# Return enhancing, cash-rich or simply empire-building? An empirical investigation of corporate real estate holdings

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**ABSTRACT**

No, we find no evidence for a return-enhancing role for corporate real estate holdings, which is consistent with the previous literature. Instead, our study based on a sample of U.S. listed corporations suggests that corporate real estate holdings are a form of managerial "empire building". Corporations with weaker corporate governance and a lower degree of financial constraint tend to have higher real estate holdings, whereas higher real estate holdings are associated with lower returns to shareholders. The impact of corporate governance on corporate real estate holdings seems to be stronger in manufacturing-related industries. Implications and future research directions are discussed.

JEL classification Number: D210, G110, G300
Keywords: corporate real estate, empire-building, corporate governance, financial constraint

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***…But over time distributable income earnings that have been withheld by managers should earn their keep. If earnings have been unwisely retained, it is likely that managers, too, have been unwisely retained.***

**Warren Buffett, The Essays of Warren Buffett.**

## 1. INTRODUCTION

It is not uncommon for corporate real estate decision to appear as headline news. For instance, on June 20th, 2007, the headline news of the Wall Street Journal reported that over the years, the Toyota U.S. has been expanding its building of factories in the U.S. as a way to enlarge employment of U.S. workers so as to win goodwill in the face of public rancor over the role of foreign automakers in the decline of the American auto industry. [1] Building new factories has increased corporate real estate holdings, installed more factory management teams, and enhanced management visibility and status. In short, corporate real estate decisions could be directly linked to the over-expansion symptom of corporate management, a typical issue in corporate governance. [2] This paper attempt to take this view seriously and attempt to systematically examine the relationship between corporate real estate holdings and corporate governance

In this paper, corporate real estate (CRE) refers to the land and buildings owned by companies that are not primarily engaged in the real estate business. Many companies choose to commit their scarce capital to owning real estate rather than re-deploying such capital to their core business. In the United States, it is estimated that corporate users own over $1 trillion worth of various property types, amounting to at least five times the value held by publicly traded real estate companies (Kim, 2004). Using US data, Tuzel (2005) found that on average property makes up 30% of a firm's physical capital. In the United Kingdom, many of the largest non-real estate companies control property portfolios that are comparable in value terms with those owned by mainstream property companies (Tewson and Chinnock, 1992; Liow, 1995).

Why do non-real estate firms prefer to buy CRE, which will clearly decrease the "liquidity" of the firms, rather than to rent them? [3] One possible and important reason is that there is a tax advantage. More generally, this class of explanations will predict that, other things being equal, higher corporate real estate holdings are associated with higher stock returns.

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[1] According to the article, the Toyota U.S. management has ignored the idle production capacity in the existing factories but built up more factories around the U.S. as a form of "political insurance." Later, in view of the rising labor costs, idle production capacity, and unprofitable expansion of factory building, the Toyota headquarters has decided to stop new factory building in the United States.

[2] Though the scale of business is often intuitively related to the scale of real estate investment in the media so that the Toyota's move was interpreted as slowing down its investment expansion in the U.S., it is not necessarily the case. In fact, there are economic arguments suggesting that firms with strong growth potential should rent rather than purchase real estate in order to preserve liquidity.

[3] See Wheaton (2005) for a discussion of the traditional views on why corporations may want to own rather than lease real estate.

Another view is that for some industries, such as manufacturing, real estate ownership is necessary, of otherwise they cannot find from the market the optimal industrial real estate which is compatible with the special design of assembly lines they need. In other words, the demand for real estate holdings is driven by the production mode. Those firms which do not own their real properties may simply be constrained to do so. On the other hand, other sectors such as legal service or accounting service do not hold real properties because their production mode does not require specially designed real estate. Thus, the *cross-firm variation* in real estate holdings is driven by the difference in the nature and necessity of corporate demand for real estate. The exact composition of assets could vary from firm to firm. And since the composition of assets is determined optimally for each firm, the *cross-firm variation* in real estate holdings should not bear any relationship with the cross-firm variation in equity returns or firm performance in general.

Contrary to these two views, most empirical work shows that real estate holdings do *not* improve and often worsen the stock market performance of those 'property-intensive' non-real estate firms.[4] (See Appendix 1a for a summary). It leaves the CRE holdings a commonly observed yet puzzling phenomenon.[5]

We attempt to address this issue from a corporate finance perspective. According to Jensen (1986), if firms are left with free cash flow, the management has incentives to use the free cash in inefficient ways, i.e., investing in projects with negative net present value but high private benefits rather than repaying to investors as dividends. In countries with extremely weak legal institutions and corporate governance, managers could easily expropriate corporate earnings for their private benefits. Under some extreme circumstances, managers can divert corporate resources simply through outright theft.[6]

However, in countries with fairly strong legal institutions and corporate governance systems, managers need to adopt a *more circuitous and hidden approach* to expropriating corporate earnings. Clearly, overinvestment in real estate could be one avenue for managerial expropriation. Managers can gain tremendous on-the-job consumption benefits from literally "empire-building" in the sense of over-purchasing, over-building and over-holding a large number of plush office buildings and luxurious company apartments, and they can keep investors' profits under their discretion and potentially gain various monetary

[4] For instance, see Deng and Gyourko (1999), Seiler, Chatrath and Webb (2001), and Brounen and Eichholtz (2005).
[5] Another popular explanation is the holdup problem for firm-specific corporate real estate. We will get back to this point later.
[6] Among others, see La Porta et. al. (1998, 1999, 2002), Johnson et. al. (2000) for related discussion.

and non-pecuniary benefits from the possible real estate price appreciation in the future. Interestingly, these investments in the real estate holdings are often made in the name of improving corporate image, improving all staff's working (and even living) conditions, and corporate long-term expansion. In sum, real estate investment could be one excellent way for managers to extract corporate earnings for their own private benefits.

In this paper, we first revisit the relationship between CRE holdings and corporate stock returns. Consistent with the earlier studies, we detect a strong negative relationship between real estate holdings and firm returns for our sample of US companies.[7] After establishing the adverse impact of CRE holdings on corporate valuation, we move on to examine the empirical determinants of real estate holdings for our sample of US firms. In particular, we study the relationship between property holdings and various corporate governance measures, controlling for other factors (including financial constraint measures, growth potential, etc.). The US is selected for this research because it is widely agreed to have one of the most adequate legal institutions and corporate governance systems in practice. Thus, it provides us with a good setting to investigate whether CRE holdings have been used as one circuitous way for the management to pursue private benefits. We measure corporate governance strength mainly from the corporate ownership structure and management compensation scheme. Our findings confirm our hypothesis: other things being equal, both a higher extent of financial constraint and weaker corporate governance are associated with higher real estate holdings. More concretely, CEO ownership, management compensation structure and outsider ownership play an important role in determining real estate holdings in the US corporations. First, an increase of ownership by CEO or outside blockholders reduces the real estate holdings. Second, for the management compensation, we find that the higher the proportion of stock options to total compensation, the lower the real estate holdings. Third, we provide empirical evidence that the problem of duality, i.e., the position of chairman of the board of directors and that of chief executive officer are held by the same person, most probably increases real estate holdings. Finally, the results suggest that higher real estate holdings are associated with larger amounts of free cash flow but with lower growth opportunities. Our analysis helps identify one channel of how corporate governance affects corporate valuation: weak corporate governance leads to excessive real estate holdings by non-real-estate companies, which in turn brings down the firm value.

[7] Recently, Dong et al (2012) study the corporate real estate holdings in China and examine whether CRE holdings are driven by some government policies among competing explanations.

Clearly, this apparently un-orthodox view may bother some readers. For instance, some may worry that larger and more capital intensive firms may need more real estate in their production process. Our current regressions do include "size" as one of the control variables. In addition, the industry dummy variables can potentially control for capital intensity variation across industries. The second worry is that the treatment of real estate depreciation may distort the measurement of real estate holding and therefore affect the accuracy of the results. While this point is well taken, we also want to mention a few points why this concern may not be as serious as it may seem. First, our sampling period is relatively short and ends before the "mark-to-the-market" practice in accounting gets popular. Second, we also have casual conversations with some accounting professionals and they tend to think that the differences in real estate depreciation treatment across firms are rather small, due to regulations and other considerations. Perhaps more importantly, we are more concerned of *how the differences in real estate holdings across firms* can be explained by the difference in corporate governance variables across firms. Thus, even if there are mis-measurements in the calculations of real estate holdings, as long as those mis-measurements are uncorrelated to the explanatory variables, it would not affect our qualitative results. The third concern points to the fact that the ownership of real estate can lead to "easier finance" through the collateral effect. Our current regression formulation has already included the "long term debt" variable which would capture that effect. (From our conversations with market participants, the collateral position does not seem to matter as much for the short term financing). The fact that corporate governance variables seem to matter most in manufacturing firms, which seems to be a kind of industry effect, also bothers some researchers. Some may argue that because manufacturing firms do need specific investment in land and building for the production process, they would naturally have larger shares of real estate holdings in their assets. While this observation is true, the production-based argument may still need to explain why firms with "weaker corporate governance" *within the same industry* will hold even more properties than those that are "stronger" in corporate governance after controlling for a host of production-based and liquidity-based potential determinants of CRE holdings. We have more elaboration on these points in later sections.

Perhaps more fundamentally, one may wonder why CRE investment is highlighted as a case study to verify the free cash flow theory as well as the importance of corporate governance in shaping corporate investment policy. After all, these points have been discussed extensively in the literature. In our view, studying the relationship between CRE

and corporate governance can substantially improve our understanding of the importance of corporate governance in determining corporate investment policy. First, CRE investment usually involves a very significant amount of liquidity, which would imply a sacrifice of other investment opportunities. Given the fact that there is a well-developed rental market for commercial real estate in the USA, it is not clear why some corporations will insist on purchasing CRE. Second, the negative correlation between CRE holdings and stock performance has been repeatedly documented and yet firms still invest in CRE. This is a puzzle that has not been resolved. Third, recent research such as Jin et al (2012) suggest that the fluctuations of CRE value can impact the "borrowing capacity" of firms and hence CRE can play a role in the propagation of shocks over the business cycles. Perhaps more importantly, the relationship between corporate governance and CRE holdings seems to be under-explored.[8] The closest one is Coles, Daniel and Naveen (2006), which studies the relationship between managerial incentive and investment in PPE (Plant, Property and Equipment). They examined the effects of CEO pay-performance sensitivity and the sensitivity of CEO wealth to stock volatility on firms' investment strategy. They found that a higher CEO pay-performance sensitivity (the change in the dollar value of the executive's wealth for a one percentage point change in stock price) provides a strong incentive to CEOs to decrease risky investment (R&D expenditure in their framework) and increase less risky investment (PPE investment in their framework). They also found that a higher sensitivity of CEO wealth to stock volatility leads to riskier policy choices, including relatively more investment in R&D and less investment in PPE. This paper examines the corporate PPE investment from a completely different angle. They treat PPE as less risky investment, but we regard PPE or CRE investment as a channel for corporate managers to over-invest for the purpose of empire building. In particular, we examine the impact of a host of corporate governance aspects rather than the CEO pay-performance sensitivity on PPE investment. Moreover, we also allow for other factors, such as diversification, financial constraint, etc., to be empirical determinants of the PPE investment. In addition, we provide evidence that higher PPE investment is not associated with higher stock return. Thus, this paper should be considered as complementary to Coles, Daniel and Naveen (2006).

