INTERNATIONAL REAL ESTATE REVIEW

2012 Vol. 15 No. 1: pp. 107 – 126

Corporate Real Estate, Capital Structure and Stock Performance: Evidence from China

Hongyan Du
PhD candidate at the School of Management and Economics, University of Electronic Science and Technology of China. zhilandu@163.com.

Yongkai Ma *
Professor and Vice Dean of the School of Management and Economics, University of Electronic Science and Technology of China. Address: No.4, Section 2, North Jianshe Road, Chengdu, P.R.China. Tel: +86-28-83205611. mayongkai@uestc.edu.cn.

This paper attempts to study the relationships among corporate real estate (CRE), capital structure and stock performance of China's non-real estate firms, including the bidirectional relationships between debt ratio (DR) and corporate real estate ratio (CRER), the impact of CRER on stock performance, and whether this impact differs across firms with different debt levels. The results show that for the overall sample, DR has a positive effect on CRER, while CRER negatively affects DR. CRER has no significant positive impact on the abnormal returns of stocks, and even decreases those for firms in the information industry. However, it can significantly reduce the systematic risks of stock returns. Moreover, we find that CRER has no significant effect on abnormal returns regardless of the amount of debt level that a firm has, and there is no significant difference between the effects of CRER on abnormal returns for firms with different levels of debt. On the other hand, the effect of CRER on systematic risk is significantly negative for firms in the low debt group, and insignificantly positive for firms in the high debt group. The CRER of lower debt firms can significantly reduce much more systematic risk than that of the high debt firms.

Keywords:

Corporate real estate; Capital structure; Stock performance

* Corresponding author

1. Introduction

Corporate real estate (CRE) comprise buildings and lands owned by a non-real estate corporation to support its core business operations and development (Liow, 2004), which play an important role in corporate asset structure. Its effect on corporate operations has attracted considerable attention from both the academia and the industry. Prior studies pay the most attention to the impact of CRE on stock performance, and report mixed results. For example, Deng and Gyourko (2000), Seiler et al. (2001), Liow (2004), Brounen and Eochholtz (2005), Du et al. (2007) and Dong et al. (2011) all show that CRE ownership may not increase the abnormal return of stocks, although in a few of the industries, it can significantly decrease the systematic risk. The research by Tuzel (2010) suggests that a higher corporate real estate ratio (CRER) is associated with higher stock returns and systematic risks. Moreover, by using a sample of 454 international retail companies, Brounen et al. (2005) find that CRE ownership not only can significantly increase abnormal returns, but also decrease systematic risks. One possible reason for these mixed findings is that the data used by the researchers are derived from different countries, regions, or industries. Moreover, another possible explanation is that there are some other factors which affect the relationship between CRER and stock performance.

Capital structure may be one of these factors, as it correlates with both the stock performance and CRER of the firm (Hukubun, 2005; Brounen and Eichhlotz, 2005). Therefore, the relationship between CRER and stock performance may be affected by the firm's debt level. To our knowledge, only Tuzel (2010) has tested this possible effect with a portfolio based approach by sorting his sample firms according to their real estate ratio and long-term debt ratio (DR) simultaneously, and then distributing into portfolios. His results show that the firms with higher CRER earn higher returns for both high leverage as well as low leverage sorted portfolios.

The prior studies show that there are few studies which have examined the effect of capital structure on the relationship between CRER and stock performance. Therefore, it is necessary to study this issue with some other data and methods, compare the results with those of Tuzel (2010), and enrich the research of CRE. Moreover, for the relationship between CRER and capital structure, we can find from prior studies that aside from the significantly positive relationship documented by Brounen and Eichhlotz (2005), Brounen et al. (2005) also find an insignificant effect of DR on CRER. Yet it is worth noticing that real estate is an asset that locks in a great deal of corporate resources, and interacts with a firm's capital structure. On the one hand, DR will have an impact on CRER. As real estate is an asset with a high capital requirement, it may be necessary for a firm to buy through debt financing, and then we will observe a rise of CRER following an increase of

