) are positive and generally strongly significant. More importantly, they increase with the portfolios' real estate intensities, as reflected in the *LL* quadrant of figure 4. For example, the portfolios' valued-weighted levered excess returns range from 4.7% for the low real estate portfolio to 10.6%

[32] The risk-free rate is the 1-month Treasury bill rates from Ibbotson and Associates. Equally-weighted industry-adjusted returns (*ew_adjret*) and value-weighted industry-adjusted returns (*vw_adjret*) refer respectively to the annualized equally-weighted and value-weighted average monthly stock returns minus equally-weighted or value-weighted average monthly returns on the industry portfolio regrouping firms sharing the same 3-digit SIC.

for the high real estate portfolio, resulting in the *High-Low* investment strategy generating a positive and significant value-weighted average levered excess returns of 5.9%.

The return penalty suffered by high-real estate firms in competitive industries also materializes in the portfolios' levered industry-adjusted returns (top half of table 6). Although these return estimates display low statistical significance, they also trend positively with real estate intensity (*LL* quadrant of figure 5), resulting in the *High-Low* investment strategy earning a positive and statistically significant average levered industry-adjusted return of roughly 4.8%. The tests of difference in mean returns between the *Low* and *high* real estate portfolios (last columns of tables 4 and 5) highlight the importance of controlling for industry fixed effects. Unlike with excess returns, the difference in industry-adjusted returns is statistically significant and in the right direction.

Overall, these findings confirm the positive relation between real estate ownership and stock returns or the negative effect of real estate ownership on firm value documented in the literature. Basically, managers of firms operating in competitive industries should seriously consider constraining real estate investments given their fiduciary responsibility to shareholders. But it is often argued that all firms, no matter their competitive environment, should pursue a low real estate strategy because real estate diverts valuable resources from core activities (Linneman, 1998) and may be associated with low productivity (Imrohoroglu and Tuzel, 2010). This paper argues that the documented negative effect of real estate ownership on shareholder value applies primarily to competitive industries because the impact of capacity investment decisions on the riskiness of cashflows depends on the intensity of competition.

The bottom half of table 5 reports levered excess portfolio returns in concentrated industries. Again, average excess portfolio returns are positive and generally statistically significant. However, the direction of the relation between real estate ownership and stock returns, depicted in the *LH* quadrant of figure 4, is now the reversed of that documented in competitive industries. The *Low* real estate portfolio earns an equally-weighted average levered excess return of 17.2%, compared to 8.9% for the *High* real estate portfolio. As a result, the *High-Low* investment strategy now generates a loss of 8.3%. Abstracting from any risk considerations, the right investment strategy in concentrated industries should obviously be to short high real estate stocks and buy low real estate stocks. The positive effect of real estate on firm value in these industries also evidences itself in the portfolios' levered industry-adjusted returns (bottom half of table 6 and *LH* quadrant of figure 5). Again, the results of the tests of difference in mean returns between the *High* and *Low* real estate portfolios highlight the importance of controlling for industry fixed effects (*DMT* column of tables 4 and 6). The next section examines the extent to which leverage might have contributed to these findings.

Unlevered Returns:

To no surprise, the descriptive tables 3 and 4 reveal a positive relation between real estate ownership and leverage, which may be partly explained by the high collateral value of real estate, the positive correlation between firm size and real estate ownership, or both. To ensure that the above findings are not driven by leverage, this section examines whether they persist in unlevered returns as well.

Tables 7 and 8 present unlevered excess and industry-adjusted returns earned by the real estate portfolios and the *High-Low* investment strategy in competitive and concentrated industries during the 444-month.[33] As expected, these returns are generally lower than the corresponding levered excess returns in table 5 and industry-adjusted returns in Table 6, reflecting the positive effect of leverage on equity returns. In competitive industries for example, the *Low* and *High* real estate portfolios post value-weighted unlevered excess returns of 2.6% and 6.7%, resulting in the *High-Low* strategy yielding 4.1% (top half of table

[33]Unlevered returns are calculated assuming no taxes and a cost of the debt of 7% across the board.

7), compared to value-weighted levered returns of 4.7%, 10.6%, and 5.9%, respectively (top half of table 5). The corresponding unlevered figures in concentrated industries are 8.2%, 3%, and -5.2% in bottom half of table 7, compared to levered figures of respectively 11.3%, 4.8%, and -6.5% in the bottom half of table 5.

Generally, unlevered returns confirm the conclusions derived from the analysis of levered returns. In competitive industries, both unlevered excess and industry-adjusted portfolio returns increase with real estate ownership (top half of tables 7 and 8). This positive correlation is displayed in the *UL* quadrant of figures 4 and 5. The unlevered portfolio returns and the resulting returns on the *High-Low* investment strategy confirm that real estate does not negatively affect firm value in concentrated industries (bottom half of tables 7 and 8 and *UH* quadrant of figures 4 and 5). Again, the tests of difference in mean returns between the *High* and *Low* real estate portfolios in the *DMT* columns of tables 7 and 8 highlight the importance of industry characteristics.

Controlling for leverage greatly enhances the positive effect of real estate ownership on firm value in concentrated industries since identification is improved at the firm level, as noticed by comparing the *High-Low* columns of tables 7 and 5 to those of tables 8 and 6. By adjusting for industry fixed effects and firm-level endogeneity, table 8 gives in fact the most accurate representation of the importance of industry concentration in the relation between real estate ownership and stock returns. On the continuum of industry concentrations, the impact of real estate on stock returns (firm value) appears to vary from positive (negative) in competitive industries to negative (positive) in concentrated industries, with possibly a region within which real estate has little to no effect on firm value. This is the first study to document this reversing effect of real estate ownership on firm value as competition increases.

So far, the analysis has largely abstracted from risk considerations. Although the *High-Low* investment strategy, if properly implemented, appears to represent an opportunity to earn "abnormal returns", its risk implications have not been explored. It is possible that the trends in the portfolios' return performance is driven by changes in the riskiness of the portfolios as their real estate contents change.

2.6.2 Average Unexplained Excess Returns

This section examines whether the trends in returns documented previously remain after controlling for the portfolios' exposure to conventional risk factors and explores the relation between average unexplained excess returns ($AUER$ or alphas) and the portfolios' real estate contents in competitive and concentrated industries. Since the finding of significant alphas is necessarily conditional on the pricing model used, this analysis adopts a 3-factor model to minimize the risk of omitted variable bias. This section does not dwell on the effects of real estate on the portfolios' risk loadings or seek evidence in favor of the existence of some real estate risk, even though the finding of significant abnormal returns might just be construed as such.

Tables 9 and 10 report the estimated alphas from equally-weighted and value-weighted levered excess returns (respectively, *ew_exret* and *vw_exret*) in competitive industries. Equally-weighted levered excess returns produce positive and generally significant (both statistically and economically) alphas ranging from -0.6% for the *Low* real estate portfolio to 4.3% for the *High* real estate portfolio (Table 9). More importantly, these alphas increase with the portfolios' real estate contents, as depicted in the *LL* quadrant of figure 6, causing the *High-Low* investment strategy to produce a significant alpha of 4.9%. The finding is the same with regressions based on value-weighted levered excess portfolio returns in table 10. The *High-Low* investment strategy again produces a significant alpha of 6.6%. Furthermore, the estimated alphas from equally-weighted and value-weighted unlevered excess returns (respectively, *ew_exuret* and *vw_exuret*) in tables 11 and 12, displayed in the *UL* quadrant of figure 6, confirm that these results are not driven by the positive correlation between leverage and real estate highlighted earlier. In conclusion, the positive impact of real estate ownership on stock returns in competitive industries present in portfolio returns is obviously not driven by exposure to these conventional risk factors.

As far as the impact of real estate on systematic risks in competitive industries is concerned, a visual inspection of the coefficient estimates in tables 9 to 12 appears to show that real estate ownership reduces market beta and exposure to the size risk factor. This observation aligns with the findings of Deng and Gyourko, 2000, and Brounen and Eichholtz, 2005. In contrast, the portfolios' sensitivity to the book-to-market risk factor appears to increase with real estate, probably due to the positive correlation between real estate and size.

The non-positive relation between real estate and average portfolio returns in concentrated industries also evidences itself in the alphas from equally-weighted and value-weighted levered excess returns presented in tables 13 and 14 and displayed in the *LH* quadrant of figure 6. For example, the equally-weighted levered excess returns produce alphas ranging from 8.8% for the *Low* real estate portfolio to -1% for the *High* real estate portfolio, causing the *High-Low* investment strategy to post now a significant negative alpha of 9.8% (Table 13). Also, the portfolio alphas estimated from equally-weighted and value-weighted unlevered returns in tables 15 and 16 confirm the non-positive effect of real estate ownership on stock returns in concentrated industries (*UH* quadrant of figure 6). This result confirms that, unlike in competitive industries, high real estate firms are not necessarily penalized in concentrated industries.

Interestingly, the effects of real estate on the portfolios' risk loadings in competitive and concentrated industries are quite similar. In tables 13 to 16 real estate appears again to negatively affect market beta and sensitivity to the size risk factor and to increase exposure to the book-to-market risk factor.[34] However, a comparison of estimated regression coefficients

[34]This observation, along with the reversing effect of real estate on alphas, might suggest the existence of an additional risk dimension, perhaps of real nature or highly correlated to real estate, being priced by the market.

(e.g., tables 9 vs. 13) shows that firms operating in competitive industries generate on average higher alphas, as documented by Hou and Robinson, 2006, and have higher systematic risk, as predicted by Aguerrevere, 2009.

In summary, this analysis shows that real estate ownership positively affects stock returns in competitive industries and generally has the opposite effect in concentrated industries. Since these effects appear to be stronger in competitive industries and most industries are relatively competitive, it is conceivable that the positive effect of real estate in competitive industries dominates in studies that do not control for industry concentration.

2.7 Robustness Checks

The previous findings technically apply to non-real estate firms classified into industry quintiles using their 3-digit SICs and concentration Herfindahls based on net sales. Furthermore, the firms in the competitive and concentrated industry groups are then sorted into real estate decile portfolios according their *REI1*, the ratio of buildings and capitalized leases to PPE. These findings remain robust to alternative measures of real estate and industry specifications.

Table 17 reports unlevered excess and industry-adjusted returns generated by the *High-Low* investment strategy in competitive and concentrated industries based alternative real estate measures. The *Base Case* column combines excess returns in the *High-Low* columns of tables 7 and 8, where firms are classified into portfolios according to *REI1*. First, using *REI2*, a broader measure of real estate that adds construction in progress and land to *REI1*, does not significantly alter the results (column 2). However, the adoption of *PPEI*, the ratio of PPE to TA, practically eliminates the significance of the results in competitive as well as concentrated industries (column 3). Basically, the broader real estate is measured, the more serious the identification problem becomes. This may explain why Deng and Gyourko, 2000, who use the same measure, find weak results. In contrast, the results are slightly stronger (particularly in competitive industries) when real estate ownership is measured as deviations from industry averages using *AREI*, which is equal to firm *REI1* minus average industry *REI1* (in column 4 of same table).

So far, the impact of industry structure on the interaction between real estate ownership and stock returns has been tested by examining average returns on real estate decile portfolios in competitive and concentrated industries. But if the argument advanced in this study is correct, quintile real estate portfolios should also provide supporting, albeit weaker, evidence. The results of such analysis presented in column 2 of table 18 confirm this prediction. The average returns on the *High-Low* investment strategy using quintile real estate portfolios are lower in absolute terms compared to the decile portfolio returns. For example, the strategy's value-weighted unlevered excess returns (*vw_exuret*) using quintile portfolios in competitive industries is 2.5% in column 2, compared to 4.1% when decile portfolios are used in column 1. In concentrated industries, the strategy's value-weighted unlevered excess returns using quintile portfolios is -3.2%, compared to -5.2% using decile portfolios. As expected, these quintile portfolio returns generally show slightly lower statistical significance. The finding is the same with unlevered industry-adjusted returns and levered returns (table not included).[35]

The documented findings are also robust to alternative industry definitions. Columns 3 and 4 of table 18 show average returns on the *High-Low* investment strategy when firms are classified into industries according to their 2-digit SICs and the 48 FF industry groups, a widely used industry classification method in the finance literature.[36] These returns generally

[35] A closer look at average returns on the *Low* and *High* decile and quintile portfolios (figures not presented in Table 18) further corroborates the thesis defended in this paper. In competitive industries, average returns on the *Low* quintile portfolio are higher than on the *Low* decile portfolio, whereas average returns on the *High* quintile portfolio are lower than on *High* decile portfolio. This interesting finding confirms the positive relation between real estate intensity and stock returns in competitive industries. In contrast, average returns on the *Low* quintile portfolio in concentrated industries are lower than on the *Low* decile portfolio, whereas the corresponding average returns on the *High* quintile and decile portfolios are generally similar, hence confirming the documented non-positive relation between real estate and stock returns in concentrated industries. This evidence further confirms the importance of product market competition.

[36] The use of two-digit SICs results in 36 industry groups. The list of the 48 FF industry groups is published

confirm the previous findings. However, the FF classification method works much better than the 2-digit SIC industry grouping. In fact, it performs as well as the 3-digit SIC industry classification used in the *Base Case*, even though it results in a much smaller number of industry groups (48 vs. 171). Obviously, the FF industry grouping results in more homogeneous industry classes, which certainly facilitates identification in this instance.

Finally, column 5 of table 18 lists average returns on the *High-Low* investment strategy when TA, rather than net sales, is used to compute industry concentrations for the first-level sorting of industries into concentration groups. As expected, these results are in line with the previous findings since table 1 and figure 2 show that these two industry concentration measures can substitute for one another.

The analysis covers 37 years from 1973 to 2010. But the period post 2005 has been relatively tumultuous as a result of the deep economic recession brought about by the housing meltdown and the ensuing mortgage and financial crises. Although it is not clear how such a tail event might have affected the previous results, it is important to ensure that the findings are robust to the exclusion of that period. Table 19 lists the alphas generated by the synthetic long real estate portfolio in competitive and concentrated industries from 1973 to 2005. Irrespective of the measure of excess portfolio returns used, the estimation of model 1 using that return series also generates, as argued in this paper, a significant positive alpha in competitive industries and a significant negative alpha in concentrated industries during that 33-year period, which almost coincides with the sample period covered by Tuzel, 2010. These results are even slightly stronger than the previous ones, showing that the inclusion of the recent economic crisis in the study might have biased the results downward.

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at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

2.8 The Role of REITs

The prescription that non-real estate firms should minimize real estate ownership is often rationalized by pointing to the tremendous growth of equity REITs over the last two decades. The number of equity REITs increased almost twofold from 107 in 1985 to 210 in 1997, with market capitalization growing almost 16.5 times to $132.3 billion (Chan et al., 2003).[37] REITs are certainly better equipped to extract more value from real estate assets than most corporations, at least for some types of real estate, and can now efficiently raise large amount of debt and equity financing in capital markets, which might have eliminated the funding advantage previously enjoyed by corporations in financing real estate acquisitions (Linneman, 1998). Furthermore, the reduction in product and corporate life cycles due to changing customer preferences, technological progress, globalization, and mergers may have reduced the attractiveness of real estate ownership, as far as shareholder value is concerned, for most corporations. Consequently, leasing has certainly become a viable alternative to owning real estate for some corporations.

This section cursorily examines the extent to which the documented real estate portfolio alphas have been affected by the growth in REIT assets, the expectation being that investors would impose a penalty (a high alpha) on firms that own a lot of real estate during the modern REIT era. For this purpose, the following model is applied to monthly excess returns from the synthetic long (*High-Low*) real estate investment strategy in competitive and concentrated industries.

$$r_{i,t} - r_{f,t} = \alpha_i + reit\_dummy_t + \beta_i^m \cdot (r_{m,t} - r_{f,t}) + \gamma_i \cdot smb_t + \delta_i \cdot hml_t + \varepsilon_{i,t} \qquad (2)$$

[37]The growth in REITs following the collapse of property prices in the early 1990s was due to several factors. The Omnibus Budget Reconciliation Act of 1993 opened REIT investing to pension funds, hence increasing market liquidity. The Internal Revenue Services allowed the treatment of umbrella partnership REIT (UPREIT) transactions as tax-deferred exchanges under rule 731. Finally, the REIT Simplification Act of 1997 and the REIT Modernization Act of 1999 streamlined regulations governing REIT operations.

This model is an extension of model 1 with the addition of a REIT dummy variable (*reit_dummy*) set equal to 1 for the pre-1990 period and 0 for the later period that has witnessed a renaissance of equity REITs.

The results of this analysis are tallied in Table 21. The synthetic long real estate strategy results in abnormal returns during both periods. Although these returns appear to be sightly lower in the first period, as evidenced by the negative (positive) sign of *reit_dummy* coefficients in competitive (concentrated) industries, the difference is not statistically significant. Even though the emergence of stronger REITs has only marginally altered investors' attitude toward real estate, REITs might have lowered exposure to systematic risk, which is not captured here. The growth of equity REITs has certainly made it easier for firms to meet their generic real estate needs. However, REITs are probably limited in their ability to provide strategic real estate, which is the bulk of corporate real estate needs. Maybe, the future will witness the emergence of new classes of REITs specialized in providing industry-specific real estate assets. This is where REITs can make a greater contribution by allowing firms to better adapt productive assets to changing product life cycles, technological progress, and increased competition due to globalization.

3 An Illustrative Model

This theory section provides a framework for analyzing the interaction of real estate ownership, industry structure, and risk. As noted, the type of real estate (strategic vs. generic real estate) and industry structure are determinant factors in corporate real estate decisions. In the following partial-equilibrium model, strategic or firm-specific real estate (denoted K_s) provides a cost advantage, but it is inflexible and takes time to build. In contrast, general-purpose or generic real estate (denoted K_g) has the advantage of being flexible, since it is rented, but involves higher production costs. Both types of capital are assumed to have the same productive efficiency and are therefore completely substitutable in the production function.

Following Dixit, 1980, and Bulow et al., 1985, firms make real estate investment and production decisions in a simple two-period setting. Period 1 starts at time t_0 and ends at time t_1, with period 2 beginning at t_1 and ending at t_2. Production only takes place in the second period. At the beginning of the first period, firms decide on how much strategic real estate (capacity) to procure and use the first period to prepare that real estate for next period's production. K_s refers to strategic real estate or capacity interchangeably. Investing in K_s involves a one-time fixed cost F that is due at t_1. Rather than investing in initial productive capacity, firms also have the option to wait until the beginning of the second period and rent the real estate they need for that period's production. Rental contracts last for one period, with rent payments due at the end of the period, and require no upfront investment. It is assumed that rental real estate is competitively provided by real estate companies, such as REITs, that earn zero profit. As a result, any surplus (or monopoly profit) from renting is captured by the users (i.e., producers).

The accumulation of K_s at t_0 does not prevent a firm from renting additional space (K_g) at t_1 if it revises its production plan upward. These two types of real estate can substitute for one another and, for simplicity purpose, are the only factor inputs used to produce a homogenous good using a linear production function.

$$F(K_s, K_g) = K_s + K_g$$

The firms' total cost functions are also linear in the factor inputs as follows:

$$\begin{aligned} C(K_s, K_g) &= C(K_s) \cdot K_s + C(K_g) \cdot K_g, \;\; \textit{with} \\ C(K_s) &= s + K_s^{1/\alpha} \\ C(K_g) &= g + K_g^{1/\beta}, \end{aligned}$$

where s and g represent the initial per-unit costs of using K_s and K_g, respectively, with $s < g$. Also, $0 < \beta \leq \alpha$ to capture the advantage of owning over renting with respect to exposure to rent increases.