The remainder of the paper is organized in the following way. Section 2 summarizes

[8] After the circulation of the first draft, the authors become aware of Sing and Yin (2006). They study a similar problem in the context of firms listed on Singapore Stock Exchange. However, they combine the real estate firms, financial firms and other firms in their sample. All of their data are from the same year. In sum, they adopt a very different strategy from this paper.

some findings of the CRE management literature. Section 3 explains the dataset and lays out the corporate governance measures to be employed. Other determinants of real estate holdings are discussed in Section 4. Section 5 provides evidence that higher CRE holdings are associated with lower stock returns. Section 6 investigates which are the empirical determinants of the CRE holdings. Section 7 looks at the role of corporate governance as well as other firm characteristics in determining the flow of real estate acquisitions or sales. Some further robustness tests are conducted in Section 8. Section 9 concludes the paper.

## 2. MISMANAGEMENT OF CORPORATE REAL ESTATE

Before conducting formal econometric tests, we would like to summarize a relatively overlooked literature on real estate management. Despite the great value invested, CRE assets are found seriously under-managed and even mismanaged.

Effective management of real estate, as in the case of other assets, requires the collection and maintenance of a database for sound decision making. However, according to a survey by Veale (1989), approximately 2/3 of the firms surveyed did not maintain any separate management information system for the ongoing management and control of real estate assets. Furthermore, when asked how the after-tax return on real estate (net income plus appreciation) was compared with the company's overall return, 60% of firms reported that real estate returns were not calculated. Most significantly, only 29% of the respondents reported that they have analyzed and prepared the information related to real estate management for top management to review on any scheduled basis (i.e., quarterly, semiannually, or annually). Approximately 47% prepared the information on an 'as necessary' basis only. Another 23% did not report at all. Gale and Case (1989) also found that less than half of the firms in the study (44%) had made any attempt to maintain current market value data on their real estate. Redman and Tanner (1991) find that many managers make their CRE purchasing decisions based on individual subjective measures rather than any analytical method. Apparently, surveys of corporate managers have revealed managers' curious ignorance and lack of interest in relating their real property assets to the overall business strategies (Veale, 1989).

On the other hand, the literature tends to support the view that leasing real estate is more favorable to shareholders' interests. Nourse (1994) found that firms that lease tend to link their real estate strategy more closely to their overall corporate strategy.

Veale (1989) found that while only 1/3 of firms surveyed did maintain a separate management information system for the ongoing management and control of their real estate, roughly 2/3 maintain information on lease dates and commitments, identification of surplus properties, utilization and current capacity of existing properties as well as for tracking square-foot costs by facility, and evaluating the physical condition and performance of buildings. Allen, Rutherford and Springer (1993) found that there are positive abnormal returns after the sales and leaseback announcement and suggested that real estate leasing decisions benefit corporate stockholders. [9]

In sum, the real estate management literature does not seem to support the value-enhancing role of CRE holdings. This leads us to naturally conjecture an alternative hypothesis, namely, over-investment in real estate is a subtle approach for the management to expropriate corporate earnings.

## 3. OUR DATASET AND CONVENTIONAL DETERMINANTS OF REAL ESTATE HOLDINGS

Our initial sample is the universe of all firms for which complete data are simultaneously available on the following databases: Compustat Industrial Annual that provides accounting data for firms, Compustat Executive Compensation that provides CEO-compensation-structure-related items, Blockholder Dataset that provides information related to blockholders, and Compustat Segment Dataset that provides the reported number of business segments. To minimize the endogeneity problem in analyzing the impact of corporate governance and corporate liquidity on CRE holdings, we focus on the CRE holdings in the year 1998, and the corporate governance, liquidity and other characteristics variables over the period 1995-97.

First, we follow the common practices in the literature to exclude financial firms from the sample because they are subject to a different set of regulations, which may affect their corporate governance. We also exclude real estate development firms since our aim is to analyze the land and buildings owned by companies that are not primarily engaged in the real estate business. Firms with missing observations of any

[9] One potential explanation that reconciles our argument with the findings of the better management of leased corporate real estate is that corporations having better corporate governance tend to lease rather than purchase and hold real estate. The better corporate management teams in corporations with better governance typically keep good record of those leased real estate.

variable are also dropped. Consequently, we are left with 549 firms for our analysis. We name this sample as the 1998 sample because it is used for analyzing the CRE holdings in 1998. To establish the robustness of our results, we further trace those firms in the 1998 sample four years forward to build a new sample. With the same selection criteria, we find that 350 firms in the 1998 sample have explanatory variables available for the period 1999-2001 and CRE holdings available for 2002. We label this new sample as the 2002 sample.

Now we turn to a description of the conventional factors which are important to CRE holdings, and how they are measured in the dataset we employ. They include the growth opportunities, size, the diversification of a firm's business segments, level of debt, industrial effect and the impact of imperfect capital market. Appendix 1b provides a summary of the variables we will employ.

### 3.1. GROWTH OPPORTUNITIES

We hypothesize that firms with greater growth opportunities have more incentives to avoid cash shortage or financial distress. The demand for cash drives these firms to rent rather than to own, which results in a smaller proportion of real estate in their total asset portfolio. Following the literature, we employ the ratio of Market to Book value of equity (M/B) as a proxy for firms' growth opportunity. A higher M/B ratio suggests that the market expects the corporations to have better future earnings. This could be indicative of better growth opportunities.

For market to book value, we derive it by using fiscal year end stock price (data 199) multiplied by the total number of shares outstanding (data 25) over total shareholders' equity (data 216).

### 3.2. SIZE

Theory suggests that smaller firms have a greater propensity to lease than larger firms do if there are significant non-convexities or indivisibilities associated with the use of certain fixed assets. For example, smaller firms may not need an entire unit of building. Also, smaller firms tend to be younger and may face larger uncertainty over their future needs of capital investment. Thus, leasing could avoid incurring the transaction costs associated with resale. On the other hand, it is also suggested that owning is less costly than leasing for major companies due to large corporations' ability to borrow at low rates (Whited, 1992; Fazzari and Petersen, 1993). However, there is presently no empirical agreement whether the size effect on the proportion of

real estate to total assets is positive or negative.[10] In our study, we employ the natural logarithm of sales (data 12) as a proxy for a firm's size.

### 3.3. FIRM FOCUS

A popular explanation for corporations to hold real estate is its use in diversifying the portfolio. The low correlations between real estate and other components in the portfolio suggest that real estate can play a significant role of risk diversification in mixed-asset portfolios.[11] We expect that firms focusing on a small number of business lines may find holding real estate as a way to diversify their corporate risk. Thus, the number of business segments reported would be negatively related with the proportion of real estate in total assets. We use the number of reported business segments from the Compustat segment dataset as a measure of business focus.

### 3.4. LEVEL OF DEBT

Since the 1980s, debt has been suggested to act as a self-enforcing governance mechanism.[12] The idea is that debt can force managers to generate cash or/and reduce the cash flow available for them in order to meet the obligations to repay interest and principal**.** Thus, it mitigates the potential agency costs of free cash flow. Thus, we expect to observe a negative correlation between CRE holdings and debt level. On the other hand, some scholars suggest that interest payments can be easily met, and hence doubt the usefulness of debt in mitigating the potential agency costs of free cash flow.[13] In this view, no significant relationship is expected between CRE holdings and corporate leverage. In addition, since real estate can serve as collateral for borrowings, CRE holdings are expected to be positively associated with long term debt[14]. We employ the ratio of long term debt to total assets as a measure of level of debt to control for the effect of corporate leverage on CRE holdings.

### 3.5 INDUSTRIAL EFFECT

It is reasonable to conjecture that for different industries, the optimal proportion

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[10] For instance, Sharpe and Nguyen (1995) empirically found that the influence of firm size on owning is positive and significant. On the other hand, Redman and Tanner (1991) found that firms with assets valued less than $50 million are more likely to own real estate than larger firms. With UK data, Liow (1995) suggested that over the sample period, it appeared that size would not affect the owning/leasing decision.

[11] The literature is too large to be reviewed here. Among others, see Quigley (2006) and the reference therein.

[12] For instance, Jensen (1986, 1993) call it the 'control hypothesis'.

[13] Empirically, the results seem to be mixed.

[14] See Redman and Tanner (1991) and Liow (1995)

of property, plant and equipment (PPE) in asset portfolio should be different.[15] For instance, power plants, bridges and railways constitute a high share of the total assets for utility and transportation firms. On the other hand, the demand of the service sector for real estate may be much smaller. Hence, it is important to control for the industry differences in the study of CRE holdings. For our model, we will try to isolate the industrial effect by including industry dummies based on the one-digit Standard Industrial Classification (SIC) Code[16].

### 3.6. IMPERFECT CAPITAL MARKET

It is well known that with perfect capital market, there would be no association between internally generated cash flows and the firm-level investment activities. In practice, the capital markets are imperfect.[17] Thus, firms facing high costs of external finance arising from severe information asymmetry may find that leasing can economize on fixed capital costs. In the literature, it is generally agreed that firms that pay no cash dividends and generate low cash flow are likely to be among those suffering most from information asymmetry.

#### 3.6.1. Dividend payout

Smith and Watts (1992) argued that dividends should be lowest for those firms with the greatest risk of facing the underinvestment problem. As a result, firms with low or no cash dividend payout may prefer to lease rather than own PPE in order to economize on the cost of funding. Sharpe and Nguyen (1995) found that the total lease share of a firm that pays no cash dividends is about 25% higher than that of a dividend-paying firm. Hence, from the perspective of liquidity constraint, we expect that firms with no cash dividend payout will hold a smaller proportion of real estate to their total assets.