DR[1]. However, when the debt level is high, to repay the principle and interest, a firm may avoid investing in low liquidity assets. In this case, higher DR is associated with lower CRER. On the other hand, CRER will also affect DR from other three aspects (1) real estate can serve as collateral for refinancing, (2) a firm sells unused or underutilized real estate to obtain funding and then repay the debt, and (3) a firm uses the cash flow generated from real estate operations and management to repay the debt. In the first two cases, CRER positively affects DR, while in the last case, CRER and DR are negatively correlated. Given that firms efficiently manage and operate their real estate, the more CRE that they own, the more cash flow will be generated, and thus, the more debt that can be repaid. Therefore, if we observe a negative effect of CRER on DR, we can propose that these firms have a more efficient real estate operation and management. However, if a positive impact is observed, this shows that these firms take real estate as collateral for loans, or sell unused or underutilized real estate to repay the debt. If the latter case is true, we can assume that these firms may over-invest in real estate or inefficiently manage real estate. Therefore, studying the impact of DR on CRER can help us to clarify the ways that firms finance real estate, while examining the impact of CRER on DR can help us to determine whether the firm's real estate operations and management are efficient. However, the bidirectional relationships between DR and CRER have not been examined by prior studies.

In addition, we can also find that in prior studies, only Dong et al. (2011) have studied the relationship between CRE and stock performance for Chinese firms. In their research, fixed asset holding is used to proxy for CRE. While it is a fact that the CRE is an important part of fixed assets for Chinese firms, but it is not enough to only have the CRE as a complete representation[2].

The purpose of this paper is to study the relationships among CRER, capital structure and stock performance, by using the real estate data of Chinese non-real estate firms. First, we make a primary attempt to examine the bidirectional relationships between CRER and DR. Secondly, we will study the effect of CRER on stock performance. Finally, we will test whether this effect differs across firms with different levels of debt.

The remainder of this paper is organized as follows. Section 2 introduces our data and presents some simple statistical analyses. The study methods are

[1] Fundamentally, this case should be thought of as the effect of CRER on DR. However, the rise of DR consequently comes before the increase of CRER, and we consider the relationship between CRER and DR from the perspective in which the change of DR results in the change of CRER.

[2] According to statistics, for Chinese non-real estate firms, the ratios of net real estate on net fixed assets are 51% in 2003 and 48% in 2008, while the ratios of gross real estate to gross fixed assets are 43% and 41%, respectively.

described in Section 3. The empirical results and analysis are presented in Section 4. The last section provides our conclusions.

2. Data

In this paper, the sample covers all the Chinese non-real estate firms that issue A-shares in the Shanghai Stock Exchange. Monthly stock return and semi-annual balance sheet and notes information are retrieved from both the China Stock Market Trading Database (CSMAR) and the website of the Shanghai Stock Exchange. Due to a variety of data limitations in the databases, we confine our analysis to the period of 2003 to 2008. We exclude financial firms from the sample because of the peculiar nature of their business operations. Companies in agriculture, mining, construction, social services and transmission are also excluded as the sample sizes of these industries are smaller than 20. The final sample includes 340 firms in 6 non-real estate industries.

In China, buildings and land belong to different categories on a balance sheet, which is different from that of other countries[3]. The land use rights are intangible assets, while the buildings are tangible assets. In our database, the information on land use rights of the sample firms is only available from 2007 to 2008, while the information on buildings is available from 2003 to 2008. Therefore, in order to maintain the sample size, we employ the ratio of buildings to total assets as a measure of CRER[4].

Table 1 shows the summary statistics for both absolute CRE holdings (CREABS) and CRE ratio of the entire sample. The average CREABS for the sample period is 777 million RMB, clearly much higher than the median 293 million RMB. These statistics demonstrate that most of the firms in our sample hold less real estate, and only a minority owns quite a lot of real estate. The minimum and maximum of CREABS are 0.13 and 5170 million RMB, respectively, which suggest that the absolute CRE holdings greatly vary across firms. The statistics of the CRER exhibit similar patterns.

[3] In China, all land is monopolized by the state or collectives, and there is no private ownership of land. Companies, organizations, and individuals could acquire land use rights from the government or existing rights-holders. Depending on the type and purpose of the land use, the maximum duration of the land use grant is 40 years for commercial use, 50 years for industrial use, and 70 years for residential use (Du et al., 2010).

[4] Since the information about land use rights is missing, the CRER calculated in this paper is lower than the real CRER of these firms.

Table 1 Summary Statistics for Absolute CRE Holdings and CRE Ratio

Statistic	CREABS	CRER
Mean	777	18.80%
Median	293	15.90%
Min	0.13	0.03%
Max	51700	88.23%
Std.	2810	0.17
Observations	2040	2040

Notes: CREABS (unit: million RMB) = gross building value reflected in notes of balance sheets.
CRER= CREABS/total asset.