Industry demand is uncertain at t_0 when firms have to make capacity investment decisions. The inverse demand function ($\tilde{P}$) for the homogenous good is:

$$\begin{aligned} &\tilde{P} = P + \tilde{\varepsilon} \;\; \textit{where} \\ &P = A - B \cdot Q, \;\; \textit{with} \;\; A > 0 \;\; \textit{and} \;\; B > 0. \end{aligned}$$

Q is the quantity of good demanded. At equilibrium, it is equal to $F(K_s, K_g)$, the quantity produced. A and B are respectively the intercept and the slope of the demand curve. The distribution of the demand shocks $\tilde{\varepsilon}$ is assumed to have a mean of 0 and a variance of σ_p^2. These shocks represent the only source of uncertainty in this economy. The realized value of the demand shock ($\bar{\varepsilon}$) is only revealed at time t_1, prior to firms choosing K_g and starting production. This economy (industry) can be seen as part of a bigger economy where aggregates such as interest rates (not a focus here) are set. The analysis focuses on the firms' decision making, household preferences being already reflected in the industry demand function.

In this setting, real estate ownership may be optimal for a firm if it considers that real estate (location) to be important for its operations or intends to undertake long-term investments on that real estate to strengthen its market position. The resulting lower production costs compared to renting, however, come at a cost. The decision must be made under uncertainty and ownership entails a fixed cost.

3.1 Firm's Problem

The firm's problem is solved backward. At time t_1, K_s and the demand shock are known prior to firms having to make production decisions for period 2. The firm's decision is therefore under certainty and consists of choosing K_g by maximizing profit as follows:

$$\max_{K_g} = [\bar{P}\,(K_s + K_g) - C_s\,K_s - C_g\,K_g] - r\,F\,\mathbb{1}_{(Ks>0)}$$

where $\bar{P} = P + \bar{\varepsilon}$ and r is the one-period discount rate. $\mathbb{1}_{(Ks>0)}$ is an indication function that takes the value 1 when $K_s > 0$. The first-order condition (FOC) of this optimization,

$$\frac{\partial \bar{P}}{\partial K_g}\,(K_s + K_g) + \bar{P} - C_g - \frac{\partial C_g}{\partial K_g}\,K_g = 0\,, \qquad (3)$$

implicitly determines K_g^*, the optimal K_g that the firm should choose at time t_1 given K_s and $\bar{\varepsilon}$.

Moving back to time t_0, the firm has to now decide whether or not to invest in K_s, not knowing what demand shock will materialize in the future. Therefore, it will choose K_s by optimizing expected profit as follows.

$$\max_{K_s} = E_0[\tilde{P}\,(K_s + K_g) - C_s\,K_s - C_g\,K_g] - r\,F\,\mathbb{1}_{(Ks>0)}$$

Equation 4 is the FOC of this optimization that implicitly defines K_s^*, the optimal K_s at time 0.

$$E_0(\tilde{P}) + \frac{\partial E_0(\tilde{P})}{\partial K_s}\,[K_s + E_0(K_g)] + \frac{\partial E_0(K_g)}{\partial K_s}\,[E_0(\tilde{P}) - E_0(C_g)] + \frac{\partial \sigma_{K_g}}{\partial K_s}\,[\sigma_p - \sigma_{C_g}] \\ - C_s - \frac{\partial C_s}{\partial K_s}\,K_s - \frac{\partial E_0(C_g)}{\partial K_s}\,E_0(K_g) - \frac{\partial \sigma_{C_g}}{\partial K_s}\,\sigma_{K_g} = 0 \tag{4}$$

It is important to note that while K_g^*, given by equation 3, is state-contingent. Since this capacity is derived under uncertainty, it is unlike that it would be optimal at t_0 when the demand shock is known. Firms are stuck with K_s^* no matter the realized demand shock at t_1. As a result, equation 4 rightly shows that firms consider the uncertainty of demand when choosing K_s.

Equations 3 and 4 characterize therefore a firm's production/investment decisions independent of the industry structure. Assuming that there is just one firm in the industry (monopoly case), equation 3 reduces to equation 5.

$$\frac{1+\beta}{\beta}\,K_g^{1/\beta} + 2B\,K_g - A + 2B\,K_s + g - \bar{\varepsilon} = 0 \tag{5}$$

The resulting optimal K_s take the following form.

$$K_g^* = K_g^*(K_s, \bar{\varepsilon}; A, B, g, \beta)$$

Even though, equation 5 does not have a closed-form solution if β is different from 1, total differentiation yields the following comparative statistics that are intuitively consistent with expectations.

$$\frac{\partial K_g^*}{\partial K_s} < 0 \; ; \quad \frac{\partial K_g^*}{\partial A} > 0 \; ; \quad \frac{\partial K_g^*}{\partial B} < 0 \; ; \quad \frac{\partial K_g^*}{\partial \bar{\varepsilon}} > 0 \; ; \quad \frac{\partial K_g^*}{\partial g} < 0 \; ; \quad \frac{\partial K_g^*}{\partial \beta} > 0$$

Under the monopoly assumption, the following equation 6 gives the FOC with respect to K_s of the optimization that is depicted in equation 4.

$$\frac{1+\alpha}{\alpha} K_s^{1/\alpha} + 2B\, K_s - A + 2B\, E_0(K_g) + s - [A - B\, K_s - g - B\, E_0(K_g)] \frac{\partial E_0(K_g)}{\partial K_s}$$
$$+ E_0(K_g^{1/\beta}) \frac{\partial E_0(K_g)}{\partial K_s} + E_0(K_g) \frac{\partial E_0(K_g^{1/\beta})}{\partial K_s} + (\sigma_{C_g} - \sigma_p) \frac{\partial \sigma_{K_g}}{\partial K_s} + \sigma_{K_g} \frac{\partial \sigma_{C_g}}{\partial K_s} = 0 \qquad (6)$$

This equation thus implicitly defines K_s^* as a function of the following exogenous variables.

$$K_s^* = K_s^*(E_0(K_g^*); A, B, s, \alpha, \sigma_p^2)$$

However, the derivation of the comparative statics of K_s^* is complicated by the nonlinear components of the equation. Assuming $\beta = 1$, the following properties of K_s^* can easily by shown by totally differentiating equation 6 (this assumption is not a necessary condition).

$$\frac{\partial K_s^*}{\partial E_0(K_g^*)} < 0 \; ; \quad \frac{\partial K_s^*}{\partial \alpha} > 0 \; ; \quad \frac{\partial K_s^*}{\partial s} < 0$$

The sign of $\partial K_s^*/\partial A$ is indeterminate because A has a positive direct on K_s^* and a negative indirect effect through K_g^*. Similarly, $\partial K_s^*/\partial B$ is indeterminate since B also has a negative direct effect on K_s^* and a positive indirect effect through K_g^*.

Predictions:

1. Irrespective of industry structure, frequent temporary demand shocks will cause firms to use more K_g than K_s, ceteris paribus.

2. As an industry experiences frequent and lasting demand shocks, firms will progressively

increase investments in K_s relative to K_g, ceteris paribus.

In summary, K_g and K_s offer different economic benefits. Since it is easy to adjust, K_g has an advantage over K_s in a risk environment. This advantage prevails both in a perfectly competitive market and in a monopoly market. In contrast, K_s dominates in oligopolistic industries where it can successfully be used by incumbent firms to deter new entries.

3.2 Entry Deterrence Condition on K_s

Obviously, the more competitive the industry is, the less willing a firm will be to invest in K_s and hence commit to future production prior to the realization of the demand shock. A possible stable (but trivial) equilibrium in competitive industries is one where firms rely only on K_g to meet demand after observing the demand shock $\bar{\varepsilon}$. But in concentrated industries, it may pay to pre-commit to production by investing in K_s. This section examines this problem in a duopoly setting. At t_0, Firm 1 (the incumbent firm) has to choose K_s and thus pre-commit to producing next period, with fully knowledge that a second firm (Firm 2) may enter the market at t_1 after the demand shock is realized and known to everyone. If Firm 2 enters, the two firms will play a Cournot game. If Firm 2 does not enter, Firm 1 will be the sole producer. Of course, Firm 1 knows that entry by Firm 2 will depend on its chosen K_s and the level of the demand shock at t_1. If the shock is small and K_s is high, Firm 2 will most likely not enter. On the other hand, if the shock is large and K_s is low, entry will certainly occur. In this setting, what is Firm 1's optimal capacity strategy?

3.2.1 Firm 2's Entry Decision

Firm 2's entry decision at t_1 is straightforward. After observing the realized shock and the incumbent's capacity choice, it will only enter if it can make a profit. It will choose K_g by maximizing profit in a Cournot duopoly game.

$$\max_{K_g} = \bar{P}(K_{s1}, K_{g1}, K_{g1})\, K_{g2} - C_g\, K_{g2}$$

Equation 7 gives the FOC of this optimization problem.

$$A - B\,(K_{s1} + K_{g1}) + \bar{\varepsilon} - 2B\, K_{g2} - \frac{1+\beta}{\beta}\, K_{g2}^{1/\beta} - g = 0 \tag{7}$$

Assuming that $\beta = 1$, the optimal amount of real estate Firm 2 should rent is:

$$K_{g2}^{*} = (3B + 2)^{-1}\,(A + \bar{\varepsilon} - g - B\, K_{s1}) \tag{8}$$

Firm will only entry if $K_{g2}^{*} > 0$, i.e., the realized demand shock $\bar{\varepsilon}$ is large. A permanent increase in demand (a high A) will largely be absorbed by Firm 1 through K_{s1}. Firm 2 will most likely jump in and out depending on the intensity of the demand shocks.

3.2.2 Incumbent's Problem

Firm 1 cannot prevent entry at t_1 with probability one. For any chosen capacity K_{s1}, there will be states of the world ($\bar{\varepsilon}s$ where that capacity will not be sufficient to deter entry. During those states, Firm 1 has no other option than to accommodate entry. However, it can limit the damage from the new entry by sharing the incremental demand with the entrant in a Cournot game and setting K_{s1} in a Stackelberg game.

Choice of Kg:

The problem faced by Firm 1 when selecting K_{g1} is similar to that faced by Firm 2. The profit maximization gives the following FOC that is symmetrical to equation 7.

$$A - B\,(K_{s1} + K_{g2}) + \bar{\varepsilon} - 2B\,K_{g1} - \frac{1+\beta}{\beta}\,K_{g1}^{1/\beta} - g = 0 \tag{9}$$

The solution of this equation shows that $K_{g1}^{*} = K_{g2}^{*}$, $\forall\ \beta$. It is easily shown that these K_{g}^{*} satisfy the comparative statics described earlier.

Choice of Ks:

Firm 1 chooses K_s at t_0 when next period's demand is uncertain by maximizing expected profit. However, next period's profit depends on the chosen K_s relative to the capacity that would have deterred entry given the realized shock. This entry deterring capacity, that is referred to as K_s^E, is derived by setting Firm 2's duopoly profit equal to zero.

$$[A - B\,(K_s^E + K_{g1} + K_{g2}) + \bar{\varepsilon}]\,K_{g2} - (g - K_{g2}^{1/\beta})\,K_{g2} = 0$$

The resulting entry-deterring capacity when $\beta = 1$ is:

$$K_s^E = B^{-1}\,(A + \bar{\varepsilon} - g) \tag{10}$$

This is the capacity threshold above which entry is deterred at t_1. It is state-dependent. Put differently, for any K_s chosen by Firm 1 at time 0, there is a $\bar{\varepsilon}$ above which entry will not be deterred. Therefore, Firm 1's expected profit at t_0, whose maximand defines K_s^*, consists of two parts as follows:

$$E_0[\Pi_1] = E_0[\Pi_1\,|_{K_s \leq K_s^E}] \cdot Pr(K_s \leq K_s^E) + E_0[\Pi_1\,|_{K_s \geq K_s^E}] \cdot Pr(K_s \geq K_s^E) \tag{11}$$

The first term is the expected profit of Firm 1 conditional of $K_s \leq K_s^E$ (i.e., Firm 1's duopoly profit) times the probability of $K_s \leq K_s^E$. The second term is Firm 1's conditional monopoly profit times the probability of $K_s \geq K_s^E$. These conditional profits for $\beta = 1$ are given in the appendix (equations 21 and 22 for duopoly and monopoly case, respectively). Therefore, Firm 1's optimal capacity choice at time 0 (K_s^*),, depends on the distribution of the shocks since it is not state-contingent as K_{g1}^*.

To simplify the problem, it is now assumed that $\tilde{\varepsilon}$ takes only 2 values: a high value (ε^H) with probability ν and a low value (ε^L) with probability $1-\nu$, such that $E(\tilde{\varepsilon}) = 0$. These two shocks will result in two distinct entry-deterring capacity thresholds $K_s^E(\varepsilon^L)$ for ε^L and $K_s^E(\varepsilon^H)$ for ε^H, such that $K_s^E(\varepsilon^H) > K_s^E(\varepsilon^L)$. Their values when β is equal to *1* are given by equation 10. This setting leads to three possible regions for K_s^*. If $K_s^* \leq K_s^E(\varepsilon^L)$, then entry cannot be deterred. This strategy would, however, be suboptimal because of the lost profits. On the other hand, entry will always be deterred if Firm 1 chooses a $K_s^* \geq K_s^E(\varepsilon^H)$. But this strategy would be too costly and hence suboptimal. The interesting region is between $K_s^E(\varepsilon^L)$ and $K_s^E(\varepsilon^H)$, where Firm 1 will deter entry with probability $1-\nu$ and will accommodate entry with probability ν. In choosing K_s, Firm 1's problem then becomes in this two-state world.

$$\max_{K_s} E_0[\Pi_1] = E_0[\Pi_1 \mid_{\bar{\varepsilon}=\varepsilon^L}] \cdot Pr(\bar{\varepsilon} = \varepsilon^L) + E_0[\Pi_1 \mid_{\bar{\varepsilon}=\varepsilon^H}] \cdot Pr(\bar{\varepsilon} = \varepsilon^H)$$

After substituting equations 21 and 22 into the above profit function, taking the FOC, and setting α and β to 1, the resulting optimal K_s for Firm 1 is:

$$K_s^* = \frac{\eta_1\eta_2\delta - \mu[\eta_2^2 B - \nu B(B^2 - 2B - 2)] - \varepsilon^L(1-\nu)B^3 - 2\eta_1\varepsilon^H\nu B}{4\eta_1\eta_2^2 + 2\nu(2B^2 - 1)B^2} \tag{12}$$

$$where\ \delta = A - s;\ \mu = A - g;\ \eta_1 = B + 1;\ \eta_2 = 3B + 2$$

Since $B > 0$, it can easily be shown that K_s^* is decreasing in s (the initial per-unit cost of K_s) and increasing in g (the initial per-unit of K_g). A necessary condition for entry deterrence is $K_s^* \geq K_s^E(\varepsilon^L)$.

Again, this section is mainly for illustration purpose. It presents a framework for analyzing corporate real estate decisions in terms of strategic vs. generic real estate assets.

Predictions:

3. The more concentrated an industry is, the higher the amount of K_s (relative to K_g) used by incumbent firms as compared to newer entrants.

4. The more concentrated an industry is, the lower the volatility of the incumbent firms' productions relative to the newer entrants' production volatility.

4 Real Estate and Risk: A Firm-Level Analysis

4.1 Preamble

The previous analysis using a stock portfolio approach shows that over the last four decades investors reacted negatively to the accumulation of real estate by firms operating in competitive industries. This negative impact of real estate ownership on shareholder value may be due to the fact that real estate ownership offers those firms little benefit, while increasing their operating leverage and reducing their operating flexibility during negative demand shocks. As argued in this study, however, that analysis also shows that real estate investments may be value enhancing in concentrated industries since incumbent firms can strategically use capacity investments, which often require substantial real estate investments, to deter new entry and therefore protect existing economic rents. Understandably, the negative (positive) effect of real estate ownership on shareholder value (stock returns) tends to dominate in studies that do not control for industry structure since most firms operate in competitive industries. Furthermore, the portfolio analysis shows that the documented real estate and return relationships persist in the portfolios' alphas, i.e., average excess returns not explained by the conventional three-factor market model.

The risk-return duality and market efficiency normally preclude the existence of persistent abnormal returns. Viewed in that angle, real estate ownership must therefore affect stock risk. However, there is still a great deal of uncertainty about the channel(s) through which it alters risk and the potential role of industry structure. Although it may be relatively straightforward to conjecture about the direction of the relationship, it is an empirical question as to how that interaction materializes. Does real estate affect stock returns by altering exposure to conventional risk factors or does it instead introduce a new real estate risk dimension, for example? How does industry structure alter exposure to specific risk factors, if any? None of these questions have been adequately addressed in the literature.[38] The following analysis attempts to fill this gap. First, it will draw valuable insights from the previous portfolio analysis. However, this question is better addressed at the micro firm level, which allows for a more accurate control for firm characteristics than is possible in the portfolio approach.

4.2 Estimation Issues

Technically, the observed significant alphas suggest that real estate ownership may alter exposure to conventional risk factors and/or introduce new risk parameters. The fundamental asset pricing equation depicts an ex ante relationship between asset prices and expected returns conditional on the information set available to investors. Its empirical test is inevitably conditional on the pricing model and the data used in the estimation and, to some extent, on the selected conditioning variables. This study follows the literature in terms of model selection, even running the risk of sacrificing efficiency for consistency by adopting a 3-factor market model rather than the more parsimonious CAPM. As far as whether it is appropriate to use real estate ownership as a conditioning variable in the previous portfolio analysis, there is no reason to believe that investors would disregard such information when assessing stock risk, while generally reacting to corporate real estate investment and divestment decisions as overwhelmingly evidenced by event studies.

Assuming that the pricing model is correctly specified and that there are no major data

[38]Deng and Gyourko (2000) examine the impact of real estate on stock performance in a wide range of industries. Except for high-beta firms, their findings are inconclusive and they do not consider the effect of real estate on systematic risk. Seiler et al. (2001) find no evidence that real estate affects systematic risk. However, their study only covers the 1985-1994 period using a sample of 80 firms across 4 industries. For a large international sample of industrial firms, Brounen and Eichholtz (2005) find a significant negative relation between real estate and beta and no effect on abnormal returns. Brounen et al. (2005), Yu and Liow (2006), and Ling et al. (2010) examine some of the questions addressed in this paper for retail firms but find no common ground. For instance, Brounen et al. find real estate to be positively associated with abnormal returns and negatively related to systematic risk, whereas Ling et al find real estate to have no effect on market beta but to be positively related to a real estate beta. Tuzel (2010) documents a positive relation between real estate and stock returns for non-real estate firms but is silent about the risk.

issues, the estimation should normally produce insignificant alphas. Even though the previously documented relationships could be data driven, comfort is derived from the long time period covered by the study and the relatively low risk of selection bias given the size and comprehensiveness of the sample. Assuming no data problems, a significant association between real estate ownership and estimated alphas does not necessarily imply that the market prices some form of real estate risk either, for it is possible that real estate is correlated to an omitted risk factor.[39]

4.3 Evidence from the Previous Analysis

The portfolio analysis provides valuable initial insights regarding the effects of real estate ownership on risk. Table 20 shows that the synthetic long real estate investment portfolio significantly loads on the market, size, and book-to-market risk factors. It shows that, independent of industry structure, real estate reduces market beta and exposure to the size risk factor, as evidenced by the significant negative coefficients of $r_m - r_f$ and *smb*. The negative effect of real estate on systematic risk is documented by Brounen and Eichholtz, 1995, for industrial firms and Brounen et al., 2005, in the retail sector. A possible explanation of this effect is that real estate generally has a lower beta than other productive assets owned by and growth options available to firms. Table 4 shows that firms that own a lot of real estate are larger in terms of total assets, sales, and market value and tend to be value stocks. Naturally then, real estate ownership should be negatively correlated with the size risk factor and market beta since market beta is generally decreasing with firm size.