Alternatively, dividend policies very likely reflect corporate governance structure. According to La Porta et al. (2000), weak corporate governance leads to a firm's smaller willingness to pay out cash dividends; the firm may well misuse the retained earnings to purchase rather than rent real estate. In this sense, we anticipate that firms with no cash dividend payout will keep a larger proportion of their assets in real estate.

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[15] For instance, see Redman and Tanner (1991), Brounen and Eichholtz (2005).

[16] According to the SIC code, firms can be generally classified into 7 categories. They are 1, Mining; 2, Construction; 3, Manufacturing; 4, Services; 5, Trade; 6, Transportation, Communication and Utility; 7, Other.

[17] For instance, see Fazzari, Hubbard and Petersen (1988), Myers (2003), Stein (2003) and the reference therein.

To test which view is more relevant, we include a dummy variable which is equal to one for non-dividend-paying firms and zero otherwise in our analysis.

3.6.2. Cash flow

Prior studies have repeatedly documented a positive relation between investment expenditure and cash flow. For instance, Sharpe and Nguyen (1995) found that the share of total annual fixed capital costs attributable to leases is substantially higher in cash-poor firms. Krishnan and Moyer (1994) found that firms with lower operating earnings are more likely to lease, suggesting the existence of financial constraint at the corporate level. Fazzari, Hubbard, and Petersen (1988) showed that investment is constrained by current cash flow for U.S. manufacturing firms in the Value line database. Myers and Majluf (1984) argued that if there was asymmetric information, firms would prefer internal funds (i.e., cash flow) to external finance that is information sensitive. Recent studies such as Brav et al. (2005), Graham, Harvey and Rajgopal (2005) suggest that managers have strong incentive to maintain the dividend at some "target ratio". What would they do if they have some "windfall cash"? Investing in real estate can be one possibility. Riddick and Whited (2007) show that when a positive productivity shock causes both cash flow and the marginal product of capital to rise, firms will dissave and invest cash in capital goods including real estate assets that have become more productive, leading to a negative correlation between savings and cash flow. Thus, we expect that firms with more cash flow will invest more in real estate.

On the other hand, cash flow can be "in excess". Jensen (1986) suggested that if firms were left with too much cash flow, the management has incentives to use the cash flow in inefficient ways. Recently, researchers have found that firms with low growth opportunity and high cash flow tend to 'waste' cash flow in ways such as acquisitions (Lang, Stulz, and Walking, 1991; Hanson, 1992; Born and Mcwilliams, 1993; Doukas, 1995). Opler et al. (2001) found that companies with excess cash (measured using balance sheet cash information) have higher capital expenditure and spend more on acquisitions, even when they appear to have poor investment opportunities (as measured by Tobin's Q).

To empirically test these competing theories, we measure cash flow by operating income before depreciation (data13) minus interest expenses (data15), taxes (data16), preferred dividends (data19), and common dividends (data21). To eliminate any size

effect, we normalize this measure by the book value of assets (data6)[18].

## 4. MEASURING CORPORATE GOVERNANCE

Clearly, the literature on corporate governance is too large to be reviewed here. Due to the limit of space, we can only afford to provide a summary of some of the literature in Appendix 2. This section only briefly describes how different measures of corporate governance could be related to CRE holdings.

### 4.1. THE EFFECT OF CORPORATE GOVERNANCE MEASURES ON OVER-INVESTMENT IN PPE

Jensen and Meckling (1976) suggested that the separation of ownership and control gives managers the chance to waste corporate resources and cash flow on excess perquisites and negative-net-present-value projects at the expense of shareholders. This view is largely verified by recent empirical studies such as La Porta et al. (1999, 2000, 2002) and Brav et al. (2005). Therefore, on top of the conventional determinants of CRE holdings, we would consider whether weaker corporate governance is associated with more CRE holdings. If such a relationship is established, our hypothesis that over-investment in real estate being an avenue for management to waste the cash flow will earn a ground. Following the corporate finance literature[19], we will consider several general categories of governance measures including CEO ownership, outside blockholder ownership, CEO compensation sensitivity, board composition and the problem of duality, all of which will be explained in more detail in the following.

### 4.2. MANAGEMENT OWNERSHIP

There is a large body of literature supporting the notion that managerial ownership of company stock shares can help align the interests of managers with those of shareholders, that is, agency cost will be reduced.[20] Thus, with increased managerial ownership, managers are less likely to divert resources away from firm value maximization as they bear part of the costs of their actions. Therefore, one would expect a negative relationship between managerial ownership and real estate holdings. In our empirical test, we adopt CEO ownership as a proxy for management ownership. Data on CEO ownership are collected from the Compustat Industrial Annual and Compustat Executive Compensation datasets.

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[18] We follow Lehn and Poulson (1989), Lang, Stulz, and Walking (1991) on this.
[19] See Survey by Shleifer and Vishny (1997) and Gillan (2006)
[20] Among others, see Mcconnel and Servaes (1990), Mehran (1995), Singh and Davidson (2003).

### 4.3. Outside Blockholder ownership

Due to the well-known free rider problem, no shareholder owning minority shares is willing to monitor the managers. It is because shareholders bear all the costs of their monitoring activities while benefit from monitoring only in proportion to their shareholdings (Grossman and Hart, 1988). On the other hand, blockholders, having claims to a large fraction of the firm's return, have much stronger incentives to monitor managers. Consequently, managerial discretion is restricted to some extent and agency costs between managers and shareholders will be reduced (Shleifer and Vishny, 1986). In addition, an outside blockholder has arguably a different set of incentives than does a shareholder who is CEO of the firm. There are many studies supporting the view that the outsider ownership is positively related to corporate governance quality (Weisbach, 1988; Mehran, 1995; North, 2001). The Compustat Blockholder dataset provides information on the ownership of outside blockholders, which is the sum of percentage of equity held by individual investors, institutional investors, and corporations who own at least 5% of the common stock of the company. We choose 5% (as many researchers do) because this ownership level triggers mandatory public filing under SEC regulation.

### 4.4. Executive compensation structure

The use of equity-based compensation in the form of stock and options has become increasingly popular in recent years (Murphy, 1999). Structure of executive compensation can be used to effectively align the interests of managers with those of shareholders. Previous research suggests that tightly linking managers' compensation to firm performance motivates them to make more value-maximizing decisions (e.g. Holmstrom, 1979; Harris and Raviv, 1979; Grossman and Hart, 1983). For instance, Jensen and Murphy (1990a) suggested that equity-based rather than cash compensation gives managers the correct incentive to maximize firm value. Jensen and Murphy (1990b) also find a statistically significant relationship between level of pay (measured by changes in executive wealth) and performance (measured by changes in value). Mehran (1995) found that firm performance is positively related to the percentage of executive compensation that is equity-based. Hall and Liebman (1998) suggested that a large amount of a CEO's incentives to increase stock price is generated from the movement of his options' value instead of by flow compensation. Datta, Datta and Raman (2001), by studying executive compensation and corporate acquisition decisions, found that executive stock option grants provide effective and

strong motivation for managers to make value-maximizing investments decisions. In this sense, we expect that more equity or option-based CEO compensation strengthens corporate governance and reduces CRE holdings.

On the other hand, some studies examine the CEO compensation structure from a different perspective. They suggest that the use of equity compensation will expose managers to more risk. It is because their level of remuneration is highly dependent on firms' performance. As a result, the risk-averse managers will choose to forgo some positive-net–present-value projects if those projects are very risky. Coles, Daniel and Naveen (2006) empirically suggested that a higher CEO pay-performance sensitivity provides a strong incentive to CEOs to decrease risky investments (R&D expenditure in their framework) and increase less risky investment (PPE investment in their framework). Thus, under this view, more equity or option-based CEO compensation increases CRE holdings.

We follow the previous practice[21] in constructing the proxy for the proportion of equity-based compensation in CEO's total compensation**.**[22] Specifically, we employ the ratio of Total Value of Stock Options Granted (using Black-Scholes) to total compensation which comprises the following items: Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted (using Black-Scholes), Long-Term Incentive Payouts, and All Other Total as a proxy of CEO's total compensation that is equity-based. These kinds of compensation-related information are from Compustat Execomp dataset.

### 4.5. BOARD COMPOSITION

There is a growing body of evidence that outside directors (those who do not work for the company) are more independent of top management and thus better represent the interests of shareholders than do inside directors. Jensen (1993) argues that outside directors have an incentive to act as effective monitors of management because they want to protect their reputation as independent and effective decision makers. There are many empirical studies on board composition and agency cost (Weisbach, 1988; Brickley, Coles and Terry, 1994; Rosenstein and Wyatt, 1997; Chen et. al., 2006). Overall, empirical findings generally support the argument that outside directors are important and effective for monitoring management and thus reducing

[21] Mehran (1995), Datta et. al (2001)

[22] We choose CEO's total compensation only but not other high ranking executives because of the limitations on data availability. Moreover, Core and Larcker (2002) suggest that non-CEO executives generally hold a substantially smaller amount of equity in their compensation than the CEO does.

agency cost. In the current context, we will test whether the real estate holdings affected by the corporate board composition, which is measured by the ratio of the number of outsider directors (neither current nor past officers) relative to the total number of directors. Data on board composition are collected from companies' proxy statements and/or annual reports.

4.6. DUALITY

Jensen (1993) argued that the CEO should not have a dual position as chairman of the board because the CEO may not separate personal interests from shareholder interests. The issue of CEO duality has aroused considerable attention because such practice is frequently observed in many large firms and it seems to exert a negative effect on the firm's performance (Kesner, Victor, & Lamont, 1986; Baliga et al., 1996; Simpson and Gleason, 1999). In our study, we include a dummy variable taking value one if the CEO of the firm is also the chairman of the board and zero otherwise. We aim at examining whether the problem of duality will exacerbate the problem of overinvestment in CRE.