Table 2 presents the average absolute CRE holdings and CRER for all six industries. As we see from Panel A, in absolute terms, the average CRE holdings vary from 263 million RMB in information to 1680 million RMB in electricity, which show that there are significant differences among the six industries. Moreover, during the entire sample period, the average CREABS continued to increase, in contrast to the downward trend that was exhibited by Liow (2004). Panel B indicates that, on average, the CRER continued to increase from 18% in 2003 to 19.9% in 2006, then experienced a slight decrease in 2007 with a rebound in 2008. This may be due to the fact that Chinese housing price was very high in the year 2007, and then many firms stopped investing in real estate. However, their firm sizes continued to expand, which thus led to a decrease in the CRER. In 2008, the Chinese housing price quickly dropped, owing to the effect of the global financial crisis and the macro control of the Chinese government. Then, many firms reinvested in real estate, and an uptrend of the CRER is observed. The distribution of the CRER across industries is different from that of CREABS. The CRER of retail is the highest, which is more than 30%, while the corresponding number of information is the lowest, about 11.2%.

As Panel B of Table 2 shows, the CRERs of 4 out of the 6 industries are less than 20%[5], except for electricity and retail. The average CRER of our sample is lower than that of most of the previous studies. There are two possible reasons. One is that the proxy for the CRER in this paper is different from that in the previous literature[6]. The other one is that the CRER presented in Table 2

[5] Liow (1999) applied a 20 percent cut-off point to identify "property intensive" non-real estate firms.

[6] There are two ways to measure the CRER in those studies: property, plant and equipment (PPE) /total asset (Deng and Gyourko, 2000; Brounen and Eichholtz, 2005; Brounen et al., 2005), and property/total tangible asset (Liow, 1999, 2004).

does not contain the value of land use rights. To clearly illustrate the CRE holdings of Chinese non-real estate firms, Table 3 provides the absolute and relative CRE holdings of the sample firms in 2007 and 2008, which include both the value of the buildings and land use rights. From Table 3, we can find that the average CRER exceeds 20% in both 2007 and 2008, and the CRERs of 4 of the 6 industries are higher than 20% as well.

Table 2 Average Absolute CRE Holdings and CRE Ratio per Year and per Industry

Panel A: Average CREABS per year and per industry (unit: million RMB)							
Industries	Ma	El	Tr	In	Re	Co	TOTAL
2003	638	1170	508	199	464	381	593
2004	651	1570	549	231	583	472	647
2005	798	1640	639	266	642	550	766
2006	936	1830	541	286	721	563	871
2007	952	1940	584	284	665	400	871
2008	963	1900	1030	312	725	466	914
AVERAGE	823	1680	642	263	633	471	777
Panel B: Average CRER per year and per industry							
2003	17.0%	22.5%	19.7%	10.1%	29.2%	15.2%	18.0%
2004	18.0%	23.6%	18.8%	10.9%	30.2%	17.4%	19.0%
2005	18.8%	23.7%	19.4%	11.7%	33.3%	18.7%	20.0%
2006	19.3%	26.0%	13.5%	11.6%	32.6%	16.8%	19.9%
2007	16.5%	24.6%	12.4%	9.8%	24.8%	11.6%	16.7%
2008	18.7%	22.3%	17.2%	13.1%	33.5%	15.1%	19.6%
AVERAGE	18.0%	23.8%	16.8%	11.2%	30.6%	15.8%	18.8%
SIZE	215	20	20	26	33	26	340

Notes: Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.
CREABS (unit: million RMB) = gross building value reflected in notes of balance sheets.
CRER= CREABS/total asset.

With respect to measuring the capital structure, Brounen and Eichholtz (2005) and Tuzel (2010) use total debt (TD) and long-term debt (LTD) to compute the DR, respectively. Following their methods and to eliminate the bias of variable selection, we use both TD/ (TD+MVE) and LTD/ (LTD+MVE) to measure capital structure, and name them DR1 and DR2, where MVE is the market value of equity. Table 4 contains the averages of the two variables for the six industries and six years. From the table, we can see that the distribution of DR1 is different from that of DR2. Firms in electricity have the highest DR1 and DR2, while firms in retail have the second-highest DR1 and

lowest DR2. As for transportation, its DR1 is the lowest, but DR2 is the second-highest. Therefore, these two variables can be used to describe capital structure from different perspectives. If we derive consistent results by including the two variables in models respectively, then the results are credible to a certain extent.