Table 20 also reveals a positive association between real estate ownership and exposure to the book-to-market risk factor, as evidenced by the coefficients of *hml*. Firms making up

[39]The omission of a risk factor orthogonal to the explanatory variables included in the model may lead to significant alphas, without jeopardizing the consistency of coefficient estimates, if its expected value is different from zero. In the event the omitted risk factor is not orthogonal to the explanatory variables, then endogeneity sets in, resulting in inconsistent coefficient estimates.

the high-real estate portfolios are generally value firms whereas those in the low-real estate portfolios tend to be growth oriented. As with the market and size risk factors, the impact of real estate on book-to-market appears to transcend industry structure.

These findings lead to the conclusion that the reversing effect of industry structure on the interaction between real estate ownership and stock returns is largely captured through the portfolios' average unexplained excess returns ($AUERs$) or alphas. Hou and Robinson, 2006, argue that pricing models that do not account for industry structure are inherently misspecified. Real estate ownership might also introduce a separate risk dimension as documented by Ling et al., 2010, for retail firms. At the end, the effects of real estate ownership and industry structure on market beta and exposure to the other risk factors are intertwined and very difficult to separate. The following firm-level analysis might shed more light on these intricate relationships.

4.4 Empirical Models

This firm-level analysis, therefore, explores the channels through which real estate ownership may affect stock risk and the relevance of industry structure. Following Brounen and Eichholtz, 2005, and Ling et al., 2010, it requires a two-step estimation process. The first step consists of estimating each stock's (firm's) yearly risk profile. The second step then examines the extent to which variations in these estimated risk characteristics are explained by real estate ownership and industry structure, after controlling for pertinent firm and industry characteristics. To facilitate comparison against the findings of the previous portfolio method, the analysis is separately performed for firms in competitive and concentrated industries using model 1, partly.

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i^m \cdot (r_{m,t} - r_{f,t}) + \gamma_i \cdot smb_t + \delta_i \cdot hml_t + \varepsilon_{i,t} \tag{1}$$

For each stock, the above equation is estimated every calendar year using daily returns, the t subscript therefore referring to day t. Section 2.4.2 presents a detailed description of the model. As noted, real estate ownership may alter $\widehat{\alpha}_i$, $\widehat{\beta}_i^m$, $\widehat{\gamma}_i$, and $\widehat{\delta}_i$. If model 1 adequately accounts for all risk factors priced by the market, the estimated alphas should be indistinguishable from zero. Otherwise, it is technically impossible to conclusively reject the existence of some other risk factor. The consideration of real estate risk component as in Ling et al., 2010, is explored later.

After gathering the stocks' yearly risk characteristics ($\widehat{\alpha}_i$, $\widehat{\beta}_i^m$, $\widehat{\gamma}_i$, and $\widehat{\delta}_i$) and their associated standard errors, the next task is to examine their sensitivity to the amounts of real estate owned by the firms. Following the literature, these risk characteristics are then regressed against the firms' corresponding real estate ownerships and a set of control variables as modeled below, the t subscripts referring to years in this case.[40]

$$\widehat{\alpha}_{i,t} = \mu_\alpha + \phi_\alpha \cdot REI_{i,t-1} + \lambda_{\alpha 1} \cdot LTDR_{i,t-1} + \lambda_{\alpha 2} \cdot BM_{i,t-1} + \zeta_{i,t} \tag{13}$$

$$\widehat{\beta}_{i,t}^m = \mu_{\beta^m} + \phi_{\beta^m} \cdot REI_{i,t-1} + \lambda_{\beta^m 1} \cdot LTDR_{i,t-1} + \lambda_{\beta^m 2} \cdot BM_{i,t-1} + \eta_{i,t} \tag{14}$$

$$\widehat{\gamma}_{i,t} = \mu_\gamma + \phi_\gamma \cdot REI_{i,t-1} + \lambda_{\gamma 1} \cdot LTDR_{i,t-1} + \lambda_{\gamma 2} \cdot BM_{i,t-1} + \vartheta_{i,t} \tag{15}$$

$$\widehat{\delta}_{i,t} = \mu_\delta + \phi_\delta \cdot REI_{i,t-1} + \lambda_{\delta 1} \cdot LTDR_{i,t-1} + \lambda_{\delta 2} \cdot BM_{i,t-1} + \nu_{i,t} \tag{16}$$

Again, the dependent variables come from first-step annual regressions. The explanatory variables are real estate ownership (REI), long-term debt ratio ($LTDR$), and the ratio of book value to market value (BM). The effects of leverage, size, and book-to-market value on risk are widely documented in the literature.

As noted, stock risk, real estate ownership, leverage, and book-to-market are likely endogenously determined. For example, low-beta firms may accumulate more real estate assets than high-beta firms since their cost of funding advantage may provide them with additional

[40] Deng and Gyourko, 2000; Seiler et al., 2001; Brounen and Eichholtz, 2005; and Yu and Liow, 2009; and Ling et al.,2010

impetus to undertake such investments. Also, high-alpha firms may curtail real estate investments in order to reduce the associated negative market perception and boost their stocks. To deal with this potential problem, the above equations use the one-period lag values of the explanatory variables.[41] The equations also include industry and year dummies (that are not represented above) to control for industry fixed effects and changes in macroeconomic variables affecting the stochastic discount factor. However, these models do not control for firm fixed effects to facilitate estimation since Brounen and Eichholtz, 2005, find that most of cross-sectional variations in real estate ownership is largely driven by industrial rather than firm-level differences.

Equations 13 to 16 are estimated using pooled time-series cross-sectional weighted least square regressions. The standard errors of the dependent variables from the estimation of model 1 at the firm level are used as weights in these estimations to deal with the inherent heteroscedasticity introduced by the use of generated dependent variables (Lewis and Linzer, 2005). Following Petersen, 2009, the standard errors are clustered at the firm level. The main focus of the ensuing analysis is on interpreting the estimated coefficients of the real estate variable, particularly $\widehat{\phi}_{\alpha}$ and $\widehat{\phi}_{\beta^m}$, i.e., the effects of real estate ownership on alpha and market beta, respectively.

The portfolio analysis documents significant alphas associated with the portfolios' real estate contents and the competitive environment. As noted, these alphas may be due to the omission of a risk factor since these regression intercepts are the average unexplained portion of excess returns. Next, the analysis considers whether these alphas are due to the omission of a risk factor associated with real estate. Following Ling et al., 2010, a real estate risk

[41]Ling et al., 2010, use a similar model specification. Alternatively, 2SLS estimation, as in Brounen and Eichholtz, 2005, should yield similar results.

component, proxied by the excess returns on a REIT index, is added to model 1 as follows.[42]

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i^m \cdot (r_{m,t} - r_{f,t}) + \gamma_i \cdot smb_t + \delta_i \cdot hml_t + \beta_i^{re} \cdot (r_{re,t} - r_{f,t}) + \xi_{i,t} \tag{17}$$

The term $r_{re,t} - r_{f,t}$ represents the daily excess returns on the REIT index over the risk-free rate. The remaining variables are the same as in model 1. As previously, model 17 is estimated for each stock every year using daily return series to extract the stock's risk characteristics, namely $\widehat{\alpha}_i$, $\widehat{\beta}_i^m$, $\widehat{\gamma}_i$, $\widehat{\delta}_i$, and $\widehat{\beta}_i^{re}$. To avoid unnecessarily duplications, the analysis now only focuses on $\widehat{\beta}_{i,t}^m$ and $\widehat{\beta}_{i,t}^{re}$ using the same model specification as equation 14. The two equations are separately estimated as before for competitive and concentrated industries with the standard errors of the coefficient estimates used as weights to adjust for possible heteroscedasticity.

The negative association between real estate ownership and systematic risk is widely documented in the literature. In keeping with the previous portfolio analysis, the impact of industry structure on the interaction between real estate ownership and systematic risk has been examined separately for competitive and concentrated industries. Although there is nothing wrong with this approach, it does not explicitly tell how responsive market beta is to changes in industry concentration or how the interaction of industry concentration and real estate ownership generally affects systematic risk. Next, the paper adopts a more general approach to addressing this question. Rather than separately examining competitive and concentrated industries, this approach relies on the entire data sample with industry structure directly included in the model as follows.

$$\begin{aligned}\widehat{\beta}_{i,t}^m = \mu + \phi \cdot REI_{i,t-1} + \rho_1 \cdot LTDR_{i,t-1} + \rho_2 \cdot BM_{i,t-1} + \rho_3 \cdot IHERF_t \\ + \rho_4 \cdot REI_{i,t-1} \times IHERF_t + \rho_5 \cdot BM_{i,t} \times IHERF_t + \omega_{i,t}\end{aligned} \tag{18}$$

[42]This study is not arguing that the market prices a real estate risk factor. It is possible that the documented alphas are related to a risk dimension highly correlated to real estate. It is also noted that REIT index returns are not a perfect proxy of real estate returns.

In this model, industry structure is proxied by $IHERF_t$, the industry concentration Herfindahls used in the portfolio analysis. It is also interacted with the real estate and book-to-market variables to shed more light on the channels through which industry structure affects systematic risk. Again, the estimation controls for industry and year fixed effects. As previously, the model is estimated using weighted least squares, with the standard errors of the dependent variables as weights. The same analysis could also be applied to the other risk characteristics, but the underlying intuition would be murky. Greater contribution can be achieved by focusing on market beta since there exists a consensus on the general effect of the real estate on systematic risk.

4.5 Data

The data set used in this analysis is similar to the one relied upon in the portfolio analysis. It comprises firms with SICs ranging from 2000 to 5999 that are listed on NYSE, AMEX, and NASDAQ, which excludes real estate and service firms. But unlike the previous analysis, it uses daily stock returns from CRSP.[43] A firm must have at least 50 successive daily stock return points available on CRSP during a year to be included in the sample for that year. The stock returns and the respective accounting data from Compustat are linked by matching CRSP calendar years to Compustat fiscal years. Even though this matching method is not perfect, it is widely used in the literature and is appropriate in this instance since most of the accounting variables of interest are relatively stable.[44]

As in the portfolio analysis, the firms are first assigned to industries according to their 3-digit Compustat SICs and the resulting industries are then sorted every year into five

[43]The estimation of the stocks' risk characteristics can also be performed on weekly returns as in Ling et al., 2010.

[44]In Compustat, a company's fiscal year corresponds to the calendar year in which it has the most overlap in months. Fiscal years ending between January and May are assigned to the previous calendar year and fiscal years ending between June and December are assigned to the current calendar year. For example, if a company's fiscal year-end is March 2001, the data in its annual report represents the company's operations for nine months of 2000 and three months of 2001. The data would be classified as fiscal 2000 data.

concentration groups according to their average concentration Herfindahls of the last three years computed using net sales. For the purposes of this study, the bottom and top industry concentration quintiles are taken as the competitive and concentrated industry groups. The resulting sample of 7,736 firms spans 171 industries. Because of the different data matching method used here as compared to the one used in the portfolio analysis, the final data set covers 38 years from 1971 to 2008. Figures 2 and 3 and tables 1 to 3 show the evolution of average industry concentration over the sample period and the characteristics of the industry concentration groups. The accounting variables used in this analysis are exactly the same as in Table 3. *IHERF*, the variable proxying for industry structure, is the industries' concentration Herfindahls. Section 2.5.3 gives an extensive description of the characteristics of the industry groups. Generally, firms operating in concentrated industries are larger, have higher book-to-market, and have higher leverage than firms operating in competitive industries. As noted, their difference in average real estate ownership are relatively small though

Unfortunately, only about half of these data can be used in the latter part of the analysis since no meaningful equity REIT return series were available prior to 1992. Consequently, the estimation of equation 17 and the following analysis of the impact of real estate ownership on the estimated β_i^m and β_i^{re} only covers 17 years from 1992 to 2008. The SNL US REIT Equity Index daily returns are used to as a proxy for real estate market returns in this portion of the analysis.[45]

4.6 Main Findings

Before presenting the main findings of this analysis and comparing them to the insights gained from the portfolio approach, the results of the first-stage estimations of the stocks'

[45]The SNL US REIT Equity Index includes all publicly traded (NYSE, NYSE MKT, NASDAQ, OTC BB, Pink Sheets) Equity REITs in SNL's coverage universe.

risk characteristics are discussed next.

4.6.1 Estimated Risk Characteristics

Table 22 summarizes the distribution characteristics of the firms' alphas and risk loadings implied by model 1. These coefficient estimates are drawn from 69,078 individual annual regressions using levered daily excess stock returns. The average daily unexplained excess stock return (alpha) of the sample is 0.04%. The distribution of these alphas shows a strong positive skewness, with a mean twice as large as the median, and flat with a standard deviation about 5 times larger than the mean. This high volatility will certainly bias against finding significant results in the second-stage estimation of equation 13 since the estimates' standard errors are used as weights in that regression.

With coefficients of variation of 0.71 and 1.03, respectively, the estimated individual market betas (*market_beta*) and exposures to the size risk factor (*smb_beta*) are, in contrast, more stable . The low volatility of these estimates should normally improve the second-stage estimations of the impact of real estate ownership and industry structure on these variables. As expected, the average market beta of the sample is close to one, showing that the sample represents a substantial portion of the market. As far as the estimated individual book-to-market betas (*hml_beta*) are concerned, the prospects do not look promising. The series' standard deviation is over 5.5 times larger than its mean, thus considerably reducing the chance of finding significant results. Unlike the other series, it is however approximately evenly distributed around its means.

Table 23 breaks down the previous data by industry concentration groups. As expected, the number firm-years used in the first estimations drops considerably as industry concentration increases. In general, the behavior of *alpha*, *market_beta*, *smb_beta*, and *hml_beta* aligns with the insights gained from the portfolio analysis. On average, firms operating in concentrated industries have significantly lower alphas than those in competitive industries, which supports the argument made by Hou and Robinson, 2006, for the inclusion of industry structure in asset pricing models. Similarly, the estimated market betas and size betas appear to decrease with industry concentration. In contrast, book-to-market betas and industry concentration are positively correlated. It is comforting that the insights gained from the portfolio analysis in table 20 evidence themselves in the unconditional relationships drawn so far from the firm-level analysis as well.

4.6.2 Regression Results

Table 24 presents the results of the estimation of equations 13 to 16 for competitive and concentrated industries. The univariate regression results, reported in the top half of the table, generally offer no definitive answers regarding the effects of real estate ownership, measured by the ratio of buildings and capitalized leases to PPE, on stock risk. However, the results of the multivariate regressions at the bottom of the table are more informative. They show that for firms operating in competitive industries, real estate ownership is positively associated with average unexplained excess returns or alphas. This finding therefore confirms to the result of the portfolio analysis. Together, this evidence shows that real estate ownership negatively affects shareholder value in competitive industries. However, no significant relation appears to exist between real estate ownership and alphas in concentrated industries (5^{th} column of Table 24), which supports the argument advanced in this paper that real estate ownership does not necessarily negatively affect shareholder value in those industries. As expected, the estimated alphas are also positively correlated to *LTDR* and negatively related to *BM* in competitive industries. Again, these results generally disappear or are generally weaker in concentrated industries, indicating a much weaker effect of real estate ownership on risk in those industries.

As far as market beta is concerned, it appears that real estate ownership is relatively inconsequential in competitive industries, although the coefficient of *REI* is negative and significant in concentrated industries. This lack of statistical significance in competitive industries is surprising since real estate ownership is generally found to reduce exposure to systematic equity risk (e.g., Brounen and Eichholtz, 2005). However, this result agrees with the finding of Ling et al., 2010, for retail firms. This question is further discussed later in this section. As expected, real estate ownership reduces exposure to the size risk factor in competitive industries. But no similar effect is found in concentrated industries, for most of those firms are relatively large. Irrespective of industry structure, no significant association is found between real estate ownership and book-to-market beta. This unexpected result may be due to the inclusion of book-to-market in the model. As expected, the coefficients of *BM* in the *hml_beta* regressions are positive and significant both in competitive and concentrated industries. Also, the impact of leverage on risk is generally positive and significant since the analysis is based on levered returns.

As a general note, the results presented in table 24 are more significant in the competitive industry estimations probably due to the larger sample size. Notwithstanding that possibility, the picture emerging from table 24 shows that real estate ownership differently affects stock returns in competitive and concentrated industries, as argued in this paper, primarily through the estimated alphas and, to some extent, the market betas. Tables 20 and 24 show that average unexplained excess returns play an important role in explaining the different effects of real estate ownership on shareholder value in competitive and concentrated industries. It is therefore plausible that the 3-factor model does not entirely capture all relevant risks. Following Ling et al., 2010, the study next considers the possible pricing of real estate risk by estimating model 17 and examining whether real estate ownership explains the stocks' β_i^m and β_i^{re}.[46]

The outcome of this analysis is reported in table 25. The univariate regressions show that real

[46] As noted, this part of the analysis covers 17 years from 1992 to 2008 since REIT returns are not available for the earlier years.

estate ownership generally negatively affects market beta, but the effect is stronger in concentrated industries. This finding, which intuitively makes sense and has been documented by previous studies, is also confirmed by the multivariate regressions. These results also show that real estate ownership may lead to exposure to an additional real estate risk for firms operating in competitive industries. Although this positive correlation between real estate ownership and real estate beta is weak in the multivariate regressions, real estate ownership continues to have a significant negative effect on market beta in concentrated industries. The positive effect of the real estate ownership on the real estate beta in competitive industries and its negative effect on market beta in concentrated industries may explain why real estate impacts shareholder value differently depending on industry structure. Leverage generally increases beta, whereas book-to-market has the opposite effect. In summary, the results of these multivariate regressions are relatively inconsistent and provide little evidence that the market prices a real estate risk factor.

In the multivariate regressions in tables 24 and 25, the negative effect of real estate on systematic risk appears stronger in concentrated industries. Table 26 presents a more general analysis of the impact of real estate ownership on systematic risk that directly controls for industry structure as modeled in equation 18, which is estimated for the entire sample, with the industries' concentration Herfindahls (*IHERF*) and their interactions with real estate ownership and book-to-market included as additional control variables. Real estate ownership, whether measured at the firm level or by real estate decile groups (*REI_DECILE*), does not appear to matter as far as systematic risk is concerned. Basically, its negative effect on beta in concentrated industries wanes when the estimation is based on the entire sample. This result supports the findings of Deng and Gyourko, 2000, and Ling et al., 2010, for retail firms, but the issue is more complicated than it appears.

Table 26 also shows that industry structure is negatively related to systematic risk as evidenced in the coefficient of *IHERF*. As shown by Hou and Robinson, 2006, and Aguerrevere, 2009, firms operating in concentrated industries appear to be intrinsically less risky than those operating in competitive industries. However, the significance of this result disappears once the interaction of real estate and industry concentration ($REI \times IHERF$) is included in the model as in columns 2 and 5. Therefore, the negative effect of industry concentration on systematic risk appears to predominantly stem from real estate ownership or vice versa. Consequently, it is highly plausible that the relation between real estate ownership and beta becomes negative in models that do not control for industry structure as in Brounen and Eichholtz, 2005. Apparently, the interaction between real estate ownership, industry structure, and systematic risk is quite complex.

As far as the remaining explanatory variables are concerned, there are no major surprises. Leverage remains positively correlated to systematic risk since the first-stage regressions use levered excess returns. Book to market continues to show a negative correlation with beta that becomes stronger when it is interacted with industry concentration as in columns 3 and 6.

5 The Determinants of Real Estate Ownership

5.1 Motivation

The previous sections examine the effects of real estate ownership and industry structure on shareholder value and the characteristics of stock returns for non-real estate firms. The evidence presented shows that the negative effect of real estate ownership on firm value documented in past literature applies primarily to competitive industries. Also, in concentrated industries, firms that own of lot of real estate may be those using capacity strategies to protect their market position. As a result, those firms may be considered less risky despite their substantial real estate ownership.