## 5. CORPORATE REAL ESTATE HOLDINGS AND FIRM RETURNS: A REVISIT

In this section, we want to investigate the relationship between CRE and firm returns by following the methodology of the existing literature such as Deng and Gyourko (2000). This is a crucial step. As it will be clear, higher CRE holdings are not associated with higher returns to corporate shares. It leads the analysis naturally to other explanations of CRE holdings, which will be examined in the following sections. The analysis here mainly consists of two stages. The first stage follows the Fama-Macbeth approach to estimate Jensen's alpha. The regression model is specified as

$$ERET_{it} = \alpha_i + \beta_i EMKT_t + \varepsilon_{it}$$

where the dependent variable, $ERET_{it}$, is the weekly excess return on the stock of firm i in period t. It is calculated as the difference between the company's weekly holding period return and the weekly T-bill return. The weekly T-bill return is derived from the 30-day T-bill return. $EMKT_t$ is the weekly excess return on the market portfolio which is measured as the difference between the weekly return on the CRSP value-weighted market portfolio and the weekly T-bill return. Slope coefficient $\beta_i$ measures the sensitivity of firm return to the systematic risk. Constant term $\alpha_i$ is the

idiosyncratic component of the monthly excess return. Error term $\varepsilon_{it}$ follows the standard normal distribution. From this regression model, we can obtain the fitted values of $\alpha_i$ and $\beta_i$. In the statistical analysis, for the sake of robustness check, we estimate this model for several different periods: we use weekly stock return data to estimate this model for the periods 1995-1998, 1998-2002, and 1995-2002 respectively. Accordingly, we obtain fitted values of $\alpha_i$ based on these three different periods.

In the second stage, we examine the relationship between CRE holdings and the non-systematic or idiosyncratic component of firm returns $\alpha_i$. Table 1 displays the various regression specifications. The dependent variable is Jensen's alpha for each firm. The central independent variable is the ratio of PPE to total assets. We control for industry dummies, firm size (the logarithm of sales), and the $\beta$ estimates. The regression results are quite strong and consistent: companies with *higher CRE* holdings tend to have *lower excess stock returns*.

(Table 1 about here)

For robustness check, we vary the measure of CRE holdings. We generate a dummy variable that takes value one if the firm's PPE/total assets ratio is above the sample median. This variable indicates high concentration of real estate holdings. It also exhibits consistently negative and significant impacts on firm returns in various regressions. We also construct a dummy variable that takes value one if the firm's beta is below 0.9 which is roughly the average beta for commercial real estate companies in the US (Deng and Gyourko, 2000). The principal result remains unchanged.

This exercise helps us verify an intriguing phenomenon in Corporate America: concentration of CRE holdings is associated with lower returns to shareholders; real estate holdings cast negative effects on corporate value. It is then natural to ask *why* there exists such a negative relationship between the two, and *why* the shareholders would allow the managers to "over-accumulate" CRE in the first place. In the following we attempt to shed light on this question from the perspective of corporate governance.

## 6. Empirical Analysis of the Relationship between Corporate Governance and Real Estate Holdings

The previous section suggested that CRE holdings may not be good news for shareholders. It begs the question of why CRE is purchased in the first place. There

are many possibilities and this section attempts to shed light on this issue. Specifically, we estimate a cross-sectional econometric model using the three-year average value of each of the firm characteristics (except corporate governance related variables).[23] For the 1998 sample, we measure real estate holdings (the dependent variable) in 1998 and the explanatory variables over the "previous period", 1995-1997. Using past values also lowers the probability of reverse causality, i.e., the observed relations reflect the effects of real estate holdings on firm-specific factors[24]. Corporate governance variables (such as CEO ownership, CEO compensation structure, outside blockholder ownership and characteristics of board structure of firms) are also measured in a year prior to 1998, i.e., they take the value of year 1995. Empirical studies suggest that corporate-governance-related variables are rather stable over a certain period of time (Shleifer and Vishny, 1986; Barclay and Holderness, 1989; Denis and Sarin, 1999). We repeat the same analysis in the 1998 sample for the 2002 sample by employing the same econometric structure. (Please refer to Table 2 for comparison.)

(Table 2 about here)

### 6.1. SUMMARY STATISTICS

The summary statistics in Table 3 present an overview of the sample characteristics of real estate holdings and corporate governance variables. The mean PPE ratio of the 1998 sample is 0.38 and the median is 0.32. The figures decrease to 0.34 and 0.28 in the 2002 sample respectively. The average CEO ownership for the 1998 sample is 2.2% and the median is 0.26%. For the 2002 sample, the corresponding figures are 2% and 0.27%. In the 1998 sample, there are 71.7% of firms with CEO ownership less than 1%; 88.9% of firms have CEO ownership less than 5%. In the 2002 sample, the corresponding figures are 72.9% and 90.3% respectively. Moreover, there are 69% and 80% of firms in the 1998 and 2002 samples respectively that contain outside blockholders. The median value of the outside blockholders' ownership is 18.9% for the 1998 sample while the figure increases to 19.9% in the 2002 sample. The median is 17.26% for the 1998 sample and 18.3% in the 2002 sample.

(Table 3 about here)

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[23] Following Ozkan and Ozkan (2004), we do this to mitigate problems that might arise due to short-term fluctuations or extreme values in any particular year.

[24] See Rajan and Zingales (1995), Ozkan and Ozkan (2004), for similar methodology.

In terms of CEO compensation structure, the mean and median of the ratio of stock option value to total compensation are 25.9% and 20.4% respectively for the 1998 sample. The corresponding figures for the 2002 sample are 37.5% and 37.6%. Our figures are very close to those found by Core, Guay, and Verrecchia (2002), who report an average ratio of 30.3% during the period 1993-98. On average, boards of firms comprise 10.4 directors in the 1998 sample and 10.2 directors in the 2002 sample, while the median is 10 directors in both the 1998 and the 2002 samples. The average proportion of outsiders in the board is 0.73 while the median is 0.75 in the 1998 sample. In the 2002 sample, the average increases slightly to 0.77, while the median also increases to 0.8. That is, for an average firm in the 1998 sample, the number of directors who are current or past executive officers is 2.8, whereas the number of directors who are not current or past executive officers is 7.6. The corresponding figures for the 2002 sample are 2.5 and 7.7 respectively. For the problem of duality, there are 26.4% of firms and 25.6% firms in the 1998 sample and 2002 sample respectively where the positions of CEO and COB are held by different people.

### 6.2. Regression results

In Table 4, we report the regression results for the model that includes the conventional and corporate governance determinants of CRE holdings. The conventional determinants include cash flow, firm size, market-to-book ratio, number of business segments, no dividend dummy, and long-term debt. The corporate governance variables include CEO ownership, CEO compensation sensitivity, ownership by outside blockholders and two variables related to board characteristics, namely (OUTSIDER/DIR) which gives the fraction of executive directors on board of directors, and a dummy variable (CEO_COB) that takes a value of one if the firm's CEO and chairman of the board are the same individual.

(Table 4 about here)

In general, the estimated coefficients deliver the predicted signs. The results are consistent with the theory that under imperfect capital markets, firms facing high costs of external finance find that leasing can economize on fixed capital costs. Two proxy variables for external financing costs display expected results. Cash flow exerts

a significantly positive impact on CRE holdings.[25] The estimated coefficients are significant at the 1% level in both the 1998 and the 2002 samples. In addition, the coefficients for the 'no dividend' dummy are negative and significant at the 1% level in both periods. The result supports that firms with no dividend payout (which may be more cash-constrained) hold less property in their asset portfolios.

Similarly, consistent with the theoretical prediction, firms with better growth opportunity (measured by a higher market to book value ratio) invest a relatively smaller amount on real estate. In both the 1998 and the 2002 samples, the relationship between growth opportunities and real estate holdings is negative and significant at the 1% level. In addition, the estimated coefficients of the number of segments are negative in sign and significant at the 10% level in the 1998 sample and the 1% level in the 2002 sample. It lends support to the argument that the advantage of corporate asset diversification by holding real estate is relatively minor for well-diversified firms that run many lines of business. On the other hand, we fail to find any evidence to support the view that larger firms have a higher propensity to own properties. The estimated coefficients for Size are *insignificant* in both periods. The coefficient of Leverage (long term debt/total assets) is positive and significant in both samples. This may be because firms holding excessive real estate come with a large amount of mortgage loans (Redman and Tanner, 1991; Liow, 1995). Our findings on the relationship between long-term debt and CRE are consistent with those of previous empirical work.

Next, we turn to the perhaps more important issue, i.e., how corporate governance affects CRE holdings in U.S. corporations. We detect evidence showing that corporate governance strength is negatively related to CRE holdings. The coefficient of CEO ownership is negative and significant at the 10% level in the 2002 sample and negative but insignificant for the 1998 sample. It suggests that the level of CEO ownership may exert an influence on CRE holding decisions of US firms. This is consistent with the view that a better alignment of the interests of CEOs and shareholders can mitigate the problem of over-investment in real estate.

The coefficients of ownership by outside blockholders are negative and significant at the 1% level and 15% level in the 1998 and 2002 samples respectively. The result corroborates the view that outside block shareholders contributing to

[25] For instance, Redman and Tanner (1991) found that 62.8% of correspondents of their survey employed cash flow from operation as the method of real estate financing.

monitor corporate management. Since outside blockholders are not involved in daily operation of the firm, they can rarely generate private benefits from firm's decision, and thus will not support inefficient investment. This finding confirms that governance structure affects firms' decision on CRE holdings.

We cannot find any significant relation between board composition and CRE holdings in both the 1998 and 2002 samples. This may arise from the fact that the variation in the proportion of outsiders in the board in our sample is too small. In our sample, only around 5% of the firms have boards of directors in which current and past executive officers account for more than half of the board. In more than 75% of our sample firms, outsiders compose more than 2/3 of their board.[26]

The dummy variable for duality, i.e., the same individual holds the position of chief executive officer and the chairman of the board, is significant at the 15% level with a positive sign in the 1998 sample. The positive sign is exhibited in the 2002 sample but the estimated coefficient is not statistically significant. The results can be interpreted as follows: when a corporation concentrates management power and board power in an individual, it would probably lower the effectiveness of corporate governance mechanisms**.** Thus, it is easier for the management under such 'loose' control mechanisms to waste cash flow by over-investing in negative-net-present-value projects such as purchasing real estate properties. The coefficients of CEO compensation incentive are negative but insignificant in both samples.

Overall, we find that some of the corporate governance indicators widely used in the literature display statistically significant and negative impacts on CRE holdings, suggesting that a higher level of CRE investment and holdings is likely to be a consequence of weaker corporate governance.

## 7. CORPORATE GOVERNANCE CHANGES AND INCREMENT IN REAL ESTATE HOLDINGS

So far, our study has focused on the cross-sectional analysis for the stock of real estate holdings in year 1998 and year 2002 separately. A natural question to ask is whether real estate holdings will change significantly once corporate governance and other firm characteristics have changed. To put it differently, what determines the flow of real estate

[26] Another possibility is that some of the "outside directors" are not "outside enough." We, however, do not have a better measure of this.

acquisition or sales? We conjecture that the changes in corporate governance structure, liquidity constraint and other firm characteristics may induce companies to purchase or sell a substantial amount of properties. Because the changes in real estate holdings may well be caused by some natural variation in real estate stock value such as depreciation, we pay particular attention to how the changes in firm characteristics affect the likelihood of incurring substantial changes in real estate holdings. The rationale for this analysis lies in that a large degree of changes in real estate holdings is more likely to be caused by significant changes in corporate policies on real estate investments rather than by natural adjustment of real estate holdings.