Table 3 Average Absolute CRE Holdings and CRE Ratio per Industry from 2007 to 2008

Panel A: Average CREABS* and CRER* per industry in 2007							
Industries	Ma	El	Tr	In	Re	Co	TOTAL
CREABS*	1380	1310	635	628	856	440	1140
CRER*	21.3%	30.4%	21.9%	18.6%	24.3%	14.6%	21.5%
Panel B: Average CREABS* and CRER* per industry in 2008							
CREABS*	1240	1690	1820	434	929	408	1150
CRER*	23.5%	26.8%	31.3%	15.6%	26.4%	18.5%	23.4%

Notes: Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.
CREABS* (unit: million RMB) = gross house, building and land value reflected in notes of balance sheets.
CRER*= CREABS*/total asset.

Table 4 Average Debt Level per Year and per Industry

Panel A：Average DR1 per year and per industry							
Industries	Ma	El	Tr	In	Re	Co	TOTAL
2003	25.5%	27.5%	18.2%	28.2%	37.7%	31.8%	27.1%
2004	33.2%	38.4%	22.6%	32.3%	40.8%	35.7%	33.8%
2005	41.4%	49.6%	31.2%	42.0%	46.4%	43.6%	42.0%
2006	36.0%	47.0%	32.0%	35.0%	37.6%	36.5%	36.6%
2007	20.4%	28.4%	20.5%	19.6%	21.8%	21.2%	21.1%
2008	38.8%	53.3%	41.5%	34.5%	41.1%	36.2%	39.5%
AVERGAE	32.5%	40.7%	27.7%	31.9%	37.6%	34.1%	33.3%
Panel B：Average DR2 per year and per industry							
2003	5.1%	13.5%	7.0%	1.8%	2.4%	6.1%	5.3%
2004	6.7%	21.8%	8.4%	3.5%	3.4%	7.3%	7.2%
2005	9.1%	31.8%	15.1%	5.2%	4.2%	9.3%	10.1%
2006	7.1%	28.5%	15.1%	3.6%	3.7%	6.2%	8.2%
2007	3.0%	15.6%	9.3%	1.8%	1.6%	4.4%	4.0%
2008	7.4%	34.8%	22.1%	3.0%	5.8%	8.5%	9.5%
AVERGAE	6.4%	24.3%	12.8%	3.1%	3.5%	7.0%	7.4%

Notes: Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.
DR1=total debt/(total debt + market value of equity); DR2=long-term debt/(long-term debt + market value of equity).

3. Research Methodology

The empirical research of this paper consists of three parts.
We first examine the bidirectional relationships between capital structure and CRER by using a Granger causality test. First, we check whether the pooled panel data for CRER, DR1 and DR2 are stationary for the overall sample and the industry-specific sub-samples. We use the procedure developed by Levin et al. (2002) to conduct the unit-root tests. The results show that CRER, DR1 and DR2 are stationary in most cases, except that the CRER of conglomerate, DR1 of transportation and DR2 of retail are I(1) series, so we find no cointegrated relationships between CRER and DR for both the overall sample and the sub-samples. Therefore, we use Models (1) and (2) to examine the relationship between CRER and DR for the samples in which the CRER and DR are stationary, while for samples in which the CRER, DR1 or DR2 are I(1), we replace the CRER and DR of Models (1) and (2) with the first differenced CRER and DR, which are stationary.

$$\mathrm{CRER}_{i,t} = c_i + \sum_{j=1}^{m} \alpha_j \mathrm{CRER}_{i,t-j} + \sum_{k=1}^{n} \beta_k \mathrm{DR}_{i,t-k} + \gamma_1 \mathrm{SIZE}_{i,t} + \gamma_2 \mathrm{MARKET}_t + \sum_{d=1}^{5} \gamma_{2+d} \mathrm{I}_d + \varepsilon_{i,t} \tag{1}$$

$$\mathrm{DR}_{i,t} = c_i + \sum_{j=1}^{p} \alpha_j \mathrm{DR}_{i,t-j} + \sum_{k=1}^{q} \beta_k \mathrm{CRER}_{i,t-k} + \gamma_1 \mathrm{SIZE}_{i,t} + \gamma_2 \mathrm{MARKET}_t + \sum_{d=1}^{5} \gamma_{2+d} \mathrm{I}_d + \xi_{i,t} \tag{2}$$