This section addresses a different, but related, question. It examines the determinants of real estate ownership and the potential role of industry structure. While the previous analysis is an ex-post examination of the effects of real estate ownership on firm value, this section presents an ex-ante view of corporate real estate decisions in light of the known stylized facts governing real estate ownership. These two questions are, of course, not totally independent. The research question is addressed from a purely financial perspective since the analysis relies primarily on accounting and return information. Undoubtedly, location and technology are important determinants of corporate real estate investments. The analysis deals with technology considerations by including industry fixed effects in the regression models. Provided that corporate real estate decisions are largely driven by national market conditions, the inclusion of year fixed effects will control for unobserved heterogeneity. However, the health of property markets is largely determined by local business conditions. Unfortunately, no reliable corporate real estate location data exist for such analysis. This remains one of the most challenging issues in corporate real estate research.

Several studies examining the relation between real estate and stock returns indirectly explore the drivers of real estate ownership when dealing with the inherent endogeneity shrouding that relationship. In the preceding analysis, the endogenous relation between real estate ownership and systematic risk was resolved, following Ling et al., 2010, by lagging the real estate variable in model 14 of section 4.4. An alternative solution consists of a 2-stage estimation, such as 2SLS, whereby real estate ownership is instrumented by its predicted value from a first-stage regression modeling it as a function of a set of exogenous explanatory variables. This approach is used in some of the cited literature (e.g., Seiler et al., 2001; Brounen and Eichholtz, 2005; Yu and Liow, 2009). Unfortunately, the first-stage estimation results are generally not reported and often not fully modeled since the focus of those studies is not on explaining cross-sectional variations in real estate ownership, Yu and Liow, 2009, being one of the few exceptions. The models proposed in this analysis build on those studies while introducing industry structure in the mix.

5.2 Empirical Models

Following Brounen and Eichholtz, 2005, and Yu and Liow, 2009, real estate ownership is modeled as a partial adjustment process. In order to facilitate comparison with the findings of the existing literature, the first model that follows does not control for industry structure.

$$\begin{aligned} REI_{i,t} = \mu + \varphi \cdot REI_{i,t-1} + \psi_1 \cdot LTDR_{i,t} + \psi_2 \cdot LTDR_{i,t-1} + \phi \cdot BM_{i,t-1} \\ + \gamma \cdot SIZE_{i,t-1} + \delta \cdot AGE_{i,t} + \lambda \cdot PERF_{i,t-1} + \xi_{i,t} \end{aligned} \tag{19}$$

The dependent variable, $REI_{i,t}$, is the level of real estate ownership of firm i at the end of year t. The explanatory variables include the lagged value of the dependent variable ($REI_{i,t-1}$), leverage, measured by the ratio of long term debt to equity ($LTDR_{i,t}$), the lagged value of leverage ($LTDR_{i,t-1}$), the lagged value of book value to market value ($BM_{i,t-1}$), lagged firm size ($SIZE_{i,t-1}$), firm age ($AGE_{i,t}$), and a lagged performance dummy variable

($PERF_{i,t-1}$), which captures the firms' stock performance during the previous year. As noted, real estate ownership is partly determined by industry characteristics (e.g., technology and competition), location, and general macroeconomic conditions. The model includes industry and year dummies (not represented above). The industry fixed effects control for cross-industry variations in real estate ownership. The year fixed effects capture changes in macroeconomic variables affecting corporate real estate decisions not in the model. Firm fixed effects are omitted since variations in real estate ownership is largely driven by industrial rather than firm differences (Brounen and Eichholtz, 2005).[47]

Firms with substantial amounts of real estate in one year can be justifiably expected to end up owning a lot of real estate the following year given the difficulty in adjusting real estate ownership in the short term. Therefore, $REI_{i,t-1}$ should be the dominant explanatory variable of the model. As far as leverage is concerned, time should normally play a crucial role. New real estate investments should increase leverage since most real estate acquisitions, even for cash-rich firms, often require substantial amounts of debt financing. Consequently, real estate ownership and leverage should contemporaneously trend together, leading to the coefficient of $LTDR_{i,t}$ being positive. However, conditional on being already highly levered, a firm should be careful about acquiring additional real estate and, in the process, further increasing leverage and the likelihood of bankruptcy. Therefore, the coefficient of $LTRD_{i,t-1}$ is expected to be negative. Real estate ownership and size are expected to be positively correlated as discussed earlier, causing the coefficient of $SIZE_{i,t-1}$ to be positive. This effect should be the same whether model 19 includes the contemporaneous or lagged value of *SIZE* (the model includes the lagged value of the size variable to avoid any endogeneity issues).

As discussed in the portfolio analysis, real estate intensive firms tend to be also value firms. Therefore, the contemporaneous relation between real estate and book-to-market should be positive. For identification reasons, the model only includes the lagged value of book-to-

[47]The inclusion of firm dummies would have also exponentially increased the computing requirement given the size of the sample.

market, which makes the direction of the relationship unclear. As far as AGE is concerned, its effect on real estate ownership could also go either way. It is conceivable that firms acquire more real estate as they mature and generate more free cashflows that could be used to acquire strategic real estate as part of capacity strategies, to purchase rather than lease generic real estate, or both. But the reverse argument could also be true since mature firms have depreciated a larger proportion of their real estate assets. The age variable could also capture the decreasing trend in real estate ownership documented in figure 1. Consequently, the direction of the relation between real estate ownership and firm age becomes an empirical question.

Generally, stock performance affects investment decisions, particulary real estate investments, since less cash would be available during bad years to finance investments. Also, poorly performing firms may disgorge some of their real estate assets to increase their financial strength. Another argument in counterpoint offered by Deng and Gyourko, 2000, is that declining firms end up with a lot of real estate on their books after they disgorge other liquid assets on the way down. It could also be argued that real estate investments affect firm performance. Thus, the impact of performance on real estate ownership also becomes an empirical question. Following Brounen and Eichholtz, 2005, the poor performance dummy ($PERF$) takes the value of 1 if a firm's stock return in the previous year is less than -10% or 0 if otherwise.

Next, the study considers whether industry structure is a determinant factor in corporate real estate investment decisions. The following model is extended version of model 19,

$$\begin{aligned} REI_{i,t} = \mu + \varphi \cdot REI_{i,t-1} + \psi_1 \cdot LTDR_{i,t} + \psi_2 \cdot LTDR_{i,t-1} + \phi \cdot BM_{i,t-1} + \gamma \cdot SIZE_{i,t-1} \\ + \delta \cdot AGE_{i,t} + \lambda \cdot PERF_{i,t-1} + \rho \cdot POWER_{i,t} + \theta \cdot IHERF_{i,t} + \zeta_{i,t} \end{aligned} \tag{20}$$

The new explanatory variables added to the model are industry concentration Herfindahls

($IHERF_{i,t}$) and firm market power ($POWER_{i,t}$). Table 3 of the portfolio analysis shows that firms operating in concentrated industries, on average, own less real estate than those operating in competitive industries, but are generally more capital intensive. As a result, the coefficient of $IHERF_{i,t}$ should be negative. The relation between market power and real estate ownership should be positive if the analysis is limited to concentrated industries where entry deterrence strategies using excess capacity (therefore, more real estate) may benefit incumbent firms. However, this study encompasses a sample across firms operating in concentrated as well as non-concentrated industries and hence may dampen the observed relation of market power and real estate ownership that is prevalent in concentrated industries.

5.3 Data

This analysis uses the same data used in the previous sections. The sample consists 7,736 non-real estate firms representing 171 industries according to the firms' 3-digit SICs. The reader is referred to sections 2.5.3 and 4.5 for more information about how the sample was put together and a discussion of the relevant descriptive statistics.

The primary measure of real estate ownership is the ratio of buildings and capitalized leases to PPE (*REI1*). The ratio of buildings, capitalized leases, construction in progress, and land to PPE (*REI2*), the ratio of buildings and land to PPE (*REI3*), and the ratio PPE to total assets (*PPEI*) are alternative measures of real estate ownership used to check the robustness of the results. Again, *LTDR* is the ratio of book value of long-term debt to market value of equity plus book value of long-term debt and book-to-market is the ratio of book value of equity to market value of equity. The size variable (*SIZE*) and firm age (AGE) are the log of market value measured in 2010 US dollars and the log of the number of years from the stock's listing date on CRSP plus one, respectively. As previously, industry concentrations are measured by the concentration Herfindahls based on net sales (*IHERF*).

Finally, market power (*POWER*) is the square of the ratio of sales to total industry sales, i.e., the contribution of each firm to its industry's concentration Herfindahl that year.

5.4 Main Findings

5.4.1 Unconditional Covariances

The characteristics of the industry concentration groups have already been discussed. Table 27 presents the correlation matrices of the variables for retail sector (the competitive industry), and rubber products (the concentrated industry).[48] These two industries are by no means fully representative of their respective industry concentration group. However, they should provide some insights on the directions of relationships between the variables in their respective concentration groups. As expected, the real estate variables are generally strongly positively correlated, especially in the rubber industry. The low correlations between *REI3* and the other real estate measures in the retail sector is likely due to the fact that leases, which are extensively used in competitive industries such as retail, are not included in that measure. Also, the weak correlations between capital intensity (*PPEI*) and the other real estate variables is expected since it is relatively stable across industries, as noted by Deng and Gyourko, 2000.

As far as the remaining explanatory variables are concerned, the results are mixed. *BM* and *AGE* show the strongest associations with real estate ownership. As expected, *BM* increases with real estate ownership in the rubber industry (a concentrated industry), but the relationship is weaker for retail firms. *AGE* appears to be negatively related to real estate ownership in the concentrated industry, but shows no significant relationship in retail. Surprisingly, leverage and size show weak associations with real estate ownership, which of

[48]Retail regroups 560, 562, and 565 3-digit SICs, whereas rubber products include firms with SICs starting with 301, 302, and 306.

course runs against the stylized facts discussed earlier. Caution is required when interpreting these results because they depict unconditional correlations and are technically applicable to retail and rubber products, rather than to their respective industry groups as a whole.

5.4.2 Regression Results

The unit root tests shows that the variables of the models are stationary. Table 28 reports the results of the estimation of equation 19 for all industries. Given how difficult it is to adjust real estate ownership in the short term, the amount of real estate owned today is, as expected, the best predictor of next year's stock of real estate. The coefficient of the lagged real estate variable shows that, irrespective of industry structure, firms carry on average 86% of their real estate assets into the next period. Basically, real estate intensive firms tend to remain so in the short to medium term. This result confirms the temporal stability of the real estate stock portfolios used in the previous portfolio analysis.

Both the portfolio and the firm-level analyses presented in tables 4 and 24 show that real estate ownership and leverage are positively related. The novelty in this time-series analysis is that it separately examines the ex-ante and ex-post effects of leverage on real estate investment decisions. Ex-post, leverage and real estate ownership are positively correlated as evidenced in the estimated coefficients of $LDTR_t$ in various model specifications presented in table 28. This positive relationship surely stems from the fact that real estate investments are typically financed at debt-to-equity ratios higher than the firms' existing capital structure. This is the general positive association between real estate and leverage mentioned in the previous sections and in studies such as Yu and Liow, 2006. In sharp contrast to this result, the ex-ante effect of leverage on real estate ownership is negative (coefficients of $LDTR_{t-1}$ in table 28), as expected. Basically, high leverage acts as a deterrent against real estate investments, which further increase leverage, thereby making the firm even riskier. As table 28 shows, this effect is completely absorbed into the positive contemporaneous association between real estate ownership and leverage if lagged leverage is omitted from the model. This ex ante adverse effect of leverage on real estate investment is discussed less in the literature.

Table 4 shows that real estate ownership and book-to-market are positively related. Surprisingly, no significant relationship is found through the estimation of model 19. It is certainly conceivable that additional real estate investment increases book-to-market. However, the effect of high book-to-market value on a firm's propensity to undertake additional real estate investment is less clear. Similarly, real estate ownership shows no significant association with firm size. Again, the contemporaneous relation between real estate and size is certainly expected to be positive as shown in table 4, but, as discussed, it is unclear what effect size has on future real estate investments. These inconclusive results could be due to the fact that model 19 does not control for industry structure in any of the specifications presented in table 28.

Contrary to the popular belief that firms accumulate more real estate assets as they age and mature, table 28 reveals a significant negative correlation between real estate ownership and firm age. This negative relationship could be due to accounting depreciations, the negative trend in corporate real estate ownership, or both. Also, the coefficient of the performance dummy, which indicates whether a firm's stock underperformed during the previous year, is positive and significant. This result could imply that real estate assets are not the first assets that firms liquidate during challenging times to shore up their finances. As argued by Deng and Gyourko, 2000, other more liquid assets, such as receivables, may provide needed cash more cheaply.

Generally, the previous regression results are relatively intuitive and do not deviate from initial expectations, even though some variables are not statistically significant. Table 29 presents results of the re-estimation of model 19 using alternative measures of real estate ownership. In the base case in column 1 of table 29, real estate ownership is proxied by *REI1* (same as in column 3 of the previous table), whereas columns 2 to 4 are based respectively on

REI2, *REI3*, and *PPEI*, as defined previously. The results of these re-estimations based on these alternative measures of real estate ownership are almost the same as in the base case. They show that real estate ownership remains stable over time and is positively related to contemporaneous leverage and lagged poor performance, but that it is negatively correlated to lagged leverage and age. As before, the effect of book-to-market remains insignificant, except in the *PPEI* regression in column 4; the meaning of that negative association is unclear. However, the effect of *SIZE* is now positive and significant, as predicted by table 4.

As in the portfolio analysis, the findings are also robust to the classification of firms into industries according to the 48 FF industry groups rather than 3-digits SICs (table 30). The fact that the results are robust to this alternative industry classification involving far fewer industry groups (171 vs. 48) further highlights the strength of the documented relationships.

The above estimations do not directly consider the importance of industry structure or market power in explaining real estate ownership. Table 31 reports the results of the estimation of equation 20, which controls for these factors. First, the effects of the explanatory variables previously discussed and displayed in column 1 remain unchanged in the various model configurations in columns 2 to 4. Even though the inclusion of industry structure does not increase the explanatory power of the regressions, all else the same, real estate ownership decreases with industry concentration. This result might be surprising since real estate ownership increases with firm size and real estate intensive firms are generally more capital intensive (high PPE to TA). But it confirms the negative relation between real estate (proxied by *REI1* and *REI2*) and industry concentration documented in table 3 of the portfolio analysis. The market power variable ($POWER$), on the other hand, shows no significant association with real estate ownership. This outcome is not surprising, nor does it contradict the argument defended in this paper since market power and real estate ownership should normally matter in concentrated industries, which only represent a relatively small portion of the sample used in these estimations.

6 Conclusion

This study extends the literature by introducing industry structure as a determinant factor affecting the impact of real estate ownership on shareholder value for non-real estate firms. Approaching the question of real estate ownership from a technology perspective, rather than the portfolio diversification motive favored by the earlier literature, and borrowing from the IO literature on entry deterrence through capacity strategies, I argue that the positive relation between real estate ownership and stock returns (i.e., the negative impact of real estate ownership on firm value) documented in the literature applies only to competitive industries. For firms operating in concentrated industries, investors are likely to favorably view capacity investments aimed at protecting existing economic rents by deterring entries. Since these capacity investments likely entail substantial real estate investments, these firms are not necessarily penalized.

Using a large sample of non-real estate firms spanning the four decades ending in 2010, this study first presents evidence supportive of these predictions. Therefore, the prescription that corporations should not own real estate is unlikely to be optimal for all firms. Managers must carefully consider industry structure when designing corporate real estate strategies. Controlling for industry structure partly alleviates the identification problem plaguing the relation between real estate ownership and stock returns noted in the literature.

But market efficiency requires that returns (value) and risk go hand in hand. The study next considers the association between real estate ownership and risk. First, the risk profile of the synthetic long real estate investment portfolio shows that, irrespective of industry structure, real estate ownership reduces market and size betas, while increasing exposure to the value premium. However, the strategy's average unexplained excess return (i.e., alpha) during the period is positive in competitive industry and negative in concentrated industries. These returns possibly compensate for a higher (lower) risk associated with real estate ownership in competitive (concentrated) industries, that is further explored using a firm-level analysis. In addition to confirming the insights gained from the portfolio formation method, this analysis shows that real estate ownership is positively associated with alphas in competitive industries. However, it finds no evidence in support of a real estate risk priced by the market.

To close the circle, the last section of this study examines the determinants of real estate ownership. As expected, real estate ownership is found to be relatively stable over time and to be positively correlated to leverage. As a result, highly levered firms are generally reluctant to undertake new real estate investments. This micro analysis further shows that real estate ownership tends to decrease with age and that real estate assets are not the first to be sold off when firms experience financial difficulty. Finally, market power appears to have no significant effect on real estate ownership, with the exception of concentrated industries.

The interaction between real estate ownership and industry structure leads to a number of potentially interesting research questions, particularly in corporate governance. Left unchecked, managers have the tendency to pursue their private benefits, through empire building for instance, to the detriment of shareholders (Jensen, 1986; Hartzell et al., 2006). The findings of this study then naturally suggest that firms should adopt appropriate governance mechanisms to ensure that real estate investment decisions enhance shareholder value. Sing and Sirmans, 2008, partly address that question. The findings of this study imply that in competitive industries real estate intensive firms should therefore be characterized by weak governance mechanisms, everything else the same. On the other hand, governance structure should be independent of real estate ownership in concentrated industries since there is no agency problem associated with these investments. This research also raises a number of capital structure questions. Due to its high collateral value, real estate tends to be positively related to leverage. But does real estate ownership affect capital structure differently depending on industry structure? Also, does competition affect the choice of debt financing (e.g., secured vs. unsecured) for real estate investments? Another potential research area is the interaction between real estate ownership, idiosyncratic risk, and industry structure.