To verify this conjecture, we first match the companies in the 1998 sample with those in the 2002 sample, and obtain 322 firms that are covered in both samples with complete data. We then calculate the *change* in real estate holdings, i.e., the difference in the ratio of PPE/Total Assets, over the four years. The majority of sample companies (around 63%) experience a decline in real estate holdings in the period 1998-2002. About 20% of the sample companies witness an increase of more than 4.6% in the ratio of PPE/Total Assets; and about 10% of the sample firms register an increment of over 5.1% in this real estate holding ratio. Based on the distribution characteristics of the increment in real estate holdings for our sample firms, we define a dummy variable for large increment in real estate holdings based on three alternative criteria: positive change (>0), more than 4.6% positive change, and more than 5.1% positive change. The dummy variable takes value one if the four-year growth in real estate holdings is larger than 0, 4.6%, and 5.1% respectively. To look at how the changes in firm characteristics affect those in CRE holdings, we generate explanatory variables reflecting the changes in cash flow, company size, market to book ratio, number of business segments, corporate leverage (long-term debt), CEO ownership, CEO compensation structure, outside blockholder ownership, board composition and duality of the positions of CEO and chairman of the board.[27]

Table 5 presents the logistic regressions where the dependent variable (dummy variable corresponding to a large increment in CRE holdings) is regressed on a host of explanatory variables. We see that an increase in cash flow leads to a lower level of real estate holdings in some regression. Other things being equal, an *increase in firm size* actually causes the ratio of CRE holdings to *decline*. Perhaps as the firm size increases, the

[27] We also examine the effects of changes in dividend issuance status on the changes in real estate holdings. However, dividend issuance status does not have enough time-series and cross-section variation so that it is often dropped from regressions.

firm tends to have more than one establishment but it may not commit to purchasing all the operation sites. Hence the ratio of renting would actually increase. The changes in the market-to-book ratio, long-term debt and the number of business segments produce no significant impact on the increment in real estate holdings.

(Table 5 about here)

In terms of corporate governance measures, an increase in the CEO ownership share *reduces* the probability of incurring a large increment in CRE holdings, and the effect is statistically significant when the dependent variable is a positive change in real estate holdings. Similarly, a change from the CEO-board chairman duality to no duality, a signal of improvement in corporate governance, *decreases* the likelihood of the firm experiencing a large increment in corporate property. These results are consistent with our claim that better corporate governance leads to lower chances of increasing CRE holdings. Other corporate governance indicators are mostly insignificant. Change in board composition (i.e., increases in the proportion of outside directors on the board) even shows positive and significant effects in one regression.

One may object that using differences in the dependent and independent variables to measure changes may suffer some bias due to the existence of scale effects. To correct this potential issue, we use the four-year growth rate in the dependent and independent variables to measure increment. For instance, the growth rate of CRE holdings for firm i is calculated as (PPE/Total Assets for year 2002 – PPE/Total Assets for year 1998)/(PPE/Total Assets for year 1998). Corresponding to the above-mentioned case of using difference in the variables, about 63% of sample companies have a decrease in real estate holdings in the period 1998-2002. Around 20% of the sample companies register a growth rate of more than 10% in property holdings; and about 10% of the sample firms record a growth rate of over 20% in real estate holdings. Therefore, we define a dummy variable for a large growth in real estate holdings based on three alternative criteria: positive change (>0), more than 10% positive growth, and more than 20% positive growth. The dummy variable takes value one if the four-year growth in real estate holdings is larger than 0, 10%, and 20% respectively.

Table 6 presents the logistic regressions based on the growth rates in property holdings, corporate governance, financial constraint and other control variables.[28] Because these variables have some observations taking value zero, the calculation of four-year

[28] The dummy variables of changes in duality are constructed as before.

growth rates leads to a smaller sample size of 161 firms. The results in table 6 are consistent with those of table 5. An increase in cash flow leads to a higher level of real estate holdings in some regression. An increase in firm size actually causes the real estate holdings to *decline*. The growth rates in the market-to-book ratio and the number of business segments produce no significant impact on the increment in real estate holdings.

(Table 6 about here)

Corporate governance measures produce some significant results. An increase in the CEO ownership share *reduces* the probability of incurring a large increment in CRE holdings. Its estimated coefficient is statistically significant when the dependent variable is more than 10% and 20% growth in real estate holdings. Similarly, an increase of the equity-based option value in CEO compensation *reduces* the likelihood of having a large increment in CRE holdings. Its estimated coefficients are significant when the dependent variable is positive or more than 10% positive changes in real estate holdings. There is also some evidence that a change from the CEO-chairman duality to no duality *reduces* the likelihood of having more than 20% growth in real estate holdings. These results are consistent with our claim that better corporate governance lead to lower chances of increasing CRE holdings. Other corporate governance measures are mostly insignificant. Change in board composition even shows positive and significant effects in one regression.

In sum, our analysis in this section provides some further evidence on how improved corporate governance depresses CRE holdings. [29]

## 8. ROBUSTNESS CHECK

### 8.1. FULL SAMPLE SPLITTING

As we mentioned in the previous section, the 'optimal' level of CRE holdings across industries should be different based on their industries' specific needs. Researchers suggest that CRE ratio exhibits very large variations across industries (Redman and Tanner, 1991; Nourse and Roulac, 1993; Brounen and Eichholtz, 2005). Our main objective in this section is to check whether the factors that are shown to be significant in determining CRE in the full sample behave the same way for industries

[29] Taking into consideration the possibility that corporate governance variables might show relatively small variations over a short period of time, we also tried to conduct regressions with variant specifications. For instance, the explanatory variables include the changes in accounting variables and the levels of the corporate governance variables taking the value of the initial year (1998). The results are reported in Appendix 3. The corporate governance variables produce much less statistically significant estimated coefficients.

with different nature. We will split the full sample into two sub-samples based on the nature of different industries. One sub-sample includes the Mineral sector, Construction sector and Manufacturing sector (MCM). The other sub-sample includes the Trade sector, Services sector and Others (TSO)[30]. Clearly, the production process of the MCM sectors often requires specific physical assets, e.g. factory and production lines. On the other hand, for firms engaged in the services and trade sectors, their need for specific physical assets is lower. Tables 7 and 8 provide a description of the summary statistics.

(Table 7 and 8 about here)

### 8.2 REGRESSION RESULTS

In Table 9, we report the regression results for the 'MCM' and 'TSO' sub-samples[31]. Firms with low cash flow, no dividend payout and good growth opportunities tend to hold a small amount of CRE in their asset portfolio no matter they are from the 'MCM' sector or 'TSO' sector. Moreover, whether in the 'MCM' or 'TSO' sector, the CRE holdings appear to be associated with long-term debt ratio. In addition, firms in the 'TSO' sector hold a smaller amount of CRE if their businesses are well-diversified by operating in several business lines. On the other hand, such pattern cannot be observed in the 'MCM' sector.

(Table 9 about here)

For corporate governance measures, CEO ownership tends to play a more important role in mitigating the problem of over-investment in CRE in the 'MCM' sector. Such a role is performed by outside blockholders in the 'TSO' sector. For the 'MCM' sector, we can also observe a significantly negative impact of CEO compensation incentive and outsider blockholder ownership on real estate holdings in the 2002 sample and the 1998 sample respectively. In addition, a significantly positive coefficient for the duality dummy (CEO=chairman) can be observed in the 1998 sample in the 'MCM' sector.

In sum, we find that the negative relationship between corporate governance strength and CRE holdings is much stronger in the 'MCM' sector. Why is it the case? A popular explanation is the "holdup" problem for firm-specific real estate. In

[30] The reason for excluding the sector of Transportation, Communication and Utility will be explained in appendix.

[31] We included Mineral sector Dummy and Construction sector Dummy in 'MCM', Trade Sector Dummy and others sector dummy in 'TSO'.

principle, real estate firms could build and own firm-specific real estate and then rent them to the production firms. However, it would lead to a "holdup" problem in *ex post* terms. After the real estate is built, since it is firm-specific, it can only be rent out to other firms with a significant discount. The "inside value" is now higher than the "outside value". In that case, the production firm can threaten to terminate the rental contract unless the real estate firm lowers the rent. The real estate firm can anticipate this ex post holdup problem and hence will be unwilling to build firm-specific real estate. Therefore, at the equilibrium, firm-specific real estate would be built and sold to the production firms.[32] The corporate governance perspective, however, further elaborates the issue. Since it is much more justifiable for those firms in the 'MCM' sector to purchase rather than rent real estate, and those properties tend to be firm-specific, the management has even more excuses to over-invest. The asset-specificity makes it harder for the shareholders to judge whether the investment is well grounded. There may be no enough "outside reference" to compare. In that situation, the corporate governance schemes in monitoring management become more critical, which explains why we obtain the result that other things being equal, the corporate governance variables are shown to be more important determinants of CRE holdings in the 'MCM' than in the 'TSO' sector.

## 9. CONCLUDING REMARKS

It has long been advised that management needs to be monitored, or their investment decisions may not maximize the interests of the shareholders. The previous literature tends to focus on investment projects which are directly related to production, such as the amount of physical capital investments. This paper suggests that the same kind of intuition also applies to Corporate Real Estate holdings, which are a kind of capital investment less directly related to the production process. Our results confirm the previous studies that asset return in the stock market is negatively associated with real estate holdings, which are in turn influenced by financial constraint variables (such as whether firms distribute dividends) and growth variables. On top of that, we find that the corporate governance variables are also important, especially in industries where plant and property are "necessary". In particular, the devices which discipline the management for other kinds of "excessive spending",

[32] For more formal discussion on the optimal contract under potential hold-up problem, see Hart (1995), among others.

such as increasing the CEO ownership, increasing the percentage of stock option in the total managerial compensation, etc., also contribute to reducing the CRE holdings. Our results derived from sample splitting and logit regression further support the view that firms with good corporate governance tend to rent real estate, and have better performance in the stock market, and that over- investment in CRE could be an avenue for management to expropriate firms' resources.

Future research should therefore address the following questions. First, if "weak corporate governance" is associated with more CRE holdings, how would those holdings interact with the executive compensation? Second, is there any self-selection about which kind of corporate governance mechanism to adopt? Third, how would the dynamics of the market structure be affected if more corporations choose to rent rather than own real estate? Fourth, would the globalization in production and consumption promote or discourage corporate real estate holdings? Some ongoing projects are now being pursued along these directions.