where $\mathrm{CRER}_{i,t}$ and $\mathrm{DR}_{i,t}$ are the CRER and DR of firm *i* at time *t*. In consideration of the results shown by the descriptive statistics in which both CRER and DR differ across industries and change along with the changing market conditions, we control the industry and market condition effect in Models (1) and (2). I_d (d=1, 2, 3, 4, 5) are industry dummies that represent manufacturing, electricity, transportation, information, and retail, respectively. MARKET_t is the market condition dummy variable, which takes a value of 1 when the time is 2008, otherwise 0. That is because in 2008, the Chinese economy was fiercely shocked due to the global financial crisis, and the economic environment greatly changed. Firm size is also included as a control variable as large firms can borrow money at a cheaper rate, may hold more debt, and then buy more CREs. $\mathrm{SIZE}_{i,t}$ is the logarithm of the equity market value of firm *i* at time *t*. The optimal lag lengths *m*, *n*, *p* and *q* are decided based on the Akaike information criteria (AIC). In Models (1) and (2), we mainly focus on the estimated values of $\sum_{k=1}^{n} \beta_k$ and $\sum_{k=1}^{q} \beta_k$, which represent the effect of CRER and DR on each other. A Wald test is conducted to determine whether $\sum_{k=1}^{n} \beta_k$ and $\sum_{k=1}^{q} \beta_k$ are statistically significant.

Secondly, we investigate the effect of CRER on stock performance in two stages. The first is to select stock performance indicators. Similar to the existing literature, we use both abnormal return and systematic risk to measure stock performance. Following the methodology of Deng and Gyourko (2000), Brounen et al. (2005) and Du et al. (2007), we use the Fama-Macbeth approach to estimate the two items. The regression model is:

$$R_{i,t} - Rf_t = \alpha_{i,t} + \beta_{i,t}(Rm_t - Rf_t) + \varepsilon_{i,t} \quad (3)$$

where R_{it} represents the monthly return of stock *i* during period *t*, Rm_t and Rf_t are the market return and risk-free rate over period *t*, respectively. β_i is the systematic risk of the stock. It measures the sensitivity of the stock return to the market return. α_i is the idiosyncratic component of the excess return, called Jensen's alpha.

In the second stage, both abnormal return and systematic risk serve as dependent variables in Models (4) and (5). To ensure the accounting information is already impounded into the stock price, all of the accounting data that we used is from the prior period.

$$\alpha_{i,t} = c_i + a_1 CRER_{i,t-1} + a_2 DR_{i,t-1} + a_3 SIZE_{i,t-1} + a_4 MB_{i,t-1} + a_5 MARKET_t + \sum_{d=1}^{5} \gamma_d I_d + \varepsilon_{i,t} \quad (4)$$

$$\beta_{i,t} = c_i + a_1 CRER_{i,t-1} + a_2 DR_{i,t-1} + a_3 SIZE_{i,t-1} + a_4 MARKET_t + \sum_{d=1}^{5} \gamma_d I_d + \xi_{i,t} \quad (5)$$

The selection of the control variables is based on the following considerations: (1) according to the three-factor model of Fama-French (1993, 1995), we include SIZE and MB in models to control for the effect of firm size and growth opportunities. SIZE is the logarithm of the market value of equity, while MB is the market to book value of equity; (2) Brounen and Eichholtz (2005) and Seiler et al. (2001) control the effect of debt when they studied the relationship between CRE and stock performance. Variable DR is also included in our models to control the possible effect of debt level. This variable has two different measurements, thus every model in this paper has two specifications; (3) the change in market conditions may have an important effect on firm operation and even their market values, so we include the dummy variable MARKET in the model, which takes a value of 1 when the time is 2008, otherwise 0; and (4) by following Brounen and Eichholtz (2005), we control the industry effect by using industry dummies I_1, I_2, I_3, I_4 and I_5.