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Appendix A: Figures

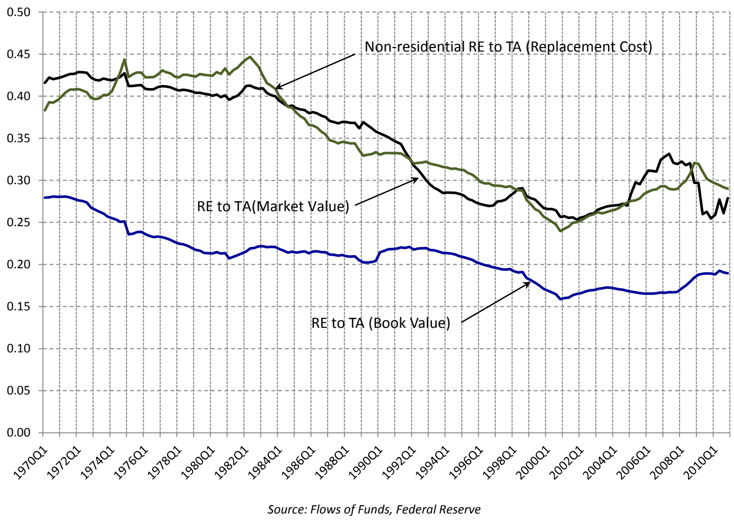


Figure 1: Real estate ownership by nonfarm nonfinancial corporations (*Source: Federal Reserve*)

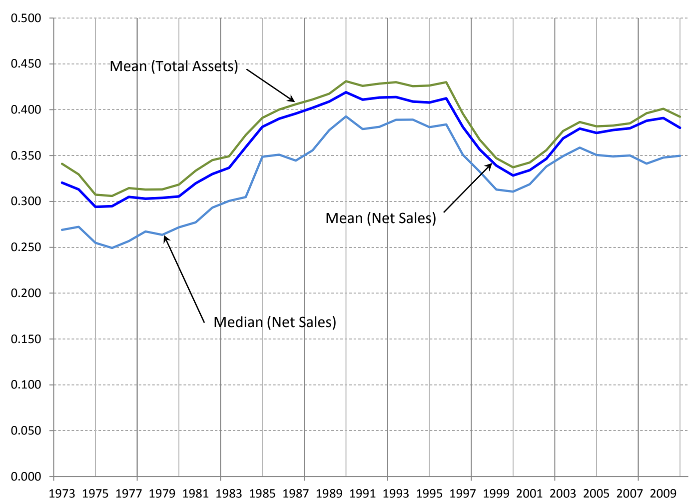


Figure 2: Trends in mean and median 3-year average industry concentrations based on net sales and total assets from 1973 to 2010

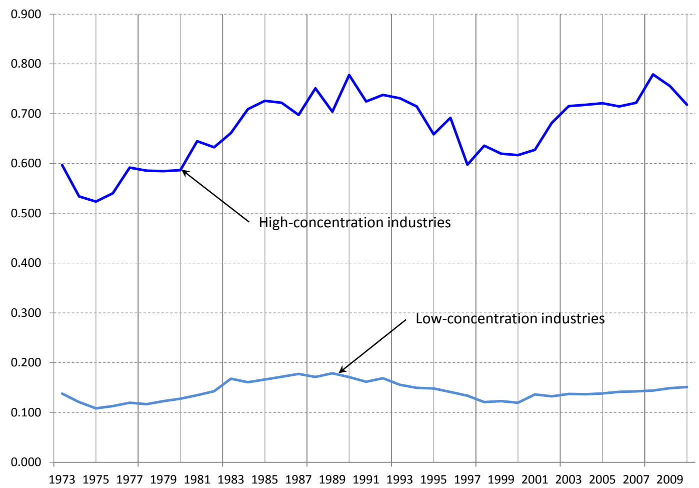
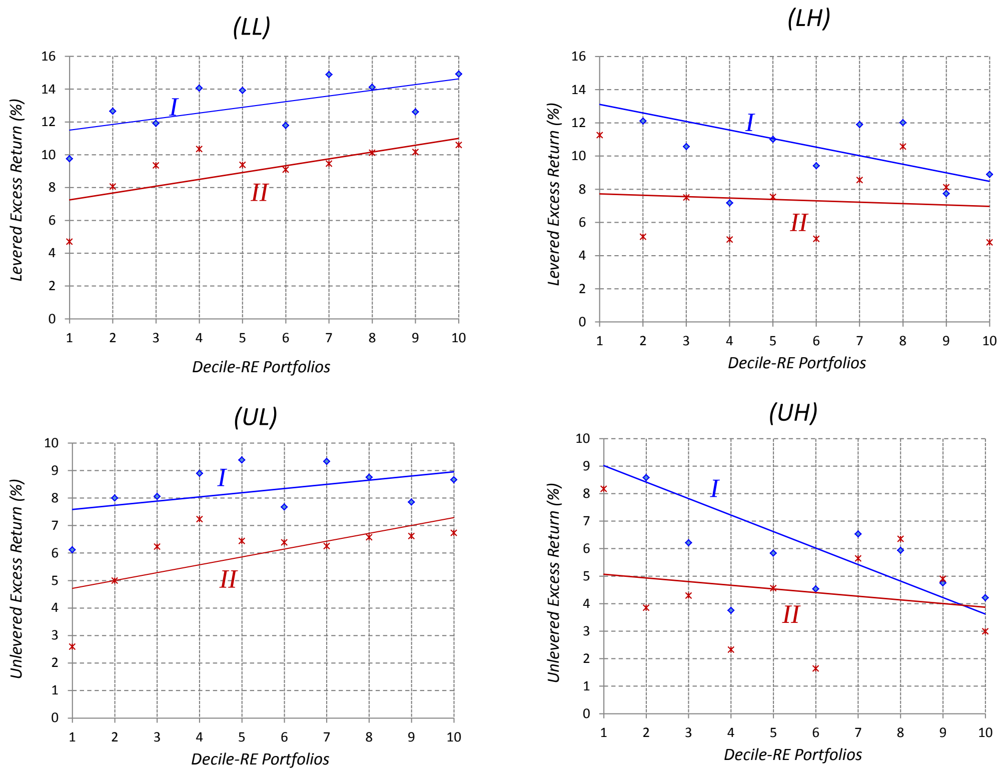
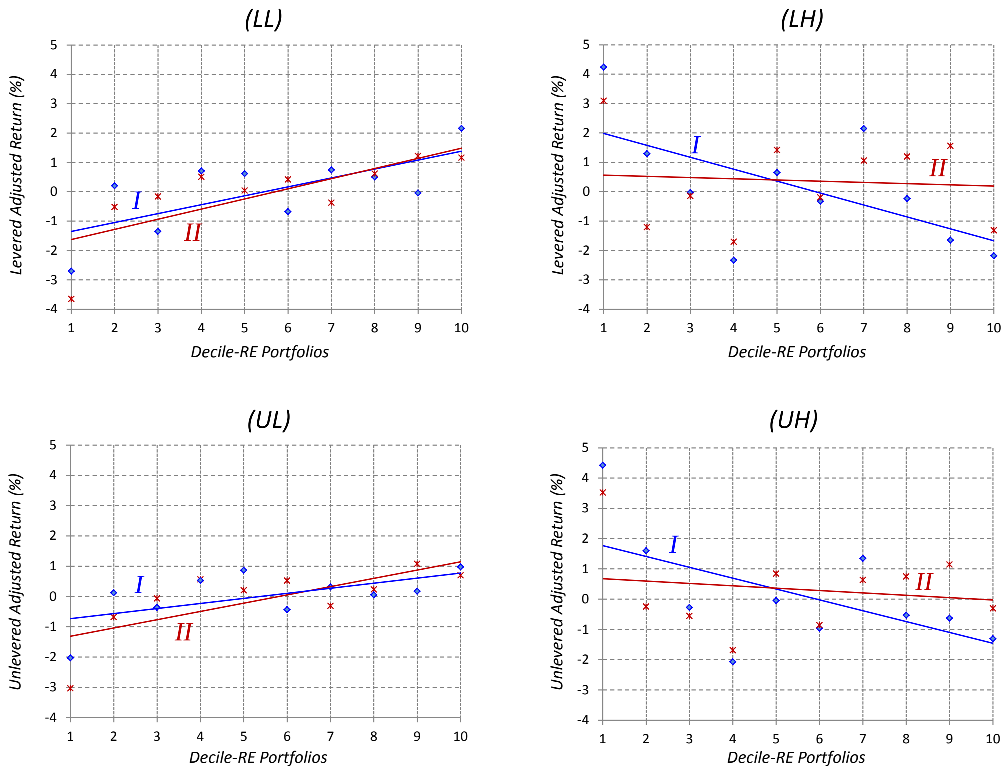


Figure 3: Trends in mean 3-year average concentrations based on net sales in the competitive and concentrated industry groups from 1973 to 2010



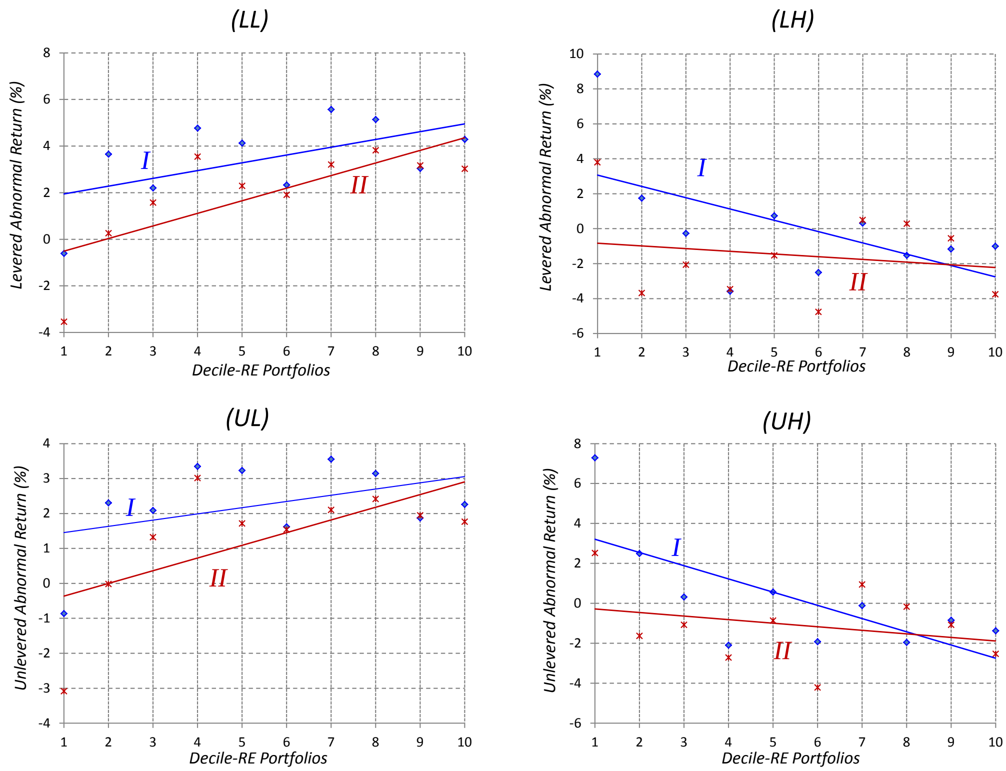
The two top quadrants, *LL* and *LH*, show respectively *average levered excess portfolio returns* in competitive industries and concentrated industries. The bottom quadrants, *UL* and *UH*, show the *average unlevered excess portfolio returns* in competitive and concentrated industries, respectively. The graphs labeled *I* (*II*) depict equally-weighted (value-weighted) average returns from 1973 to 2010.

Figure 4: Average Levered Excess Portfolio Returns



The two top quadrants, *LL* and *LH*, show respectively *average levered industry-adjusted portfolio returns* in competitive industries and concentrated industries. The bottom quadrants, *UL* and *UH*, show the *average unlevered industry-adjusted portfolio returns* in competitive and concentrated industries, respectively. The graphs labeled *I* (*II*) depict equally-weighted (value-weighted) average returns from 1973 to 2010.

Figure 5: Average Levered Industry-Adjusted Portfolio Returns



The two top quadrants, *LL* and *LH*, show respectively *abnormal returns (alphas) from levered excess portfolio returns* in competitive industries and concentrated industries. The bottom quadrants, *UL* and *UH*, show *abnormal returns from unlevered excess portfolio returns* in competitive and concentrated industries, respectively. The graphs labeled *I* (*II*) depict abnormal returns from equally-weighted (value-weighted) returns from 1973 to 2010.

Figure 6: Average Unexplained Excess Portfolio Returns or Portfolio Alphas

Appendix B: Tables

Table 1: Distributional Characteristics of Industry Concentrations

	Mean	*Median*	*SDV*	*Min.*	*Max.*	*P25*	*P75*
Hsales	0.363	0.325	0.203	0.043	0.997	0.211	0.472
Hsales_ma	0.361	0.327	0.194	0.043	0.996	0.216	0.469
Hassets	0.375	0.331	0.208	0.037	0.997	0.217	0.487
Hassets_ma	0.373	0.334	0.199	0.039	0.997	0.222	0.487

The sample consists of 7,736 industrial firms spanning the 37-year period from 1973 to 2010. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their concentration Herfindahl values. *Hsales* and *Hassets* measure industry concentration using net sales and total assets, respectively, with *Hsales_ma* and *Hassets_ma* representing their respective 3-year moving averages. *SDV*, *P25*, and *P75* stand for standard deviation, 25^{th} percentile, and 75^{th} percentile, respectively.

Table 2: Concentration Characteristics of Quintile Industry Concentration Groups

	(I) Industries			*(II) Firms*		
	Herfindahl	*Industries*	*Indus.-yrs*	*Market Power*	*Firms*	*Firm-yrs*
Competitive Indus.	0.142	26	988	0.004	869	33,025
2	0.238	27	1,015	0.016	392	14,884
3	0.329	27	1,012	0.031	287	10,902
4	0.434	27	1,015	0.058	200	7,583
Concentrated Indus.	0.663	26	995	0.121	145	5,491
DMT	*(115.32)*			*(33.77)*		

The sample consists of 7,736 industrial firms spanning the 37-year period from 1973 to 2010. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. The above statistics are the 37-year averages at the industry level in section (I) and at the firm level in section (II). The column headings *Industries*, *Indus.-yrs*, and *Firm-yrs* stand for number of industries, industry-years, and firm-years, respectively. *Market Power* is the average squared values of net-sales over aggregate industry net-sales. The DMT row reports the t-statistics of the tests of difference in means between the competitive and concentrated industry groups.

Table 3: Characteristics of Firms in Competitive and Concentrated Industries

	SALES	*TA*	*MV*	*BM*	*LEV*	*LTDR*	*REI1*	*REI2*	*REI3*	*PPEI*
Competitive Indus.	1,275	1,062	1,654	0.783	0.332	0.177	0.300	0.365	0.246	0.283
Concentrated Indus.	2,889	2,460	2,425	1.043	0.435	0.251	0.288	0.359	0.274	0.304
DMT	*(8.27)*	*(9.03)*	*(4.03)*	*(13.18)*	*(28.30)*	*(22.39)*	*(-4.50)*	*(-2.05)*	*(8.71)*	*(7.71)*

The sample consists of 7,736 industrial firms spanning the 37-year period from 1973 to 2010. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. The above statistics are the 37-year averages. *SALES*, *TA*, and *MV*, stand respectively for net sales, total assets, and market value of equity (share price times number of shares outstanding), in 2010 U.S. dollars (millions). Book to market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. *LEV* is the ratio of book value of total liabilities (*TA* minus book equity) to total market value of firm (market value of equity plus book value of total liabilities). *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. *REI1*, *REI2*, and *REI3* are respectively the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE); the ratio of buildings, capitalized leases, construction in progress, and land to PPE; and the ratio of buildings and land to PPE. On the other hand, *PPEI* is the ratio PPE to *TA*. The data is from Compustat and CRSP for firms with missing *MV* data in Compustat. The *DMT* row reports the t-statistics of the tests of difference in means between the competitive and concentrated industry groups.

Table 4: Characteristics of Firms in the Low and High Real Estate Stock Portfolios in Competitive and Concentrated Industries

	Firm-yrs	*TA*	*SALES*	*MV*	*BM*	*LTDR*	*LEV*	*REI1*	*REI2*	*REI3*	*PPEI*
Competitive Indus.											
Low-RE Firms (1a)	3,285	331	373	301	0.647	0.126	0.267	0.031	0.076	0.031	0.206
High-RE Firms (2a)	3,287	703	905	931	0.818	0.213	0.358	0.651	0.716	0.401	0.387
DMT		*(7.60)*	*(9.90)*	*(8.32)*	*(5.67)*	*(16.15)*	*(14.31)*	*(321.29)*	*(206.41)*	*(64.47)*	*(32.73)*
Concentrated Indus.											
Low-RE Firms (1b)	531	900	701	823	0.807	0.211	0.366	0.028	0.098	0.045	0.322
High-RE Firms(2b)	535	3,059	6,011	4,580	1.201	0.252	0.438	0.678	0.754	0.531	0.324
DMT		*(3.27)*	*(3.43)*	*(3.03)*	*(4.00)*	*(2.83)*	*(4.49)*	*(93.98)*	*(70.19)*	*(32.29)*	*(0.21)*
Cross-indus. DMT											
(1b) vs (1a)		*(5.16)*	*(2.83)*	*(3.95)*	*(2.45)*	*(7.71)*	*(8.33)*	*(-2.27)*	*(3.12)*	*(2.84)*	*(10.08)*
(2b) vs (2a)		*(3.61)*	*(3.31)*	*(2.95)*	*(4.81)*	*(3.52)*	*(6.42)*	*(3.89)*	*(5.27)*	*(8.45)*	*(-7.08)*

The sample consists of 7,736 industrial firms spanning the 37-year period from 1973 to 2010. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership proxied by *REI1* defined below. The above statistics are the portfolios' 37-year averages. *SALES*, *TA*, and *MV*, stand respectively for net sales, total assets, and market value of equity (share price times number of shares outstanding), in 2010 U.S. dollars (millions). Book to market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. *LEV* is the ratio of book value of total liabilities (*TA* minus book equity) to total market value of firm (market value of equity plus book value of total liabilities). *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. *REI1*, *REI2*, and *REI3* are respectively the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE); the ratio of buildings, capitalized leases, construction in progress, and land to PPE; and the ratio of buildings and land to PPE. On the other hand, *PPEI* is the ratio PPE to *TA*. The data is from Compustat and CRSP for firms with missing *MV* data in Compustat. *Low-RE* and *High-RE* are abbreviations of *Low-real estate* and *High-real estate*, respectively. The *DMT* rows report the t-statistics of the tests of difference in means between the low-real estate and high-real estate portfolios in their respective industry concentration group. *Cross-indus.* stands form *Cross-industry.*

Table 5: *Levered Excess Returns* of Real Estate-sorted Stock Portfolios from July 1973 to June 2010

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*	*DMT*
Competitive Indus.												
ew_exret	9.76	12.66	11.92	14.06	13.92	11.79	14.89	14.11	12.61	14.92	5.16	*(0.79)*
	(1.95)	*(2.85)*	*(2.73)*	*(3.65)*	*(3.51)*	*(3.21)*	*(3.91)*	*(3.72)*	*(3.29)*	*(3.57)*	*(2.25)*	
vw_exret	4.70	8.06	9.35	10.34	9.39	9.09	9.46	10.12	10.17	10.59	5.89	*(0.99)*
	(1.02)	*(2.00)*	*(2.43)*	*(2.96)*	*(2.74)*	*(2.83)*	*(3.01)*	*(2.98)*	*(3.05)*	*(2.82)*	*(2.72)*	
Concentrated Indus.												
ew_exret	17.15	12.11	10.57	7.18	11.00	9.41	11.89	12.02	7.74	8.89	-8.26	*(-1.09)*
	(2.82)	*(1.95)*	*(2.38)*	*(1.75)*	*(2.79)*	*(2.40)*	*(2.78)*	*(2.45)*	*(1.93)*	*(1.99)*	*(-1.65)*	
vw_exret	11.26	5.13	7.51	4.96	7.54	5.01	8.55	10.57	8.12	4.79	-6.46	*(-1.00)*
	(2.12)	*(1.02)*	*(2.01)*	*(1.36)*	*(2.16)*	*(1.44)*	*(2.55)*	*(2.92)*	*(2.24)*	*(1.28)*	*(-1.45)*	

The above figures represent annualized average monthly levered excess returns (in percents) earned by the real estate-sorted decile stock portfolios in the competitive and concentrated industry groups) for the 444-month period from July 1973 to June 2010 and their *t*-statistics (italicized figures in parentheses). Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). The rows labeled *ew_exret* and *vw_exret* stand respectively for equally-weighted and value-weighted levered excess returns over the risk-free rate, proxied by the 1-month Treasury bill rates from Ibbotson and Associates. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership. Stock return and accounting data are from CRSP and Compustat, respectively. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The *DMT* column reports the t-statistics of the tests of difference in mean returns between *Low* and *High* real estate portfolios.