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Table 1: Cross sectional data regression of Alpha vs. PPE(net)/TA-Full Sample

| | Alpha98 | Alpha02 | Alpha full | Alpha98 | Alpha02 | Alpha full |
|---|---|---|---|---|---|---|
| PPE/Total Assets | -0.0014 [b] | -0.0013 [a] | -0.00092 [b] | -0.0014 [b] | -0.0013 [a] | -0.00094 [b] |
| | (0.00070) | (0.00048) | (0.00037) | (0.00070) | (0.00048) | (0.00037) |
| Log of Sales | 0.000073 | -0.000053 | -0.000022 | 0.000069 | -0.000063 | -0.000032 |
| | (0.000098) | (0.000063) | (0.000052) | (0.000098) | (0.000064) | (0.000052) |
| Beta | | | | 0.00029 | 0.0012 [b] | -0.00076 [a] |
| | | | | (0.00029) | (0.00049) | (0.00016) |
| # of obs. | 549 | 549 | 549 | 549 | 549 | 549 |
| Adjusted $R^2$ | 0.0078 | 0.073 | 0.071 | 0.0080 | 0.059 | 0.047 |

Notes: Industry specific fixed effects are estimated for all models, but they are not reported. Superscripts a, b, c, and d indicate statistical significance at the 1%, 5%, 10%, and 15% levels respectively.

| | Alpha98 | Alpha02 | Alpha full | Alpha98 | Alpha02 | Alpha full |
|---|---|---|---|---|---|---|
| PPE/Total Assets | -0.0014 [b] | -0.0013 [a] | -0.00094 [b] | | | |
| | (0.00070) | (0.00048) | (0.00037) | | | |
| PPE/Total Assets>50% | | | | -0.00059 [b] | -0.00049 [a] | -0.00033 [b] |
| | | | | (0.00027) | (0.00018) | (0.00015) |
| Log of Sales | 0.000069 | -0.000063 | -0.000032 | 0.000081 | -0.000053 | -0.000025 |
| | (0.000098) | (0.000064) | (0.000052) | (0.000097) | (0.000064) | (0.000052) |
| Beta<0.9 | 0.00029 | -0.0011 [a] | -0.00076 [a] | 0.00028 | -0.0010 [a] | -0.00077 [a] |
| | (0.00029) | (0.00022) | (0.00016) | (0.00029) | (0.00022) | (0.00017) |
| # of obs. | 549 | 549 | 549 | 549 | 549 | 549 |
| Adjusted $R^2$ | 0.0080 | 0.059 | 0.047 | 0.0082 | 0.056 | 0.045 |

Notes: PPE/Total Assets>50% is a dummy variable that takes value one if the ratio PPE/Total assets for a company is above sample median and zero otherwise. Beta<0.9 is a dummy variable that takes value one if the beta of a company is below 0.9, which is roughly the average level of beta in commercial real estate industry, and takes value zero if otherwise. Industry specific fixed effects are estimated for all models, but they are not reported. Superscripts a, b, c, and d indicate statistical significance at the 1%, 5%, 10%, and 15% levels respectively.

Table 2: Comparison of 1998 sample and 2002 sample

| | 1998 sample | 2002 sample |
|---|---|---|
| Dependent variable | 1998 | 2002 |
| Financing variables | Average of 1995-1997 | Average of 1999 to 2001 |
| Corporate Governance variables | 1995 | 1999 |

## Table 3: Summary statistics-Full sample

### Summary statistics for variables explaining 1998PPE/TA

Remarks: Number in ( ) is the summary statistics for variables explaining 2002 PPE/TA

| | Mean | S.D. | Max | Min | 25th percentile | 50th percentile | 75th percentile |
|---|---|---|---|---|---|---|---|
| PPE/TA | 0.375<br>(0.337) | 0.222<br>(0.220) | 0.933<br>(0.946) | 0.011<br>(0.007) | 0.197<br>(0.166) | 0.324<br>(0.283) | 0.548<br>(0.485) |
| Free Cash Flow | 0.093<br>(0.086) | 0.054<br>(0.053) | 0.287<br>(0.288) | -0.323<br>(-0.160) | 0.058<br>(0.054) | 0.090<br>(0.083) | 0.124<br>(0.113) |
| M/B | 3.339<br>(4.100) | 3.210<br>(5.981) | 35.214<br>(69.681) | 0.371<br>(0.164) | 1.767<br>(1.469) | 2.512<br>(2.327) | 3.757<br>(4.229) |
| Business segments | 2.02<br>(3.31) | 1.40<br>(1.94) | 10<br>(10) | 1<br>(1) | 1<br>(1) | 1<br>(3) | 3<br>(4) |
| Sales ($MM) | 4776<br>(5802) | 9434<br>(11045) | 105481<br>(121275) | 6.727<br>(101.9) | 714<br>(867) | 1626<br>(2035) | 4658<br>(5797) |
| Ln Sales | 7.549<br>(7.761) | 1.329<br>(1.303) | 11.57<br>(11.71) | 1.906<br>(4.624) | 6.571<br>(6.765) | 7.394<br>(7.618) | 8.446<br>(8.665) |
| LT DEBT | 0.195<br>(0.221) | 0.124<br>(0.139) | 0.630<br>(0.664) | 0<br>(0) | 0.097<br>(0.126) | 0.192<br>(0.228) | 0.284<br>(0.311) |
| CEO OWN (%) | 2.19<br>(1.98) | 5.62<br>(5.23) | 53.6<br>(39.6) | 0<br>(0) | 0.080<br>(0.084) | 0.258<br>(0.266) | 1.216<br>(1.002) |
| CEO COMP | 0.259<br>(0.375) | 0.251<br>(0.281) | 0.964<br>(0.999) | 0<br>(0) | 0<br>(0.129) | 0.204<br>(0.376) | 0.419<br>(0.578) |
| OUTBLK OWN (%) | 18.9<br>(19.9) | 11.5<br>(12.2) | 65.4<br>(79.5) | 5<br>(5) | 10.4<br>(10.6) | 17.26<br>(18.3) | 25.2<br>(26.5) |
| Board Composit -ion | 0.727<br>(0.771) | 0.159<br>(0.117) | 1<br>(1) | 0<br>(0) | 0.667<br>(0.714) | 0.75<br>(0.8) | 0.833<br>(0.846) |

PPE/TA is the ratio of property, plant and equipment to total asset, both in net book value. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. LT DEBT is long term debt scaled by total assets. No dividend dummy equal to 1 if the firm paid no dividend in year 1997(2001) and is 0 otherwise. CEO OWN is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based( please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

Table 4: Cross sectional data regression of PPE(net)/TA-Full Sample

| | | | | Expect sign |
|---|---|---|---|---|
| Year of PPE(net)/TA | 1998 | 2002 | | |
| Year of independent variables | Average of 95-97* | Average of 99-01* | | |
| Year of Corp gov variables | 1995 | 1999 | | |
| Sample size | 549 | 350 | | |
| M/B | -0.011 ***a*** | -0.004 ***a*** | - | |
| | (0.003) | (0.001) | | |
| Size | -0.009 | -0.003 | **?** | |
| | (0.007) | (0.007) | | |
| Business Segments | -0.009 ***c*** | -0.014 ***a*** | - | |
| | (0.005) | (0.005) | | |
| LT DEBT | 0.525 ***a*** | 0.390 ***a*** | | **?** |
| | (0.074) | (0.071) | | |
| Cash flow | 1.045 ***a*** | 0.769 ***a*** | | **+** |
| | (0.211) | (0.166) | | |
| No dividend | -0.089 ***a*** | -0.067 ***a*** | | **-** |
| | (0.018) | (0.021) | | |
| CEO OWN | -0.002 | -0.003 ***c*** | | **-** |
| | (0.001) | (0.002) | | |
| OUTBLK OWN | -0.002 ***a*** | -0.001 ***d*** | | **-** |
| | (0.001) | (0.001) | | |
| CEO COMP | -0.018 | -0.029 | | **-** |
| | (0.033) | (0.034) | | |
| Board Composition | 0.028 | 0.001 | | **-** |
| | (0.051) | (0.086) | | |
| CEO_CHR | 0.024 ***d*** | 0.008 | | **+** |
| | (0.017) | (0.020) | | |
| R-sq. | 0.461 | 0.489 | | |

The dependent variable is the ratio of property, plant and equipment to total asset, both in net book value. Dependent variables are cash flow, size, M/B, Business segments, LT DEBT, No dividend, CEO OWN, CEO COMP, OUTBLK OWN, Board Composition and CEO_CHR. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. LT DEBT is long term debt scaled by total assets. No dividend dummy equal to 1 if the firm paid no dividend in year 1997(2001) and is 0 otherwise. CEO OWN is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based (please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

Table 5: Logistic Model Regressions of the Change in PPE(net)/TA on the Changes in Liquidity and Corporate Governance Variables - Full Sample

| Years of PPE(net)/TA change | 1998-2002 | 1998-2002 | 1998-2002 |
|---|---|---|---|
| Dependent Variable | Dummy =1 if change>0 | Dummy =1 if change > 4.6% (about 20% of firms) | Dummy=1 if change > 5.1% (about 10% of firms) |
| Sample size | 322 | 322 | 322 |
| Change in M/B | 0.00634 | 0.0483 | 0.0158 |
| | (0.0317) | (0.0342) | (0.0382) |
| Change in Size | -0.557 [d] | -0.157 | -0.977 [c] |
| | (0.375) | (0.407) | (0.548) |
| Change in Business | -0.0753 | 0.151 | -0.121 |
| Segments | (0.0872) | (0.113) | (0.134) |
| Change in LT DEBT | -0.104 | 0.320 | 0.598 |
| | (1.339) | (1.457) | (2.181) |
| Change in Cash flow | -1.0634 | -5.730 [c] | 0.679 |
| | (2.908) | (3.183) | (3.887) |
| Change in CEO OWN | -0.0805 [c] | -0.0385 | -0.0560 |
| | (0.0437) | (0.0344) | (0.0402) |
| Change in OUTBLK | 0.0141 | 0.00096 | 0.00020 |
| OWN | (0.00986) | (0.011) | (0.0134) |
| Change in CEO COMP | 0.219 | 0.520 | 0.135 |
| | (0.443) | (0.541) | (0.717) |
| Change in Board | 1.468 [c] | 0.763 | -0.992 |
| Composition | (0.782) | (0.855) | (0.953) |
| Change in Duality (from | -0.483 | -0.151 | -0.624 |
| no to yes) | (0.361) | (0.403) | (0.583) |
| Change in Duality (from | -0.607 [d] | -0.852 [c] | -0.903 [d] |
| yes to no) | (0.391) | (0.501) | (0.593) |
| Log Pseudo Likelihood | -201.863 | -155.94 | -113.744 |
| Pseudo R-sq. | 0.0434 | 0.0372 | 0.0431 |