Thirdly, we examine whether the relationship between CRER and stock performance differs across firms with different debt levels. At first, similar to the method used by Tuzel (2010), we sort the sample firms by year and industry according to their DR, and categorize them into low, medium and high debt groups. Then we generate two debt level dummies, LD and MD. LD takes a value of 1 if the firm is in the low debt group, otherwise 0, while MD

takes a value of 1 if the firm is in the medium debt group, otherwise 0. Therefore, Models (6) and (7) are specified below. In these two models, a_1, $a_1 + a_3$ and $a_1 + a_2$ measure the effects of CRER on abnormal returns and systematic risks for high, medium and low debt firms, respectively. A Wald test is conducted to determine whether $a_1 + a_3$ and $a_1 + a_2$ are statistically significant. If a_2 and a_3 are significant, then there is evidence that the effects of CRER for low and medium debt firms are significantly different from those of high debt firms.

$$\alpha_{i,t} = c_i + a_1 \mathrm{CRER}_{i,t-1} + a_2 \mathrm{LD}_{i,t-1} * \mathrm{CRER}_{i,t-1} + a_3 \mathrm{MD}_{i,t-1} * \mathrm{CRER}_{i,t-1} + a_4 \mathrm{LD}_{i,t-1} + a_5 \mathrm{MD}_{i,t-1} + a_6 \mathrm{SIZE}_{i,t-1} + a_7 \mathrm{MB}_{i,t-1} + a_8 \mathrm{MARKET}_t + \sum_{d=1}^{5} \gamma_d \mathrm{I}_d + \varepsilon_{i,t} \quad (6)$$

$$\beta_{i,t} = c_i + a_1 \mathrm{CRER}_{i,t-1} + a_2 \mathrm{LD}_{i,t-1} * \mathrm{CRER}_{i,t-1} + a_3 \mathrm{MD}_{i,t-1} * \mathrm{CRER}_{i,t-1} + a_4 \mathrm{LD}_{i,t-1} + a_5 \mathrm{MD}_{i,t-1} + a_6 \mathrm{SIZE}_{i,t-1} + a_7 \mathrm{MARKET}_t + \sum_{d=1}^{5} \gamma_d \mathrm{I}_d + \xi_{i,t} \quad (7)$$

There are three methods to estimate the panel data model: pool, fixed effect and random effect models. We first use the Hausman test to compare the fixed effect model versus the random effect model. If the random effect model is better, we will use the LM test to choose between this model and the pool model, but in the event that the fixed effect model is better, we will use an F-test to choose between the fixed effect model and the pool model. The F-statistic is:

$$\mathrm{F} = \frac{(\mathrm{SSE}_r - \mathrm{SSE}_u)/(\mathrm{N}-1)}{\mathrm{SSE}_u/(\mathrm{NT\text{-}N\text{-}K})}$$

where SSE_r and SSE_u represent the sum of the residual squares of the pool model and fixed effect model, respectively. N is the number of individuals, K is the number of independent variables, T is the maximum length of the time series, and NT is N*T. If $\mathrm{F} > \mathrm{F}_\alpha(\mathrm{N}-1, \mathrm{NT-N-K})$, we will choose the fixed effect model.

4. Empirical Results

Tables 5 and 6 document the regression results of Models (1) and (2)[7]. As Table 1 shows, $\sum_{k=1}^{n} \beta_k$ for the overall samples in Spec.1 is positive and significant at the 1% level, while the corresponding number in Spec.2 is also positive, but not significant. An analysis on the results of the sub-samples

[7] Since the estimated values of $\sum_{k=1}^{n} \beta_k$ and $\sum_{k=1}^{q} \beta_k$ are mainly focused, and due to the table design, we do not report the values of $\sum_{j=1}^{m} \alpha_j$ and $\sum_{j=1}^{p} \alpha_j$. The results are available upon request.

shows that in both specifications, the $\sum_{k=1}^{n}\beta_k$ for manufacturing and conglomerate is significantly positive, while that for the other industries is all insignificant, except that $\sum_{k=1}^{n}\beta_k$ for transportation in Spec.2 is significantly negative. Indeed, these results indicate that debt financing is a necessary way for Chinese firms to hold real estate, and mainly used by firms in manufacturing and conglomerate. Firms in other industries rely more on equity financing to hold real estate. The reason may lie in the different debt and CRE levels of various industries. According to the descriptive statistics, we find that the total debt levels of electricity and retail are the top two highest in the six industries, while the long-term debt level of transportation is the second-highest, ranking only second to electricity. Due to the high debt level, the firms in these industries may hold real estate through equity financing rather than debt financing. Moreover, the high debt level even forces the firm in transportation to stop investing in real estate or sell real estate. For information, although its debt level is low, its demand for real estate is also minimal because these firms mainly need office buildings, and it is easy to have their needs met by renting.