Table 6: *Levered Industry-Adjusted Returns* of Real Estate-sorted Stock Portfolios from July 1973 to June 2010

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*	*DMT*
Competitive Indus.												
ew_adjret	-2.71	0.20	-1.35	0.71	0.62	-0.68	0.74	0.50	-0.04	2.16	4.86	*(2.69)*
	(-1.86)	*(0.18)*	*(-1.36)*	*(0.76)*	*(0.59)*	*(-0.67)*	*(0.73)*	*(0.51)*	*(-0.05)*	*(2.01)*	*(2.80)*	
vw_adjret	-3.65	-0.51	-0.16	0.51	0.04	0.42	-0.37	0.62	1.22	1.16	4.81	*(2.73)*
	(-2.48)	*(-0.53)*	*(-0.20)*	*(0.65)*	*(0.06)*	*(0.51)*	*(-0.40)*	*(0.78)*	*(1.67)*	*(1.20)*	*(3.06)*	
Concentrated Indus.												
ew_adjret	4.24	1.29	-0.03	-2.33	0.65	-0.33	2.15	-0.24	-1.65	-2.18	-6.42	*(-1.73)*
	(1.47)	*(0.44)*	*(-0.02)*	*(-1.08)*	*(0.34)*	*(-0.18)*	*(1.03)*	*(-0.09)*	*(-0.69)*	*(-0.93)*	*(-1.72)*	
vw_adjret	3.09	-1.21	-0.14	-1.70	1.42	-0.19	1.06	1.20	1.56	-1.31	-4.41	*(-1.65)*
	(1.46)	*(-0.52)*	*(-0.09)*	*(-1.19)*	*(1.14)*	*(-0.15)*	*(0.86)*	*(0.88)*	*(0.96)*	*(-0.81)*	*(-1.58)*	

The above figures represent annualized average monthly levered industry-adjusted returns (in percents) earned by the real estate-sorted decile stock portfolios in the competitive and concentrated industry groups for the 444-month period from July 1973 to June 2010 and their *t*-statistics (italicized figures in parentheses). Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). The rows labeled *ew_adjret* and *vw_adjret* stand respectively for equally-weighted and value-weighted levered industry-adjusted returns. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership. Stock return and accounting data are from CRSP and Compustat, respectively. Equally-weighted industry-adjusted returns (*ew_adjret*) and value-weighted industry-adjusted returns (*vw_adjret*) refer to respectively the annualized equally-weighted and value-weighted average monthly stock returns minus the equally-weighted or value-weighted average monthly returns on the industry portfolio regrouping firms sharing the same 3-digit SIC code. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The *DMT* column reports the t-statistics of the tests of difference in mean returns between *Low* and *High* real estate portfolios.

Table 7: *Unlevered Excess Returns* of Real Estate-sorted Stock Portfolios from July 1973 to June 2010

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*	*DMT*
Competitive Indus.												
ew_exuret	6.11	8.00	8.05	8.89	9.38	7.67	9.33	8.75	7.85	8.66	2.55	*(0.53)*
	(1.12)	*(1.79)*	*(1.89)*	*(2.51)*	*(2.58)*	*(2.17)*	*(2.74)*	*(2.54)*	*(2.15)*	*(2.20)*	*(1.38)*	
vw_exuret	2.59	5.00	6.23	7.23	6.43	6.38	6.25	6.57	6.61	6.73	4.14	*(0.88)*
	(0.25)	*(0.98)*	*(1.45)*	*(2.02)*	*(1.79)*	*(1.92)*	*(1.92)*	*(1.91)*	*(1.91)*	*(1.64)*	*(2.23)*	
Concentrated Indus.												
ew_exuret	12.86	8.58	6.21	3.75	5.84	4.53	6.53	5.94	4.75	4.21	-8.65	*(-1.73)*
	(2.53)	*(1.48)*	*(1.26)*	*(0.43)*	*(1.34)*	*(0.80)*	*(1.51)*	*(1.07)*	*(0.93)*	*(0.60)*	*(-2.45)*	
vw_exuret	8.17	3.85	4.29	2.32	4.56	1.64	5.64	6.35	4.90	2.99	-5.18	*(-1.16)*
	(1.61)	*(0.44)*	*(0.71)*	*(-0.06)*	*(0.93)*	*(-0.35)*	*(1.56)*	*(1.65)*	*(1.17)*	*(0.31)*	*(-1.65)*	

The above figures represent annualized average monthly unlevered excess returns (in percents) earned by the real estate-sorted decile stock portfolios in the competitive and concentrated industry groups for the 444-month period from July 1973 to June 2010 and their t-statistics (italicized figures in parentheses). Unlevered return calculations assume no take taxes and a cost of the debt of 7% across the board. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). The rows labeled *ew_exuret* and *vw_exuret* stand respectively for equally-weighted and value-weighted unlevered excess returns over the risk-free rate, proxied by the 1-month Treasury bill rates from Ibbotson and Associates. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership. Stock return and accounting data are from CRSP and Compustat, respectively. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The *DMT* column reports the t-statistics of the tests of difference in mean returns between *Low* and *High* real estate portfolios.

Table 8: *Unlevered Industry-adjusted Returns* of Real Estate-sorted Stock Portfolios from July 1973 to June 2010

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*	*DMT*
Competitive Indus.												
ew_adjuret	-2.03	0.12	-0.36	0.53	0.87	-0.44	0.31	0.05	0.17	0.98	3.01	*(2.20)*
	(-1.64)	*(0.22)*	*(-0.58)*	*(0.77)*	*(1.08)*	*(-0.64)*	*(0.37)*	*(0.02)*	*(0.27)*	*(1.12)*	*(2.24)*	
vw_adjuret	-3.04	-0.68	-0.07	0.56	0.20	0.52	-0.31	0.23	1.07	0.69	3.73	*(2.47)*
	(-2.22)	*(-0.81)*	*(-0.25)*	*(0.90)*	*(0.36)*	*(0.78)*	*(-0.36)*	*(0.38)*	*(1.98)*	*(0.83)*	*(2.85)*	
Concentrated Indus.												
ew_adjuret	4.42	1.60	-0.28	-2.07	-0.05	-0.96	1.35	-0.53	-0.63	-1.31	-5.74	*(-2.15)*
	(2.25)	*(0.80)*	*(-0.20)*	*(-1.60)*	*(-0.20)*	*(-0.94)*	*(0.97)*	*(-0.34)*	*(-0.35)*	*(-0.71)*	*(-2.11)*	
vw_adjuret	3.52	-0.24	-0.55	-1.69	0.84	-0.87	0.63	0.75	1.14	-0.30	-3.83	*(-1.96)*
	(2.27)	*(-0.12)*	*(-0.67)*	*(-1.69)*	*(0.84)*	*(-1.05)*	*(0.72)*	*(0.79)*	*(1.19)*	*(-0.10)*	*(-1.88)*	

The above figures represent annualized average monthly unlevered industry-adjusted returns (in percents) earned by the real estate-sorted decile stock portfolios in the competitive and concentrated industry groups for the 444-month period from July 1973 to June 2010 and their t-statistics (italicized figures in parentheses). Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). The rows labeled *ew_adjuret* and *vw_adjuret* stand respectively for equally-weighted and value-weighted unlevered industry-adjusted returns. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership. Stock return and accounting data are from CRSP and Compustat, respectively. Equally-weighted industry-adjusted returns (*ew_adjret*) and value-weighted industry-adjusted returns (*vw_adjret*) refer to respectively the annualized equally-weighted and value-weighted average monthly stock returns minus the equally-weighted or value-weighted average monthly returns on the industry portfolio regrouping firms sharing the same 3-digit SIC code. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The *DMT* column reports the t-statistics of the tests of difference in mean returns between *Low* and *High* real estate portfolios.

Table 9: Average Unexplained Excess Returns (Alphas) on Equally-weighted Levered Excess Returns (*ew_exret*) in *Competitive Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	-0.61	3.65	2.20	4.76	4.13	2.33	5.57	5.14	3.04	4.28	4.90
	(-0.24)	*(1.75)*	*(1.25)*	*(3.15)*	*(2.63)*	*(1.66)*	*(3.73)*	*(3.58)*	*(1.86)*	*(2.27)*	*(2.21)*
r_m-r_f	1.089	1.041	1.085	1.032	1.087	1.044	1.017	0.989	0.978	1.015	-0.0737
	(23.31)	*(26.77)*	*(33.03)*	*(36.53)*	*(37.16)*	*(39.92)*	*(36.48)*	*(36.93)*	*(32.08)*	*(28.75)*	*(-1.79)*
smb	1.379	1.119	1.132	0.936	0.927	0.824	0.933	0.966	1.003	1.165	-0.214
	(20.70)	*(20.18)*	*(24.17)*	*(23.23)*	*(22.22)*	*(22.09)*	*(23.46)*	*(25.28)*	*(23.05)*	*(23.13)*	*(-3.64)*
hml	-0.0626	-0.102	-0.0162	0.0913	0.137	0.187	0.112	0.0533	0.158	0.216	0.279
	(-0.89)	*(-1.75)*	*(-0.33)*	*(2.15)*	*(3.12)*	*(4.76)*	*(2.67)*	*(1.32)*	*(3.44)*	*(4.07)*	*(4.49)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.762*	*0.790*	*0.845*	*0.853*	*0.851*	*0.861*	*0.853*	*0.863*	*0.827*	*0.805*	*0.115*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from equally-weighted monthly levered excess portfolio returns (*ew_exret*) in competitive industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 10: Average Unexplained Excess Returns (Alphas) on Value-weighted Levered Excess Returns (*vw_exret*) in *Competitive Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	-3.54	0.25	1.57	3.54	2.29	1.91	3.20	3.82	3.17	3.02	6.56
	(-1.90)	*(0.17)*	*(1.23)*	*(2.90)*	*(2.08)*	*(1.72)*	*(2.80)*	*(3.17)*	*(2.35)*	*(2.01)*	*(3.20)*
r_m-r_f	1.084	1.072	1.083	0.967	1.012	0.998	0.904	0.943	0.906	0.952	-0.132
	(31.13)	*(37.92)*	*(45.46)*	*(42.46)*	*(49.46)*	*(48.26)*	*(42.38)*	*(41.99)*	*(36.01)*	*(33.88)*	*(-3.45)*
smb	1.143	0.852	0.759	0.688	0.601	0.483	0.547	0.632	0.691	0.885	-0.258
	(23.00)	*(21.14)*	*(22.33)*	*(21.18)*	*(20.57)*	*(16.37)*	*(17.99)*	*(19.74)*	*(19.25)*	*(22.07)*	*(-4.72)*
hml	-0.315	-0.190	-0.142	-0.163	-0.0924	0.0194	-0.106	-0.196	-0.0612	-0.130	0.185
	(-6.02)	*(-4.47)*	*(-3.96)*	*(-4.76)*	*(-3.00)*	*(0.63)*	*(-3.32)*	*(-5.81)*	*(-1.62)*	*(-3.07)*	*(3.22)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.844*	*0.866*	*0.895*	*0.884*	*0.902*	*0.887*	*0.874*	*0.881*	*0.844*	*0.847*	*0.143*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from value-weighted monthly levered excess portfolio returns (*vw_exret*) in competitive industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 11: Average Unexplained Excess Returns (Alphas) on Equally-weighted Unlevered Excess Returns (*ew_exuret*) in *Competitive Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	-0.87	2.30	2.09	3.35	3.23	1.62	3.55	3.14	1.87	2.26	3.12
	(-0.42)	*(1.33)*	*(1.46)*	*(2.87)*	*(2.48)*	*(1.51)*	*(3.09)*	*(3.01)*	*(1.56)*	*(1.57)*	*(1.82)*
$r_{m,t} - r_{f,t}$	0.789	0.702	0.698	0.670	0.729	0.709	0.685	0.661	0.651	0.641	-0.147
	(20.59)	*(21.69)*	*(26.22)*	*(30.75)*	*(30.02)*	*(35.46)*	*(31.98)*	*(33.95)*	*(29.20)*	*(23.92)*	*(-4.61)*
smb	1.001	0.803	0.784	0.617	0.610	0.542	0.601	0.642	0.648	0.794	-0.207
	(18.31)	*(17.37)*	*(20.62)*	*(19.85)*	*(17.60)*	*(19.02)*	*(19.68)*	*(23.14)*	*(20.39)*	*(20.75)*	*(-4.53)*
hml	-0.152	-0.177	-0.107	-0.0444	0.0183	0.0655	-0.00274	-0.0390	0.0411	0.0355	0.187
	(-2.64)	*(-3.65)*	*(-2.67)*	*(-1.36)*	*(0.50)*	*(2.18)*	*(-0.09)*	*(-1.33)*	*(1.23)*	*(0.88)*	*(3.90)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.724*	*0.733*	*0.792*	*0.815*	*0.793*	*0.832*	*0.819*	*0.847*	*0.800*	*0.761*	*0.181*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from equally-weighted monthly unlevered excess portfolio returns (*ew_exuret*) in competitive industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 12: Average Unexplained Excess Returns (Alphas) on Value-weighted Unlevered Excess Returns (*vw_exuret*) in *Competitive Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	-3.08	-0.02	1.32	3.01	1.72	1.54	2.10	2.41	1.94	1.76	4.85
	(-1.76)	*(-0.01)*	*(1.12)*	*(2.85)*	*(1.86)*	*(1.74)*	*(2.23)*	*(2.51)*	*(1.81)*	*(1.31)*	*(2.80)*
$r_{m,t} - r_{f,t}$	0.801	0.736	0.736	0.661	0.715	0.710	0.652	0.675	0.629	0.654	-0.147
	(24.44)	*(29.03)*	*(33.53)*	*(33.60)*	*(41.48)*	*(43.07)*	*(37.06)*	*(37.62)*	*(31.40)*	*(26.16)*	*(-4.56)*
smb	0.894	0.657	0.562	0.507	0.429	0.338	0.375	0.432	0.516	0.679	-0.215
	(19.12)	*(18.17)*	*(17.95)*	*(18.06)*	*(17.43)*	*(14.38)*	*(14.92)*	*(16.88)*	*(18.06)*	*(19.06)*	*(-4.66)*
hml	-0.349	-0.248	-0.204	-0.221	-0.127	-0.0327	-0.136	-0.199	-0.104	-0.184	0.164
	(-7.08)	*(-6.51)*	*(-6.19)*	*(-7.48)*	*(-4.91)*	*(-1.32)*	*(-5.13)*	*(-7.36)*	*(-3.47)*	*(-4.91)*	*(3.39)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.787*	*0.813*	*0.838*	*0.843*	*0.872*	*0.864*	*0.844*	*0.859*	*0.817*	*0.791*	*0.171*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from value-weighted monthly unlevered excess portfolio returns (*vw_exuret*) in competitive industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 13: Average Unexplained Excess Returns (Alphas) on Equally-weighted Levered Excess Returns (*ew_exret*) in *Concentrated Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	8.84	1.74	-0.27	-3.59	0.73	-2.51	0.31	-1.54	-1.17	-1.00	-9.84
	(1.96)	*(0.37)*	*(-0.09)*	*(-1.35)*	*(0.28)*	*(-1.09)*	*(0.11)*	*(-0.44)*	*(-0.41)*	*(-0.30)*	*(-2.01)*
$r_{m,t} - r_{f,t}$	1.078	1.089	1.050	0.949	0.903	1.046	1.082	1.113	0.898	0.863	-0.215
	(12.83)	*(12.30)*	*(18.67)*	*(19.17)*	*(18.21)*	*(24.36)*	*(20.82)*	*(16.96)*	*(17.13)*	*(13.78)*	*(-2.36)*
smb	1.152	1.245	0.826	0.921	0.827	0.763	0.770	0.911	0.758	0.934	-0.218
	(9.61)	*(9.86)*	*(10.29)*	*(13.03)*	*(11.69)*	*(12.45)*	*(10.39)*	*(9.73)*	*(10.13)*	*(10.45)*	*(-1.68)*
hml	-0.302	0.0285	0.452	0.480	0.496	0.715	0.603	0.863	0.279	0.392	0.694
	(-2.39)	*(0.21)*	*(5.35)*	*(6.45)*	*(6.65)*	*(11.07)*	*(7.71)*	*(8.75)*	*(3.54)*	*(4.16)*	*(5.06)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.479*	*0.442*	*0.560*	*0.602*	*0.567*	*0.671*	*0.596*	*0.512*	*0.533*	*0.461*	*0.106*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from equally-weighted monthly levered excess portfolio returns (*ew_exret*) in concentrated industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 14: Average Unexplained Excess Returns (Alphas) on Value-weighted Levered Excess Returns (*vw_exret*) in *Concentrated Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	3.79	-3.68	-2.06	-3.47	-1.54	-4.76	0.50	0.28	-0.56	-3.76	-7.56
	(1.07)	*(-1.15)*	*(-0.91)*	*(-1.51)*	*(-0.76)*	*(-2.44)*	*(0.25)*	*(0.12)*	*(-0.24)*	*(-1.51)*	*(-1.75)*
$r_{m,t} - r_{f,t}$	1.183	1.194	1.085	0.969	0.999	1.062	0.979	0.977	0.925	0.929	-0.254
	(17.79)	*(20.01)*	*(25.53)*	*(22.55)*	*(26.31)*	*(29.16)*	*(26.48)*	*(22.32)*	*(21.28)*	*(19.94)*	*(-3.15)*
smb	0.748	0.828	0.419	0.522	0.496	0.397	0.363	0.517	0.614	0.608	-0.140
	(7.89)	*(9.73)*	*(6.91)*	*(8.51)*	*(9.16)*	*(7.64)*	*(6.88)*	*(8.27)*	*(9.90)*	*(9.15)*	*(-1.22)*
hml	-0.305	-0.104	0.444	0.271	0.385	0.524	0.295	0.634	0.306	0.279	0.584
	(-3.05)	*(-1.16)*	*(6.94)*	*(4.19)*	*(6.74)*	*(9.57)*	*(5.31)*	*(9.63)*	*(4.68)*	*(3.99)*	*(4.82)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.569*	*0.616*	*0.647*	*0.618*	*0.676*	*0.701*	*0.666*	*0.600*	*0.607*	*0.576*	*0.109*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from value-weighted monthly levered excess portfolio returns (*vw_exret*) in concentrated industries. The italicized figures in parentheses are the t-statistics of the coefficient estimates. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 15: Average Unexplained Excess Returns (Alphas) on Equally-weighted Unlevered Excess Returns (*ew_exuret*) in *Concentrated Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	7.28	2.50	0.32	-2.10	0.56	-1.92	-0.11	-1.96	-0.85	-1.38	-8.65
	(2.29)	*(0.76)*	*(0.15)*	*(-1.33)*	*(0.37)*	*(-1.36)*	*(-0.06)*	*(-0.85)*	*(-0.50)*	*(-0.62)*	*(-2.57)*
$r_{m,t} - r_{f,t}$	0.710	0.633	0.636	0.534	0.519	0.614	0.625	0.676	0.543	0.518	-0.191
	(11.98)	*(10.33)*	*(16.34)*	*(18.05)*	*(18.19)*	*(23.29)*	*(19.22)*	*(15.72)*	*(17.22)*	*(12.63)*	*(-3.05)*
smb	0.789	0.801	0.483	0.541	0.439	0.391	0.433	0.472	0.489	0.486	-0.303
	(9.33)	*(9.17)*	*(8.70)*	*(12.82)*	*(10.79)*	*(10.39)*	*(9.34)*	*(7.69)*	*(10.87)*	*(8.30)*	*(-3.38)*
hml	-0.199	-0.0265	0.153	0.215	0.187	0.350	0.347	0.514	0.190	0.216	0.415
	(-2.24)	*(-0.29)*	*(2.62)*	*(4.82)*	*(4.36)*	*(8.82)*	*(7.09)*	*(7.95)*	*(4.01)*	*(3.50)*	*(4.40)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.452*	*0.383*	*0.499*	*0.585*	*0.561*	*0.637*	*0.554*	*0.453*	*0.544*	*0.393*	*0.132*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from equally-weighted monthly unlevered excess portfolio returns (*ew_exuret*) in concentrated industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 16: Average Unexplained Excess Returns (Alphas) on Value-weighted Unlevered Excess Returns (*vw_exuret*) in *Concentrated Industries*

RE-sorted Portf.	*Low*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*High*	*High-Low*
alpha	2.52	-1.63	-1.08	-2.71	-0.87	-4.21	0.94	-0.17	-1.08	-2.53	-5.05
	(0.96)	*(-0.73)*	*(-0.72)*	*(-1.69)*	*(-0.61)*	*(-3.20)*	*(0.77)*	*(-0.10)*	*(-0.72)*	*(-1.39)*	*(-1.65)*
$r_{m,t} - r_{f,t}$	0.792	0.731	0.654	0.601	0.630	0.677	0.583	0.633	0.594	0.627	-0.165
	(16.13)	*(17.67)*	*(23.49)*	*(20.04)*	*(23.96)*	*(27.65)*	*(25.32)*	*(20.27)*	*(21.38)*	*(18.42)*	*(-2.87)*
smb	0.515	0.540	0.236	0.338	0.295	0.208	0.198	0.265	0.438	0.327	-0.188
	(7.35)	*(9.14)*	*(5.94)*	*(7.89)*	*(7.85)*	*(5.94)*	*(6.04)*	*(5.95)*	*(11.04)*	*(6.73)*	*(-2.29)*
hml	-0.0856	-0.0702	0.200	0.121	0.195	0.289	0.168	0.429	0.245	0.197	0.282
	(-1.16)	*(-1.13)*	*(4.78)*	*(2.67)*	*(4.94)*	*(7.84)*	*(4.85)*	*(9.13)*	*(5.86)*	*(3.84)*	*(3.26)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.505*	*0.564*	*0.609*	*0.570*	*0.633*	*0.672*	*0.642*	*0.537*	*0.618*	*0.513*	*0.083*

This table reports estimated *alphas* (in percents and annualized) and other coefficient estimates from value-weighted monthly unlevered excess portfolio returns (*vw_exuret*) in concentrated industries. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Column 2 (labeled *Low*) to column 11 (labeled *High*) are the stock portfolios sorted in increasing order of real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The column labeled *High-Low* reports returns on an investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership.