The dependent variable is dummy variables indicating changes in corporate real estate holdings meeting certain criteria, that is, changes in the ratio of property, plant and equipment to total asset, both in net book value, are larger than 0, 4.6% and 5.1% respectively. Independent variables are four-year differences in cash flow, size, M/B, business segments, long-term debt, CEO ownership, equity-based CEO compensation, outside blockholder ownership, board composition and CEO_chairman duality. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. Long-term Debt is long term debt scaled by total assets. CEO ownership is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based (please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

Table 6: Logistic Model Regressions of the Growth Rate in PPE(net)/TA on the Growth Rates in Liquidity and Corporate Governance Variables --- Full Sample

| Years of PPE(net)/TA change | 1998-2002 | 1998-2002 | 1998-2002 |
|---|---|---|---|
| Dependent Variable | Dummy =1 if growth rate>0 | Dummy =1 if growth rate > 10% | Dummy=1 if growth rate > 20% |
| Sample size | 161 | 161 | 161 |
| Growth in M/B | -0.308 | -0.0547 | -0.535 |
| | (0.425) | (0.203) | (0.515) |
| Growth in Size | -3.892 | -9.468 [b] | -15.571 [a] |
| | (2.965) | (4.323) | (5.141) |
| Growth in Business | 0.0573 | -0.0173 | 0.0132 |
| Segments | (0.137) | (0.0631) | (0.265) |
| Growth in LT DEBT | 0.0196 | 0.0172 | 0.0809 [b] |
| | (0.0367) | (0.0631) | (0.0327) |
| Growth in Cash flow | 0.189 | 0.0739 [a] | -0.0100 |
| | (0.221) | (0.0265) | (0.0234) |
| Growth in CEO OWN | -0.00202 | -0.431 [a] | -0.476 [c] |
| | (0.0291) | (0.157) | (0.268) |
| Growth in OUTBLK | 0.174 | 0.0911 | 0.174 |
| OWN | (0.120) | (0.155) | (0.197) |
| Growth in CEO COMP | -0.186 [c] | -0.310 [b] | -0.265 [d] |
| | (0.107) | (0.149) | (0.183) |
| Change in Board | 0.00309 | 0.647 [b] | -0.0189 |
| Composition | (0.167) | (0.277) | (0.125) |
| Change in Duality (from | -0.552 | -0.701 | -1.749 |
| no to yes) | (0.487) | (0.774) | (1.393) |
| Change in Duality (from | -0.145 | -0.268 | -2.317 [d] |
| yes to no) | (0.538) | (0.757) | (1.463) |
| Log Pseudo Likelihood | -102.038 | -71.565 | -40.593 |
| Pseudo R-sq. | 0.0531 | 0.151 | 0.221 |

The dependent variable is dummy variables indicating growth rates in corporate real estate holdings meeting the stated criteria, that is, growth rates in the ratio of property, plant and equipment to total asset, both in net book value, are larger than 0, 10% and 20% respectively. Independent variables are four-year growth rates in cash flow, size, M/B, business segments, long-term debt, CEO ownership, equity-based CEO compensation, outside blockholder ownership, board composition and CEO_chairman duality. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. Long-term Debt is long term debt scaled by total assets. CEO ownership is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based (please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

Table 7: Summary statistics- Mineral, Construction and Manufacturing

Summary statistics for variables explaining 1998PPE/TA
Remarks: Number in ( ) is the summary statistics for variables explaining 2002 PPE/TA

| | Mean | S.D. | Max | Min | 25th percentile | 50th percentile | 75th percentile |
|---|---|---|---|---|---|---|---|
| PPE/TA | 0.338 (0.301) | 0.186 (0.189) | 0.933 (0.946) | 0.011 (0.007) | 0.196 (0.164) | 0.305 (0.267) | 0.427 (0.366) |
| LT DEBT | 0.72 (0.210) | 0.114 (0.131) | 0.630 (0.634) | 0 (0) | 0.085 (0.110) | 0.161 (0.208) | 0.253 (0.301) |
| Free Cash Flow | 0.101 (0.090) | 0.055 (0.051) | 0.287 (0.282) | -0.323 (-0.159) | 0.070 (0.064) | 0.098 (0.088) | 0.128 (0.115) |
| M/B | 3.676 (4.267) | 3.658 (5.374) | 35.214 (40.559) | 0.371 (0.164) | 2.036 (1.588) | 2.722 (2.485) | 4.105 (4.350) |
| Business segments | 2.06 (3.42) | 1.36 (1.77) | 8 (10) | 1 (1) | 1 (2) | 2 (3) | 3 (4) |
| Sales ($MM) | 4323 (5036) | 7432 (7849) | 64765 (55743) | 6.7 (102) | 700 (842) | 1603 (1820) | 4171 (5410) |
| Ln Sales | 7.486 (7.672) | 1.333 (1.298) | 11.08 (10.93) | 1.906 (4.624) | 6.551 (6.735) | 7.380 (7.506) | 8.336 (8.596) |
| CEO OWN (%) | 2.227 (1.823) | 5.677 (4.777) | 53.6 (37.1) | 0 (0) | 0.101 (0.084) | 0.291 (0.259) | 1.360 (0.939) |
| CEO COMP | 0.272 (0.400) | 0.242 (0.269) | 0.964 (0.985) | 0 (0) | 0.047 (0.206) | 0.227 (0.394) | 0.442 (0.591) |
| OUTBLK OWN (%) | 20.1 (19.4) | 11.5 (12.6) | 64.2 (79.5) | 5 (5) | 11.3 (10) | 17. (16.83) | 27.0 (25.8) |
| Board Composit-ion | 0.723 (0.766) | 0.166 (0.120) | 1 (1) | 0 (0) | 0.667 (0.714) | 0.75 (0.8) | 0.833 (0.833) |

PPE/TA is the ratio of property, plant and equipment to total asset, both in net book value. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. LT DEBT is long term debt scaled by total assets. No dividend dummy equal to 1 if the firm paid no dividend in year 1997(2001) and is 0 otherwise. CEO OWN is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based( please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

Table 8: Summary statistics-Trade, Services and other

Summary statistics for variables explaining 1998PPE/TA

Remarks: Number in ( ) is the summary statistics for variables explaining 2002 PPE/TA

| | Mean | S.D. | Max | Min | 25th percentile | 50th percentile | 75th percentile |
|---|---|---|---|---|---|---|---|
| PPE/TA | 0.318 (0.317) | 0.243 (0.248) | 0.917 (0.932) | 0.017 (0.022) | 0.127 (0.111) | 0.239 (0.263) | 0.469 (0.463) |
| LT DEBT | 0.195 (0.218) | 0.136 (0.163) | 0.529 (0.664) | 0 (0) | 0.073 (0.080) | 0.192 (0.211) | 0.270 (0.314) |
| Free Cash Flow | 0.089 (0.090) | 0.052 (0.060) | 0.258 (0.288) | -0.020 (-0.069) | 0.052 (0.050) | 0.084 (0.082) | 0.115 (0.118) |
| M/B | 3.250 (4.702) | 2.395 (8.264) | 13.174 (69.681) | 0.488 (0.223) | 1.923 (1.408) | 2.531 (2.377) | 3.774 (5.420) |
| Business segments | 1.680 (2.759) | 1.350 (2.139) | 10 (10) | 1 (1) | 1 (1) | 1 (2) | 2 (4) |
| Sales ($MM) | 6345 (8948) | 14183 (18030) | 105481 (121275) | 207 (320) | 711 (1198) | 1799 (2503) | 6346 (8630) |
| Ln Sales | 7.717 (8.099) | 1.358 (1.347) | 11.57 (11.71) | 5.333 (5.767) | 6.567 (7.088) | 7.495 (7.825) | 8.755 (9.062) |
| CEO OWN (%) | 2.963 (3.058) | 6.348 (6.981) | 43.872 (39.604) | 0 (0.002) | 0.124 (0.120) | 0.459 (0.456) | 2.014 (1.363) |
| CEO COMP | 0.286 (0.347) | 0.284 (0.323) | 0.948 (0.999) | 0 (0) | 0 (0) | 0.218 (0.323) | 0.464 (0.598) |
| OUTBLK OWN (%) | 18.3 (21.1) | 11.6 (11.3) | 65.4 (59.6) | 5 (5.1) | 10.5 (13.1) | 16.8 (19.8) | 22.6 (26.6) |
| Board Composit -ion | 0.695 (0.761) | 0.149 (0.122) | 0.929 (0.952) | 0.1 (0.375) | 0.615 (0.696) | 0.714 (0.778) | 0.786 (0.866) |

PPE/TA is the ratio of property, plant and equipment to total asset, both in net book value. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. LT DEBT is long term debt scaled by total assets. No dividend dummy equal to 1 if the firm paid no dividend in year 1997(2001) and is 0 otherwise. CEO OWN is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based( please refer variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which equal to 1 if the CEO of the firm is also he chairman of the board, 0 otherwise. Number in ( ) is Robust Standard Error. '*' represent the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