Table 5 Estimation Results of Model (1)

Spec.1	$\sum_{k=1}^{n}\beta_k$	SIZE	MARKET	*m*	*n*	R^2 adju.
Overall	0.019 [a]	-0.003 [a]	0.006 [a]	2	1	
	I1	I2	I3	I4	I5	0.951
	0.002	0.003 [d]	0.003	0.001	0.004 [d]	
Ma	0.012 [c]	-0.002 [a]	0.005 [b]	2	2	0.939
El	-0.002	-0.004 [c]	-0.005	2	2	0.953
Tr	0.007	0.001	0.000	2	2	0.234
In	-0.015	0.004	-0.010	1	1	0.898
Re	0.011	-0.007 [b]	0.002	1	1	0.935
Co	0.072 [a]	-0.002	0.008 [a]	1	1	0.057
Spec.2	$\sum_{k=1}^{n}\beta_k$	SIZE	MARKET	*m*	*n*	R^2 adju.
Overall	0.007	-0.003 [a]	0.001	2	1	
	I1	I2	I3	I4	I5	0.950
	0.001	0.003 [d]	0.001	0.000	0.005 [b]	
Ma	0.014 [b]	-0.003 [a]	0.001	2	2	0.946
El	-0.026	-0.003	-0.012	2	2	0.962
Tr	-0.044 [c]	0.001	0.000	2	3	0.936
In	0.062	0.004	-0.004	1	1	0.897
Re	0.014	-0.006 [a]	0.004	1	1	0.023
Co	0.087 [a]	-0.003 [c]	0.006 [b]	1	1	0.039

Notes: a, b, c, d, are statistically significant at the 1%, 5% , 10% and 15% confidence levels, respectively.

Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

Table 6 shows that in Spec.1, the $\sum_{k=1}^{q}\beta_k$ for the overall sample is negative with a significance of 5%, while it is insignificantly negative in Spec.2. As we have mentioned before, the negative effect of CRER on debt level suggests that Chinese firms gain benefits from real estate operation and management. These companies efficiently manage and operate their real estate to a certain extent. The analysis on the sub-samples shows that the $\sum_{k=1}^{q}\beta_k$ for manufacturing, retail and transportation is significantly negative. The difference is that the CRER has a significantly negative effect on both the total debt and the long-term debt levels for manufacturing, while for transportation and retail, CRER just significantly decreases the long-term and the total debt levels, respectively. This can be explained by the differences in the total and long-term debt levels of these industries. For example, the total DR of retail is 37.6% and its long-term DR is just 3.5%, therefore, the return gained from real estate will not be used to repay the long-term debt, while in the case of transportation, it is just the opposite. Moreover, it is worth noticing that in both specifications, the $\sum_{k=1}^{q}\beta_k$ for information is positive and significant at a 1% level. Therefore, there is no evidence to support the view that information firms receive benefits from real estate management, but possibly that these firms may sell real estate to repay debt, reflecting an over-investment and inefficient management of real estate. On the other hand, for other industries, there is no significant effect of CRER on DR. From the analysis above, we can argue that firms in manufacturing, transportation and retail manage real estate much more efficiently than the firms in the other industries, and the real estate management efficiency of information may be the lowest. Therefore, we expect that the performance of CRE in the first three industries will be better than that in the other industries.

Table 7 reports the estimated results of Model (4). For the overall sample, the coefficients of CRER in both specifications are insignificantly positive, while for the sub-samples, the coefficients of CRER are all insignificant, except for the significantly negative CRER coefficient for information. This shows that CRE will not significantly increase the abnormal returns of Chinese non-real estate firms, and even significantly decrease those of firms in information, which is consistent with the results of Seiler et al. (2001), but contrasts with the results of Tuzel (2010). As Dong et al. (2011) have shown, a possible reason is that Chinese firms have overinvested in real estate, so that the return may be weakened or even offset by the losses of over-investment or inefficient management. We can also find that the coefficients of CRER for manufacturing, transportation and retail are a little higher than those of electricity, information and conglomerate, while the coefficient for information is the lowest. This is consistent with our findings in which firms in the first three industries operate and manage their real estate much more efficiently, and the efficiency of real estate management of information may be the lowest.