Table 17: Robustness Checks - *Unlevered Excess and Industry-Adjusted Returns* on the Synthetic Long (*High-Low*) Real Estate Investment Strategy from July 1973 to June 2010 using Alternative Real Estate Measures

	(1) *Base Case*	*(2)* *REI2*	*(3)* *PPEI*	*(4)* *AREI*
Competitive Industries				
ew_exuret	2.55	1.71	-1.22	3.52**
	(1.38)	*(0.79)*	*(-0.41)*	*(2.37)*
vw_exuret	4.14**	4.70**	4.33	4.01***
	(2.23)	*(2.18)*	*(1.56)*	*(2.69)*
ew_adjuret	3.01**	2.74*	2.33	3.74**
	(2.24)	*(1.88)*	*(1.58)*	*(2.53)*
vw_adjuret	3.73***	4.28***	4.86***	4.53***
	(2.85)	*(2.84)*	*(2.92)*	*(3.26)*
Concentrated Industries				
ew_exuret	−8.65**	−9.14**	-3.37	−5.71*
	(-2.45)	*(-2.25)*	*(-1.12)*	*(-1.88)*
vw_exuret	−5.18*	-5.01	-3.02	-1.03
	(-1.65)	*(-1.52)*	*(-0.99)*	*(-0.41)*
ew_adjuret	−5.74**	−6.11**	-1.50	−5.42*
	(-2.11)	*(-2.08)*	*(-0.60)*	*(-1.85)*
vw_adjuret	−3.83*	-2.78	-0.36	-1.11
	(-1.88)	*(-1.33)*	*(-0.17)*	*(-0.47)*

The above figures represent annualized average monthly unlevered excess and industry-adjusted returns (in percents) generated by the *High-Low* investment strategy in competitive and concentrated industries during the 444-month period from July 1973 to June 2010 and their t-statistics (italicized figures in parentheses). The *High-Low* investment strategy consists of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership. In column (*1*), the *Base Case*, firms are sorted into decile portfolios according to *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE). The figures in columns (*2*) to (*4*) are based on different measures of real estate ownership. *REI2* and *PPEI* are respectively the ratio of buildings, capitalized leases, construction in progress, and land to PPE, and the ratio PPE to total assets (TA). *AREI*, on the other hand, is firm *REI1* minus the average industry *REI* (i.e., firms belonging to the same 3-digit Compustat SIC). The rows labeled *ew_exuret* and *vw_exuret* stand respectively for equally-weighted and value-weighted unlevered excess returns over the risk-free rate, proxied by the 1-month Treasury bill rates from Ibbotson and Associates. Unlevered return calculations assume no taxes and a cost of debt of 7% across the board. The rows labeled *ew_adjuret* and *vw_adjuret* are respectively equally-weighted and value-weighted unlevered industry-adjusted returns. Equally-weighted and value-weighted industry-adjusted returns refer to respectively the annualized equally-weighted and value-weighted average monthly stock returns minus the equally-weighted or value-weighted average monthly returns on the industry portfolio regrouping firms sharing the same 3-digit SIC. Stock return and accounting data are from CRSP and Compustat, respectively. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 18: Robustness Checks - *Unlevered Excess and Industry-Adjusted Returns* on the Synthetic Long (*High-Low*) Real Estate Investment Strategy from July 1973 to June 2010 on Quintile Portfolios and using Alternative Industry Concentration Measures

	(1) *Base Case*	*(2)* *Quintile Portf.*	*(3)* *2-digit SIC*	*(4)* *FF Indus.*	*(5)* *Hassets*
Competitive Industries					
ew_exuret	2.55	1.19	1.94	0.67	3.20*
	(1.38)	*(0.79)*	*(0.99)*	*(0.39)*	*(1.83)*
vw_exuret	4.14**	2.47	3.44*	3.45**	4.17**
	(2.23)	*(1.60)*	*(1.79)*	*(2.22)*	*(2.25)*
ew_adjuret	3.01**	1.52	2.09	1.08	2.66*
	(2.24)	*(1.63)*	*(1.20)*	*(0.84)*	*(1.90)*
vw_adjuret	3.73***	2.42***	3.62**	3.02***	4.07***
	(2.85)	*(2.92)*	*(2.39)*	*(2.58)*	*(2.95)*
Concentrated Industries					
ew_exuret	−8.65**	−5.79**	-0.62	−9.64*	−5.07*
	(-2.45)	*(-2.17)*	*(-0.17)*	*(-1.94)*	*(-1.65)*
vw_exuret	−5.18*	-3.21	-4.46	−12.15**	-4.06
	(-1.65)	*(-1.43)*	*(-1.46)*	*(-2.30)*	*(-1.45)*
ew_adjuret	−5.74**	−3.62**	-0.66	−7.61*	-2.77
	(-2.11)	*(-1.96)*	*(-0.22)*	*(-1.83)*	*(-1.02)*
vw_adjuret	−3.83*	-1.85	-1.67	−9.31*	-1.85
	(-1.88)	*(-1.42)*	*(-0.68)*	*(-1.91)*	*(-0.93)*

The above figures represent annualized average monthly unlevered excess and industry-adjusted returns (in percents) generated by the *High-Low* investment strategy in competitive and concentrated industries during the 444-month period from July 1973 to June 2010 and their t-statistics (italicized figures in parentheses). The *High-Low* investment strategy consists of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC (except in columns (*3*) and (*4*)), resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales (except in column (*5*)). Firms in the competitive and concentrated industry groups are then sorted into decile portfolios (except in column (*2*)) according to real estate ownership, proxied by *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE). Column (*1*) represents the *Base Case*. Column (*2*) lists returns on quintile, rather than decile, portfolios based on *REI1*. In columns (*3*), firms are assigned to industries according to their 2-digit Compustat SICs, whereas column (*4*) uses the 48 Fama and industry groups. In column (*5*), industry concentrations are based on total assets, rather than net sales. The rows labeled *ew_exuret* and *vw_exuret* stand respectively for equally-weighted and value-weighted unlevered excess returns over the risk-free rate, proxied by the 1-month Treasury bill rates from Ibbotson and Associates. Unlevered return calculations assume no taxes and a cost of debt of 7% across the board. The rows labeled *ew_adjuret* and *vw_adjuret* are respectively equally-weighted and value-weighted unlevered industry-adjusted returns. Equally-weighted and value-weighted industry-adjusted returns refer to respectively the annualized equally-weighted and value-weighted average monthly stock returns minus the equally-weighted or value-weighted average monthly returns on the industry portfolio regrouping firms sharing the same 3-digit SIC. Stock return and accounting data are from CRSP and Compustat, respectively. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 19: Robustness Checks - Average Unexplained Excess Returns (Alphas) on the Synthetic Long (*High-Low*) Real Estate Strategy in Competitive and Concentrated Industries from 1973 to 2005

	Competitive Industries				Concentrated Industries			
	(1)	*(2)*	*(3)*	*(4)*	*(1')*	*(2')*	*(3')*	*(4')*
Dependent variable	*ew_exret*	*vw_exret*	*ew_exuret*	*vw_exuret*	*ew_exret*	*vw_exret*	*ew_exuret*	*vw_exuret*
alpha	5.42**	6.73***	3.37*	4.64**	−12.60**	−10.63**	-9.70***	−6.84**
	(2.37)	*(3.08)*	*(1.92)*	*(2.53)*	*(-2.45)*	*(-2.31)*	*(-2.79)*	*(-2.10)*
r_m-r_f	−0.141***	−0.164***	−0.194***	−0.162***	-0.092	-0.130	−0.136**	-0.098
	(-3.12)	*(-3.80)*	*(-5.59)*	*(-4.47)*	*(-0.90)*	*(-1.43)*	*(-1.98)*	*(-1.52)*
smb	−0.248***	−0.283***	−0.229***	−0.229***	−0.233*	-0.137	−0.356***	−0.219***
	(-4.22)	*(-5.03)*	*(-5.09)*	*(-4.86)*	*(-1.76)*	*(-1.16)*	*(-3.99)*	*(-2.61)*
hml	0.169**	0.116*	0.108**	0.121**	0.873***	0.751***	0.467***	0.350***
	(2.51)	*(1.79)*	*(2.09)*	*(2.24)*	*(5.73)*	*(5.51)*	*(4.55)*	*(3.64)*
N	*390*	*390*	*390*	*390*	*390*	*390*	*390*	*390*
Adj. R-squared	*0.139*	*0.161*	*0.222*	*0.186*	*0.132*	*0.127*	*0.163*	*0.095*

This table presents the regression results of levered and unlevered excess returns on the *High-Low* investment strategy from 1973 to 2005. This investment strategy consists of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. Columns (*1*) to (*4*) apply to competitive industries, whereas columns (*1'*) to (*4'*) are for concentrated industries. The sample consists of 7,736 industrial firms. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*), with the bottom-decile and top-decile portfolios in each group take as its low-real estate and high-real estate portfolios. *ew_exret* and *vw_exret* are respectively the levered equally-weighted and value-weighted levered monthly excess returns, with*ew_exuret* and *vw_exuret* coming the unlevered returns. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Average unexplained excess returns (alphas) are annualized values. $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* being from Kenneth French's website. The italicized figures in parentheses are the t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 20: Risk Exposure under the Synthetic Long (*High-Low*) Real Estate Strategy in Competitive and Concentrated Industries

	Competitive Industries				Concentrated Industries			
	(1)	*(2)*	*(3)*	*(4)*	*(1')*	*(2')*	*(3')*	*(4')*
Dependent variable	*ew_exret*	*vw_exret*	*ew_exuret*	*vw_exuret*	*ew_exret*	*vw_exret*	*ew_exuret*	*vw_exuret*
alpha	4.90**	6.56***	3.12*	4.85***	−9.84**	−7.56*	−8.65**	−5.05*
	(2.21)	*(3.20)*	*(1.82)*	*(2.80)*	*(-2.01)*	*(-1.75)*	*(-2.57)*	*(-1.65)*
$r_{m,t} - r_{f,t}$	−0.074*	−0.132***	−0.147***	−0.147***	−0.215**	−0.254***	−0.191***	−0.165***
	(-1.79)	*(-3.45)*	*(-4.61)*	*(-4.56)*	*(-2.36)*	*(-3.15)*	*(-3.05)*	*(-2.87)*
smb	−0.214***	−0.258***	−0.207***	−0.215***	−0.218*	−0.140	−0.303***	−0.188**
	(-3.64)	*(-4.72)*	*(-4.53)*	*(-4.66)*	*(-1.68)*	*(-1.22)*	*(-3.38)*	*(-2.29)*
hml	0.279***	0.185***	0.187***	0.164***	0.694***	0.584***	0.415***	0.282***
	(4.49)	*(3.22)*	*(3.90)*	*(3.39)*	*(5.06)*	*(4.82)*	*(4.40)*	*(3.26)*
N	*444*	*444*	*444*	*444*	*444*	*444*	*444*	*444*
Adj. R-squared	*0.115*	*0.143*	*0.181*	*0.171*	*0.106*	*0.109*	*0.132*	*0.083*

This table presents the regression results of levered and unlevered excess returns on the *High-Low* investment strategy consisting of holding the high-real estate stocks and simultaneously shorting the low-real estate stocks within the same industry concentration group. Columns (*1*) to (*4*) apply to competitive industries, whereas columns (*1'*) to (*4'*) are for concentrated industries. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*), with the bottom-decile and top-decile portfolios in each group take as its low-real estate and high-real estate portfolios. *ew_exret* and *vw_exret* are respectively the levered equally-weighted and value-weighted levered monthly excess returns, with*ew_exuret* and *vw_exuret* coming the unlevered returns. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. These estimates are based on the 3-factor model 1 consisting of the excess market return ($r_{m,t} - r_{f,t}$) and the two Fama and French stock risk factors, *smb* and *hml*. Average unexplained excess returns (alphas) are annualized values. $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* being from Kenneth French's website. The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 21: Impact of REITs on Average Unexplained Excess Returns (Alphas) under the Synthetic Long (*High-Low*) Real Estate Investment Strategy

	Competitive Industries		Concentrated Industries	
	(1)	*(2)*	*(1')*	*(2')*
	vw_exret	*vw_exuret*	*vw_exret*	*vw_exuret*
alpha	6.48**	6.26***	−10.15*	−6.77*
	(2.39)	*(2.74)*	*(-1.78)*	*(-1.66)*
reit_dummy	0.19	-3.22	5.9	3.89
	(0.05)	*(-0.95)*	*(0.69)*	*(0.64)*
$r_{m,t} - r_{f,t}$	−0.132***	−0.147***	−0.255***	−0.166***
	(-3.45)	*(-4.55)*	*(-3.15)*	*(-2.88)*
smb	−0.258***	−0.213***	-0.143	−0.190**
	(-4.71)	*(-4.63)*	*(-1.24)*	*(-2.31)*
hml	0.185***	0.167***	0.580***	0.279***
	(3.21)	*(3.43)*	*(4.78)*	*(3.22)*
N	*444*	*444*	*444*	*444*
Adj. R-squared	*0.141*	*0.171*	*0.108*	*0.081*

This table presents the results of the estimation of model 2 using as dependent variables monthly excess returns generated by the *High-Low* investment strategy in competitive and concentrated industries. The *High-Low* strategy consists of holding high-real stocks and simultaneously shorting low-real estate stocks. *vw_exret* and *vw_exuret* are respectively the strategy's value-weighted levered and unlevered monthly excess returns. Unlevered return calculations assume no taxes and a cost of the debt of 7% across the board. Columns (*1*) and (*2*) apply to competitive industries, whereas columns (*1'*) and (*2'*) are for concentrated industries. The explanatory variables in model 2 consist of the excess market return ($r_{m,t} - r_{f,t}$), the two Fama and French stock risk factors (*smb* and *hml*), and a REIT dummy variable (*reit_dummy*), whose value is set to 1 during the period pre-1990 and 0 otherwise. $r_{m,t} - r_{f,t}$ represents the value-weighted monthly returns on CRSP-listed stocks minus the 1-month Treasury bill rates from Ibbotson and Associates. *smb* and *hml* are the average returns on small-stock portfolios minus the average return on big-stock portfolios and the average return on value-stock portfolios minus the average return on growth-stock portfolios, respectively. Monthly stock return data are from CRSP, with $r_{m,t}$, $r_{f,t}$, *smb* and *hml* coming from Kenneth French's website. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. At the end of June each year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. Firms in the competitive and concentrated industry groups are then sorted into decile portfolios according to their real estate ownership, proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment (*REI1*). The italicized figures in parentheses are the *t*-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 22: Distributional Characteristics of the Sample's Firm Risk Characteristics Estimated with a 3-Factor Market Model

	Mean	*Median*	*SDV*	*Min.*	*Max.*
alpha	0.04%	0.02%	0.22%	-2.00%	5.38%
market_beta	0.958	0.926	0.657	-3.321	5.590
smb_beta	0.807	0.744	0.832	-2.973	3.996
hml_beta	0.166	0.167	0.919	-2.997	3.995

This table presents the firms' alphas and risk-factor loading estimated annually from daily returns using the 3-factor model (1). The dependent variable is the firm's excess daily stock return over the risk-free rate ($r_{i,t} - r_{f,t}$) and the explanatory variables are the excess market return ($r_{m,t} - r_{f,t}$), the return on the FF size benchmark portfolios (*smb*), and the return on the FF book-to-market benchmark portfolios (*hml*). The reported *alphas* are daily average returns. The sample consists of 7,736 industrial firms spanning the 38-year period. These statistics are based on 69,078 annual estimations.

Table 23: Average Risk Characteristics of Industry Concentration Groups

Industry Structure	*Firm-years*	*alpha*	*market_beta*	*smb_beta*	*hml_beta*
Competitive Indus.	31,659	0.04%	0.986	0.844	0.100
2	14,354	0.02%	0.960	0.805	0.189
3	10,531	0.04%	0.941	0.767	0.220
4	7,282	0.03%	0.899	0.738	0.261
Concentrated Indus.	5252	0.03%	0.905	0.758	0.261
DMT	*69,078*	*(3.32)*	*(8.15)*	*(6.87)*	*(-11.87)*

This table presents the average *alphas* and market, size, and book-to-market risk-factor loadings (*market_beta*, *smb_beta*, and *hml_beta*) of the industry concentration groups computed from the constituent firms' risk characteristics that are estimated annually estimated values from the 3-factor model (1) using daily return data. The dependent variable is the firm's daily excess stock return over the risk-free rate ($r_{i,t} - r_{f,t}$) and the explanatory variables are the excess market return ($r_{m,t} - r_{f,t}$), the return on the FF size benchmark portfolios (*smb*), and the return on the FF book-to-market benchmark portfolios (*hml*). The reported *alphas* are daily average returns. The sample consists of 7,736 industrial firms spanning the 38-year period. The firms are classified into industries using 3-digit SICs, with the industries then divided into 5 concentration groups according to their concentration Herfindahls.