## Table 9: Regression of PPE(net)/TA-Split into 'MCM' and 'TSO'

| | Mineral-construction-Manufacturing | | Trade-Services, Other | |
|---|---|---|---|---|
| Year of PPE(net)/TA | 98 | 02 | 98 | 02 |
| Year of independent variables | Average of 95-97* | Average of 99-01* | Average of 95-97* | Average of 99-01* |
| Year of Corp gov variables | 1995 | 1999 | 1995 | 1999 |
| Sample size | 351 | 230 | 122 | 83 |
| M/B | -0.007 **a** | -0.003 **b** | -0.036 **a** | -0.011 **a** |
| | (0.002) | (0.001) | (0.014) | (0.002) |
| Size | -0.008 | -0.003 | 0.000 | -0.008 |
| | (0.008) | (0.008) | (0.016) | (0.014) |
| Business Segments | -0.000 | 0.004 | -0.040 **a** | -0.060 **a** |
| | (0.007) | (0.006) | (0.012) | (0.010) |
| LT DEBT | 0.413 **a** | 0.355 **a** | 0.689 **a** | 0.662 **a** |
| | (0.080) | (0.078) | (0.148) | (0.134) |
| Cash flow | 0.831 **a** | 0.498 **a** | 2.213 **a** | 2.086 **a** |
| | (0.222) | (0.172) | (0.571) | (0.411) |
| No dividend | -0.087 **a** | -0.062 **a** | -0.077 **b** | -0.062 |
| | (0.021) | (0.023) | (0.038) | (0.047) |
| CEO OWN | -0.002 **c** | -0.004 **c** | 0.000 | -0.003 |
| | (0.001) | (0.002) | (0.003) | (0.003) |
| OUTBLK OWN | -0.001 **b** | -0.001 | -0.004 **b** | -0.007 **a** |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| CEO COMP | -0.016 | -0.068 **c** | -0.037 | 0.018 |
| | (0.038) | (0.040) | (0.067) | (0.060) |
| Board Composition | 0.003 | -0.119 | 0.026 | 0.344 |
| | (0.061) | (0.086) | (0.119) | (0.177) |
| CEO_CHR | 0.037 **b** | 0.003 | 0.014 | 0.017 |
| | (0.019) | (0.022) | (0.037) | (0.050) |
| R-sq. | 0.336 | 0.478 | 0.420 | 0.566 |

The dependent variable is the ratio of property, plant and equipment to total asset, both in net book value. Dependent variables are cash flow, size, M/B, Business segments, LT DEBT, No dividend, CEO OWN, CEO COMP, OUTBLK OWN, Board Composition and CEO_CHR. Cash flow is operating income before depreciation minus the sum of interest expenses, taxes, preferred dividends and common dividend scaled by total assets. Size is natural log of sales. M/B is market value to book value. Business segment is the number of segments reported by compustat segment dataset. LT DEBT is long term debt scaled by total assets. No dividend dummy equals 1 if the firm paid no dividend in year 1997(2001) and is 0 otherwise. CEO OWN is the percentage of share owned by Chief Executive Officer. CEO COMP is the proportion of compensation that is equity based( please refer to variables description for detail construction). OUTBLK OWN is the percentage of share owned by outside blockholder. Board Composition is the proportion of outsider in the board of directors. CEO_CHR is a dummy variable which is equal to 1 if the CEO of the firm is also he chairman of the board, and is 0 otherwise. Number in ( ) is Robust Standard Error. '*' represents the figure on number of segments and No dividend are from year 1997(2001) for 1998(2002) year of PPE(net)/TA. 'a', 'b', 'c' and 'd' indicate statistical significance at the 1%, 5%, 10% and 15% levels, respectively.

## Appendix 1a

Previous literature on the Relationship between Real estate concentration ratio with Raw Return, Risk, Systematic Risk and Abnormal Return

| | Deng and Gyourko (1999) | Seiler, Chatrath and Webb (2001) | Liow (2004) | Brounen and Eichholtz (2005) |
|---|---|---|---|---|
| Sample period | 1984-93 | 1985-1994 | 1997-2001 | 1992-2000 |
| Raw Return | N.A | N.A | positive : 46.7% negative : 53.3% | Negative ( exception: Electronics industry ) |
| Risk ( standard deviation of return) | N.A | N.A | Positive | N.A |
| Systematic Risk ( Beta ) | N.A | Insignificant | Positive and significant | Insignificant ( only significant in the high yielding industries like Communications and business Services ) |
| Abnormal Return ( Jensen index ) | Negative (Only forfirms with high real estate concentration and high beta risk) | 2 out of 9 sub samples: Positive 7 out of 9 sub samples: Negative overall: insignificant | Negative | N.A |

# Appendix 1b

## Variables description:

| Variables' name | Variables' definition | Data code in Compustat | year |
|---|---|---|---|
| **Dependent variable** | | | |
| PPE/TA | PPE(net)/TA | Data8/ data 6 | 1998 (2002) |
| **Firm Characteristics:** | | | |
| LT DEBT | Long term debt/Total asset | Data 9/Data 6 | Average of 1995-1997 (1999-2001) |
| Cash Flow | Operating income before depreciation minus interest expense , taxes, preferred dividends and common dividends divided by book value of Total assets | (Data 13-Data 15-Data 16- Data Data 19- Data 21) / Data 6 | Average of 1995-1997 (1999-2001) |
| No Dividend | Dummy variable which equal to 1 if the firm paid no dividend in year 1997(2001) , and is 0 otherwise. | NA | 1997 (2001) |
| M/B | Market to book value | (Data 199 * Data 25)/ Data 216 | Average of 1995-1997 (1999-2001) |
| Ln Sales($MM) | Ln Sales($MM) | Ln Data 12 | Average of 1995-1997 (1999-2001) |
| Business segments | number of reported business segments | NA | 1997 (2001) |
| **Corporate governance variables :** | | | |
| CEO OWN (%) | Share owned by Chief Executive officer | NA | 1995 (1999) |

| | | | |
|---|---|---|---|
| OUTBLK OWN (%) | Share owned by outside blockholder | NA | 1995 (1999) |
| Board Composition | Number of outsider in the board of directors ( neither current nor past officer ) divided by total number of director inside the board | NA | 1995 (1999) |
| CEO COMP | Total Value of Stock Options Granted (using Black-Scholes) divided by total compensation which is comprised of Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted (using Black-Scholes), Long-Term Incentive Payouts, and All Other Total | NA | 1995 (1999) |
| CEO_CHR | Dummy variable which equal to 1 if the CEO of the firm is also the chairman of the board, 0 otherwise. | NA | 1995 (1999) |

# Appendix 2

## A selective summary of Corporate Governance

## Quality of Corporate Governance measures Management Ownership

| | Sample period | Sample size | Relationship between the variable and corporate governance quality | Significance | origin | remark |
|---|---|---|---|---|---|---|
| Morch, Shleifer and Vishny (1988) | 1980 | 371 | (+) 0% to 5%<br>(-) 5% to 25%<br>(+) > 25% | Yes | U.S | |
| Short and Keasey (1999) | 1988-1992 | 225 | <12% (+)<br>>12% and <42% (-)<br>>42% (+) | Yes | U.K | Firms quoted on the Offical list of the London stock Exchange |
| Mehran (1995) | 1979-1980 | 153 | (+) | Yes | U.S | Manufacturing firms |
| Hermalin and Weisbech (1991) | 1971, 1974, 1977,1980 1983 | 142 | Tobin'Q<br>(+) 0-1%, (-)1-5%<br>(+)5-20%, (-) >20% | 0-1%: Yes<br>1-5%: Yes<br>5-20%:Yes<br>>20%:Yes | U.S | NYSE firms |

| | | | | | | |
|---|---|---|---|---|---|---|
| Singh and Davidson (2003) | 1992 and 1994 | 1528 | proxies by<br>(1)Asset turnover:(+)<br>(2)SG&A expensive:(-) | Asset turnover: Yes<br>SG&A expensive: No | U.S | NYSE, AMEX and NASDAQ listed large US corporation having sales revenue of $100M or more |
| Mcconnel and Servaes (1990) | 1976 and 1986 | 1173 (yr1976)<br>1093 ( yr1986) | (+) until 40-50%<br>(-) afterward | Yes | U.S | |
| Holderness, Kroszner and Sheehan (1999) | 1935 and 1995 | 651 (yr1935)<br>1464 (yr1995) | 1995 data<br>0-5%: (+)<br>>5% and <25%: (+)<br>>25% (+) | 0-5%: No<br>>5% and <25%: No<br>>25%: Yes | U.S. | |
| Ozkan and Ozkan (2004) | 1984-1999 | 839 | (+) < 20%<br>(-) >24% and <64%<br>(+) >64% | Yes | U.K | Use cash holding as proxy of Corporate Governance Measure ( cash holding inversely related to agency cost ) |

Structure of Executive compensation

| | Sample period | Sample size | Relationship between the variable and corporate governance quality | Significance | origin | remark |
|---|---|---|---|---|---|---|
| Mehran(1995) | 1979-1980 | 153 | (+) | Yes | U.S | Manufacturing firms |
| Datta, Datta and Raman (2001) | 1993-1998 | 1719 | (+) | Yes | U.S | Analysis the Cumulative Abnormal Returns to Acquiring Shareholders |

Duality

| | Sample period | Sample size | Relationship between the variable and corporate governance quality | Significance | origin | remark |
|---|---|---|---|---|---|---|
| Simpson and Gleason (1999) | 1993 | 287 | (-) | yes | U.S | Banking firms |
| Baliga et al. (1996) | 1986 to 1991 | 181 | (-) | yes | U.S | |

Outside Blockholder

| | Sample period | Sample size | Relationship between the variable and corporate governance quality | Significance | origin | remark |
|---|---|---|---|---|---|---|
| Mehran (1995) | 1979-1980 | 153 | (+) | No | U.S | Manufacturing firms |
| Holderness and Sheeham (1988) | | 114 | (+) | Yes | U.S | Analysis the stock performance after block share purchase |
| Barclay and Holderness (1989) | 1978-1982 | 63 | (+) | Yes | U.S | Analysis the stock performance after block share purchase |
| Singh and Davidson (2003) | 1992 and 1994 | 1528 | Asset turnover: (+)<br>SG&A expense: (+) | Asset turnover: No<br>SG&A expense: No | U.S | NYSE, AMEX and NASDAQ listed large US corporation having sales revenue of $100M or more |
| Mcconnel and Servaes (1990) | 1976 and 1986 | 1173 (yr1976)<br>1093 ( yr1986) | (+) | No | U.S | |

Board Composition-Fraction of outside director

| | Sample period | Sample size | Relationship between the variable and corporate governance quality | Significant | origin | remark |
|---|---|---|---|---|---|---|
| Weisbach (1988) | 1977-1980 | 495 | (+) | yes | U.S | Use earning as performance measure |
| Rosenstrin and Wyatt (1990) | 1981-1985 | 1251 | (+) | Yes | U.S | |
| Mehran (1995) | 1979-1980 | 153 | (+) | No | U.S. | Manufacturing firms |
| North (2001) | 1990-1997 | 342 | (+) | Yes | U.S | Analysis on corporate acquisitions( not restricted to hostile ) |
| Singh and Davidson (2003) | 1992 and 1994 | 1528 | proxies by<br>(1)Asset turnover: (+)<br>(2)SG&A expensive: (-) | Asset turnover: No<br>SG&A expense: No | U.S | NYSE, AMEX and NASDAQ listed large US corporation having sales revenue of $100M or more |
| Ozkan and Ozkan (2004) | 1984-1999 | 839 | (+) | No | U.K | Use cash holding as proxy of Corporate Governance Measure |