Table 24: Univariate and Multivariate Weighted Least Squares Regressions of Estimated Firm Betas on Real Estate Ownership

	(I) Competitive Industries				*(II) Concentrated Industries*			
	alpha	*market_beta*	*smb_beta*	*hml_beta*	*alpha*	*market_beta*	*smb_beta*	*hml_beta*
Univariate Model:								
REI_{t-1}	-0.004	-0.024	-0.080^{**}	0.072	-0.007	-0.021	0.149	-0.073
	(0.16)	*(0.83)*	*(2.18)*	*(1.55)*	*(0.12)*	*(0.30)*	*(1.57)*	*(0.60)*
N	*28,655*	*28,655*	*28,655*	*28,655*	*4,506*	*4,506*	*4,506*	*4,506*
Adj. R-squared	*0.136*	*0.628*	*0.483*	*0.057*	*0.162*	*0.601*	*0.462*	*0.120*
Multivariate Model:								
REI_{t-1}	0.055^{**}	-0.021	-0.105^{***}	-0.007	-0.027	-0.145^{**}	0.133	-0.087
	(2.08)	*(0.72)*	*(2.83)*	*(0.15)*	*(0.46)*	*(2.23)*	*(1.39)*	*(0.71)*
$LTDR_{t-1}$	0.270^{***}	0.089^{***}	0.203^{***}	0.488^{***}	0.043	0.147^{***}	0.113	0.028
	(10.91)	*(3.37)*	*(5.90)*	*(11.23)*	*(0.89)*	*(2.54)*	*(1.43)*	*(0.28)*
BM_{t-1}	-0.055^{***}	-0.046^{***}	-0.003	0.060^{***}	0.088^{***}	-0.038^{***}	0.021	0.062^{***}
	(12.65)	*(9.72)*	*(0.50)*	*(7.77)*	*(9.10)*	*(3.55)*	*(1.35)*	*(3.06)*
N	*28,655*	*28,655*	*28,655*	*28,655*	*4,506*	*4,506*	*4,506*	*4,506*
Adj. R-squared	*0.147*	*0.629*	*0.484*	*0.065*	*0.180*	*0.580*	*0.463*	*0.122*

This table presents univariate and multivariate weighted least squares regression results of the firms' estimated average unexplained daily excess returns (*alphas*), market betas (*market_beta*), size risk factor loadings (*smb_beta*), and book-to-market risk factor loadings (*hml_beta*) on real estate ownership (*REI*), proxied by the ratio of buildings and capitalized leases to properties, plants and equipment and other variables. The reported *alphas* are annual average returns. These regressions include both industry and year fixed effects. The dependent variables are estimated annually for each firm from the 3-factor model (1) using daily returns. Their resulting standard errors are used as weights in the above second-stage weighted least squares regressions. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. Book to market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. The sample consists of 7,736 industrial firms spanning the 38-year period from 1971 to 2008. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. Every year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahls based on net sales with the low and high concentration groups used as the competitive and concentrated industry sub-samples. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 25: Univariate and Multivariate Weighted Least Squares Regressions of Estimated Firm Market Betas and Real Estate Betas on Real Estate Ownership

	(I) Competitive Industries		*(II) Concentrated Industries*	
	market_beta	*real_estate_beta*	*market_beta*	*real_estate_beta*
Univariate Model:				
REI_{t-1}	-0.069	0.041*	−0.505***	0.110
	(1.40)	*(1.65)*	*(3.18)*	*(1.38)*
N	*15,569*	*15,569*	*2,048*	*2,048*
Adj. R-squared	*0.510*	*0.033*	*0.467*	*0.185*
Multivariate Model:				
REI_{t-1}	-0.019	0.030	−0.541***	0.117
	(0.39)	*(1.18)*	*(3.38)*	*(1.46)*
$LTDR_{t-1}$	−0.332***	0.090***	0.240**	0.047
	(6.50)	*(3.42)*	*(1.96)*	*(0.76)*
BM_{t-1}	−0.085***	0.013**	-0.006	−0.030***
	(7.76)	*(2.32)*	*(0.26)*	*(2.61)*
N	*15,569*	*15,569*	*2,048*	*2,048*
Adj. R-squared	*0.513*	*0.034*	*0.468*	*0.187*

This table presents univariate and multivariate weighted least squares regression results of the firms' estimated market betas (*market_beta*) and real estate betas (*real_estate_beta*) on real estate ownership (*REI*), proxied by the ratio of buildings and capitalized leases to properties, plants and equipment and other variables. These regressions include both industry and year fixed effects. The dependent variables, *market_beta* and *real_estate_beta*, are estimated annually for each firm respectively from the 3-factor model (1) and the 4-factor model (17) using daily returns. Their resulting standard errors are used as weights in the above second-stage weighted least squares regressions. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. Book to market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. The sample consists of 7,736 industrial firms. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. Every year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahls based on net sales with the low and high concentration groups used as the competitive and concentrated industry sub-samples. The 3-factor analysis spans the 38-year period from 1971 to 2008, whereas the 4-factor analysis only spans 17 years from 1992 to 2008 due to the much shorter REIT index return series. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 26: Weighted Least Squares Regressions of Estimated Firm Market Betas on Real Estate Ownership and Industry Concentration Herfindahls

	(1) market_beta	(2) market_beta	(3) market_beta	(4) market_beta	(5) market_beta	(6) market_beta
REI_{t-1}	0.0276	0.0971	0.0377			
	(0.36)	*(1.02)*	*(0.50)*			
REI_DECILE				0.0025	0.0057	0.0031
				(0.50)	*(1.00)*	*(0.62)*
$LTDR_{t-1}$	0.2140***	0.2120***	0.2300***	0.2140***	0.2130***	0.2300***
	(3.02)	*(3.00)*	*(3.28)*	*(3.01)*	*(3.01)*	*(3.27)*
BM_{t-1}	-0.0004	-0.0007	−0.0953***	-0.0004	-0.0006	−0.0953***
	(-0.04)	*(-0.07)*	*(-3.50)*	*(-0.04)*	*(-0.06)*	*(-3.49)*
$IHERF_t$	−0.0553**	-0.0330	−0.0899***	−0.0558**	-0.0361	−0.0906***
	(-2.16)	*(-1.14)*	*(-3.37)*	*(-2.17)*	*(-1.29)*	*(-3.39)*
$REI_{t-1} \times IHERF_t$		−0.0973*			−0.0888*	
		(-1.78)			*(-1.81)*	
$BM_{t-1} \times IHERF_t$			0.0493***			0.0493***
			(3.92)			*(3.92)*
Constant	0.7290***	0.7210***	0.8060***	0.7250***	0.7200***	0.8020***
	(7.64)	*(7.61)*	*(8.20)*	*(7.55)*	*(7.54)*	*(8.11)*
N	*60,885*	*60,885*	*60,885*	*60,885*	*60,885*	*60,885*
Adj. R-squared	*0.069*	*0.070*	*0.075*	*0.069*	*0.070*	*0.075*

This table presents weighted least squares regression results of the firms' estimated market betas (*market_beta*) on real estate ownership (*REI*), proxied by the ratio of buildings and capitalized leases to properties, plants, and equipment, their industry's concentration Herfindahls (*IHERF*) and other variables. These regressions include both industry and year fixed effects. The dependent variable is estimated annually for each firm from the 3-factor model (1) using daily returns, with the resulting standard errors used as weights in the above second-stage weighted least squares regressions. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. Book to market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. $REI \times IHERF$ and $REI \times IHERF$ are the interactions of the industry concentration variable with respectively real estate ownership and book-to-market. The sample consists of 7,736 industrial firms spanning the 38-year period from 1971 to 2008. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. Every year, the industries are then grouped into quintiles according to their 3-year average concentration Herfindahls based on net sales. *REI_DECILE* is rank variable generated through the classification of firms in each concentration group into deciles according to their level of real estate ownership. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 27: Correlation Tables

	REI1	*REI2*	*REI3*	*PPEI*	*LTDR*	*BM*	*SIZE*	*AGE*
			(I) Competitive Industries - Retail					
REI1	1.00							
REI2	0.93	1.00						
REI3	0.08	0.29	1.00					
PPEI	0.21	0.27	0.14	1.00				
LTDR	-0.02	0.00	0.11	-0.15	1.00			
BM	-0.13	-0.09	0.19	-0.26	0.50	1.00		
SIZE	-0.01	0.02	0.00	0.14	-0.17	-0.26	1.00	
AGE	0.03	0.05	0.21	-0.04	0.09	0.12	0.20	1.00
			(II) Concentrated Industries - Rubber Products					
REI1	1.00							
REI2	0.89	1.00						
REI3	0.83	0.85	1.00					
PPEI	-0.12	0.01	0.10	1.00				
LTDR	-0.01	0.06	0.12	0.23	1.00			
BM	0.24	0.29	0.31	0.10	0.33	1.00		
SIZE	-0.10	0.02	-0.05	0.08	-0.09	-0.13	1.00	
AGE	-0.28	-0.26	-0.21	0.11	0.11	-0.05	0.24	1.00

Correlation tables in retail industries (560, 562, and 565 3-digit SICs) and (rubber products industries (301, 302, and 306 3-digit SICs) from 1971 to 2008. *REI1*, *REI2*, and *REI3* are respectively the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE); the ratio of buildings, capitalized leases, construction in progress, and land to PPE; and the ratio of buildings and land to PPE. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. On the other hand, *PPEI* is the ratio PPE to *TA*. Book- to-market (*BM*) is the ratio of book value of equity (*TA* minus total liabilities plus balance sheet deferred taxes and investment tax credit minus book value of preferred stocks) to market value of equity. *SIZE* is the log of market value and *AGE* is the log of number of years from the stock's listing year on CRSP plus 1.

Table 28: Determinants of Real Estate Ownership

	(1)	*(2)*	*(3)*
REI_{t-1}	0.8610***	0.8610***	0.8620***
	(265.22)	*(265.45)*	*(265.90)*
$LTDR_t$	0.0373***	0.0365***	0.0366***
	(10.33)	*(10.09)*	*(10.19)*
$LTDR_{t-1}$	−0.0214***	−0.0198***	−0.0209***
	(-5.75)	*(-5.31)*	*(-5.68)*
BM_{t-1}	0.00005	0.00005	0.00005
	(0.41)	*(0.42)*	*(0.42)*
$SIZE_{t-1}$	-0.00008	0.00021	0.00022
	(-0.46)	*(1.15)*	*(1.17)*
AGE_t		−0.0021***	−0.0019***
		(-4.18)	*(-3.84)*
$PERF_{t-1}$			0.0013**
			(1.97)
Constant	0.0494***	0.0527***	0.0516***
	(14.85)	*(15.35)*	*(15.01)*
N	*61,751*	*61,751*	*61,459*
Adj. R-squared	*0.826*	*0.826*	*0.828*

These table presents time series regression results of real estate ownership modeled as equation (19). Real estate ownership is proxied by *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment following. These regressions include both industry and year fixed effects. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. *SIZE* is the log of market value and *AGE* is the log of number of years from the stock's listing year on CRSP plus 1. *PERF* is a poor performance dummy variable that is set equal to 1 if firm's stock return during the year is less than -10% or 0, otherwise. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. The industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 29: Robustness Check 1: Alternative Measures of Real Estate Ownership

	(1) *REI1*	(2) *REI2*	(3) *REI3*	(4) *PPEI*
REI_{t-1}	0.8620***	0.8720***	0.9070***	0.8960***
	(265.90)	*(309.09)*	*(395.60)*	*(340.04)*
$LTDR_t$	0.0366***	0.0392***	0.0282***	0.0657***
	(10.19)	*(9.31)*	*(6.92)*	*(20.70)*
$LTDR_{t-1}$	−0.0209***	−0.0289***	−0.0160***	−0.0610***
	(-5.68)	*(-6.67)*	*(-3.82)*	*(-18.69)*
BM_{t-1}	0.00005	0.00007	0.00002	-0.00015***
	(0.42)	*(0.43)*	*(0.15)*	*(-2.77)*
$SIZE_{t-1}$	0.00022	0.00084***	0.00112***	0.00158***
	(1.17)	*(3.99)*	*(5.85)*	*(10.83)*
AGE_t	−0.0019***	−0.0027***	−0.0017***	−0.0052***
	(-3.84)	*(-5.08)*	*(-3.52)*	*(-13.83)*
$PERF_{t-1}$	0.0013**	-0.0024***	0.0010	0.0022***
	(1.97)	*(-3.31)*	*(1.52)*	*(4.43)*
Constant	0.0516***	0.0577***	0.0321***	0.0290***
	(15.01)	*(14.20)*	*(8.88)*	*(10.87)*
N	*61,459*	*61,459*	*61,459*	*61,459*
Adj. R-squared	*0.828*	*0.843*	*0.876*	*0.893*

These table presents time series regression results of real estate ownership modeled as equation (19). Real estate ownership is proxied in columns 1 to 4 respectively as *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment (PPE); *REI2*, the ratio of buildings, capitalized leases, construction in progress, and land to PPE; *REI3* the ratio of buildings and land to PPE; and *PPEI*, the ratio of PPE to total assets. These regressions include both industry and year fixed effects. *LTDR* is the ratio of book value of long-term debt to MV plus book value of long-term debt. *SIZE* is the log of market value and AGE is the log of number of years from the stock's listing year on CRSP plus 1. *PERF* is a poor performance dummy variable that is set equal to 1 if firm's stock return during the year is less than -10% or 0, otherwise. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. The industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 30: Robustness Check 2: Using the 48 Fama and French Industry Groups

	(1) 3-Digit SIC Industries	*(2)* FF Industries
REI_{t-1}	0.8620***	0.8730***
	(265.90)	*(287.67)*
$LTDR_t$	0.0366***	0.0367***
	(10.19)	*(10.18)*
$LTDR_{t-1}$	−0.0209***	−0.0220***
	(-5.68)	*(-5.99)*
BM_{t-1}	0.00005	0.00006
	(0.42)	*(0.45)*
$SIZE_{t-1}$	0.00022	0.00007
	(1.17)	*(0.39)*
AGE_t	−0.0019***	−0.0017***
	(-3.84)	*(-3.61)*
$PERF_{t-1}$	0.0013**	0.0013**
	(1.97)	*(1.95)*
Constant	0.0516***	0.0399***
	(15.01)	*(18.91)*
N	*61,459*	*61,459*
Adj. R-squared	*0.828*	*0.826*

These table presents time series regression results of real estate ownership modeled as equation (19). Real estate ownership is proxied as *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment. Column 1 present the base results where industries are defined by 3-digit Compustat SICs, resulting in 171 industries in total. In column 2, on the other hands, the 48 Fama and French industry groups are used. These regressions include both industry and year fixed effects. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. *SIZE* is the log of market value and *AGE* is the log of number of years from the stock's listing year on CRSP plus 1. *PERF* is a poor performance dummy variable that is set equal to 1 if firm's stock return during the year is less than -10% or 0, otherwise. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry. The industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Table 31: The Impact of Industry Structure

	(1)	*(2)*	*(3)*	*(4)*
REI_{t-1}	0.8620***	0.8620***	0.8620***	0.8620***
	(265.90)	*(265.80)*	*(265.76)*	*(265.68)*
$LTDR_t$	0.0366***	0.0366***	0.0366***	0.0365***
	(10.19)	*(10.18)*	*(10.17)*	*(10.16)*
$LTDR_{t-1}$	−0.0209***	−0.0209***	−0.0210***	−0.0210***
	(-5.68)	*(-5.66)*	*(-5.70)*	*(-5.70)*
BM_{t-1}	0.00005	0.00005	0.00005	0.00005
	(0.42)	*(0.42)*	*(0.40)*	*(0.40)*
$SIZE_{t-1}$	0.00022	0.00024	0.00020	0.00019
	(1.17)	*(1.24)*	*(1.07)*	*(0.96)*
AGE_t	−0.0019***	−0.0019***	−0.0018***	−0.0018***
	(-3.84)	*(-3.81)*	*(-3.62)*	*(-3.66)*
$PERF_{t-1}$	0.0013**	0.0013**	0.0013**	0.0013**
	(1.97)	*(1.99)*	*(1.98)*	*(1.99)*
$POWER_t$		-0.0013		0.0008
		(-0.49)		*(0.27)*
$IHERF_t$			−0.0069**	−0.0070**
			(-2.22)	*(-2.13)*
Constant	0.0516***	0.0515***	0.0531***	0.0532***
	(15.01)	*(14.70)*	*(15.30)*	*(14.87)*
N	*61,459*	*61,424*	*61,459*	*61,424*
Adj. R-squared	*0.828*	*0.828*	*0.828*	*0.828*

These table presents time series regression results of real estate ownership modeled as equation (20). Real estate ownership is proxied by *REI1*, the ratio of buildings and capitalized leases to properties, plants, and equipment following. These regressions include both industry and year fixed effects. *LTDR* is the ratio of book value of long-term debt to *MV* plus book value of long-term debt. *SIZE* is the log of market value and *AGE* is the log of number of years from the stock's listing year on CRSP plus 1. *PERF* is a poor performance dummy variable that is set equal to 1 if firm's stock return during the year is less than -10% or 0, otherwise. The sample consists of 7,736 industrial firms spanning the 37-year period. Each firm is assigned to an industry according to its 3-digit Compustat SIC, resulting in 171 industries in total. The industries are then grouped into quintiles according to their 3-year average concentration Herfindahl values based on net sales, which is referred to as *IHERF* above. Market power (*POWER*) is the firms's contributions to their industries' concentration Herfindahl. The italicized figures in parentheses are the robust t-statistics of the coefficient estimates. The superscripts *, **, and *** indicate statistical significance at 10%, 5%, and 1%.

Appendix C: List of Industries in 2005

SIC	*Industry Name*
Competitive Industries	
271	Printing, publishing and allied industries
281	Industrial inorganic chemicals
283	Drugs
289	Chemical products (miscellaneous)
308	Plastics products (miscellaneous)
314	Footwear
331	Steel works, blast furnaces, and mills
344	Metal products
356	Industrial machinery and equipment
364	Electric lighting and wiring equipment
367	Electronic components and accessories
371	Motor vehicles and motor vehicle equipment manufacturing
382	Laboratory apparatus and instruments
384	Surgical, medical, and dental instruments
399	Manufacturing (miscellaneous)
508	Machinery, equipment, and supplies (wholesale)
541	Grocery stores
560	Men's and boys' clothing and accessory stores
562	Women's clothing stores
565	Family closing stores
581	Restaurants
594	Shopping goods stores (miscellaneous)
596	Catalog and online retailers
Concentrated Industries	
202	Dairy products
211	Tobacco products
227	Carpets and rugs
243	Millwork, and structural wood
240	Lumber and other wood products
262	Paper mills
299	Petroleum products and coal
301	Tires
302	Rubber and plastic footwear
306	Fabricated rubber products (miscellaneous)
322	Glass products and glassware
335	Nonferrous metal products (smelting and refining)
348	Ammunition and small arm manufacturing
351	Engines and turbines manufacturing
352	Farm and garden machinery and equipment
373	Ship and boat building and repairing
376	Missiles and space vehicles and parts
386	Photographic equipment and supplies
451	Air transportation
470	Transportation Services(other)
501	Wholesale motor vehicles and motor vehicle parts and supplies
511	Wholesale distribution paper and paper products
514	Wholesale distribution groceries and related products
521	Lumber and building materials dealers
533	General merchandise stores

Appendix D: Additional Formulas

$$E_0[\Pi_1 \,|_{K_s \le K_s^E}] = [\mu - 3B\,K_s + \bar{\varepsilon} - \theta_1\,(2B+1)(\mu + \bar{\varepsilon} - B\,K_s)]\,\theta_1(\mu + \bar{\varepsilon} - B\,K_s) + (\delta + \bar{\varepsilon})\,K_s - B\,K_s^2 - K_s^{(1+\alpha)/\alpha} \tag{21}$$

$$where\ \delta = A - s;\ \ \mu = A - g;\ \ \theta_1 = (3B+2)^{-1}$$

$$E_0[\Pi_1 \,|_{K_s \ge K_s^E}] = [\mu - B\,K_s + \bar{\varepsilon} - (B+1)\,\theta_2\,(\mu + \bar{\varepsilon} - 2B\,K_s)]\,\theta_2(\mu + \bar{\varepsilon} - 2B\,K_s) + [\delta - B\,K_s + \bar{\varepsilon} - \theta_2\,(\mu + \bar{\varepsilon} - 2B\,K_s)]\,K_s - K_s^{(1+\alpha)/\alpha} \tag{22}$$

$$where\ \delta = A - s;\ \ \mu = A - g;\ \ \theta_2 = (2B+2)^{-1}$$

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