Table 6 Estimation Results of Model (2)

Spec.1	$\sum_{k=1}^{q}\beta_k$	SIZE	MARKET	p	q	R^2 adju.
Overall	-0.020 [b]	0.000	-0.048 [a]	2	1	
	I1	I2	I3	I4	I5	0.683
	0.002	0.028 [a]	0.007	0.001	0.008	
Ma	-0.074 [a]	-0.046 [a]	-0.077 [a]	1	1	0.781
El	-0.048	-0.002	-0.045	2	1	0.706
Tr	0.057	-0.043 [a]	-0.038 [d]	1	1	0.007
In	0.137 [a]	-0.045 [a]	-0.101 [a]	1	1	0.731
Re	-0.028 [c]	0.006	-0.045 [a]	1	1	0.764
Co	-0.041	-0.082 [a]	-0.022 [c]	1	1	0.168
Spec.2	$\sum_{k=1}^{q}\beta_k$	SIZE	MARKET	p	q	R^2 adju.
Overall	-0.009 [a]	0.000 [c]	-0.001 [b]	1	1	
	I1	I2	I3	I4	I5	0.621
	0.000	0.020 [a]	0.010 [a]	-0.001	0.003 [b]	
Ma	-0.012 [a]	-0.001 [a]	-0.002 [a]	1	1	0.613
El	0.028	0.005	-0.007	2	1	0.486
Tr	-0.082 [a]	-0.004 [a]	0.005 [a]	1	1	0.582
In	0.004 [a]	-0.003 [a]	-0.012 [a]	1	1	0.552
Re	0.000	-0.001	0.000	1	1	0.001
Co	0.042	0.000	-0.008	1	1	0.014

Notes: a, b, c, d, are statistically significant at the 1%, 5%, 10% and 15% confidence levels, respectively.
Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

The estimation results of Model (5) are presented in Table 8. In both specifications, the coefficients of CRER are significantly negative at the 1% level for the overall sample, which suggests that CRE ownership of Chinese non-real estate firms provides a diversification benefit in terms of lowering the systematic risk, which is different from the results of Seiler et al. (2001), Liow (2004) and Tuzel (2010). However, this effect differs across industries. As we can see from Spec.1, the coefficient of CRER is -0.360 for manufacturing with a significance of 5%, while that for retail is -0.332 and significant at a level of 1%. The coefficients of CRER for electricity and transportation are insignificantly negative, while those for information and conglomerate are insignificantly positive. The results of Spec.2 are similar to those of Spec.1, except that the coefficient of CRER for transportation is insignificantly positive. These results indicate that the CRE holdings of firms in transportation, electricity, information, and conglomerate will not significantly decrease or even increase the systematic risk of their stock

returns. There are two possible reasons: one is that, as we have found, firms in electricity, information and conglomerate do not efficiently operate and manage their real estate, which may increase their financial risks and even operational risks, and then weaken or offset the risk diversification of real estate, while the other reason is that the real estate of transportation and electricity is more specialized than that of other industries, so it is more difficult for firms in these two industries to convert the use or sell their real estate. Therefore, the real estates of transportation and electricity are riskier.

Table 7 Estimation Results of Model (4)

Spec.1	Constant	CRER	DR1	SIZE	MB	MARKET	R^2 adju.
Overall	-0.047 [b]	0.006	0.001	0.002[c]	-0.001	0.011[a]	
		I1	I2	I3	I4	I5	0.008
		0.008[b]	-0.003	0.008 [d]	0.002	0.009[c]	
Ma	-0.034 [d]	0.008	0.001	0.001	0.000	0.015[a]	0.019
El	-0.032	-0.009	-0.011	0.001	0.003	0.022[a]	0.050
Tr	0.063	0.015	-0.011	-0.002	-0.004[b]	0.007	0.005
In	-0.030	-0.069[c]	-0.059 [c]	0.002	-0.002	0.012	0.012
Re	-0.082	0.003	0.044 [c]	0.003	-0.001	0.003	0.016
Co	-0.071	-0.020	-0.026	0.004	-0.005 [c]	0.023 [a]	0.043
Spec.2	Constant	CRER	DR2	SIZE	MB	MARKET	R^2 adju.
Overall	-0.047[b]	0.006	-0.009	0.002 [b]	-0.001[b]	0.011 [a]	
		I1	I2	I3	I4	I5	0.009
		0.008 [b]	-0.002	0.009 [c]	0.002	0.009 [c]	
Ma	-0.034[d]	0.008	-0.016 [d]	0.001	0.000	0.015 [a]	0.019
El	-0.037	-0.011	-0.003	0.001	0.004	0.022 [a]	0.047
Tr	0.038	0.010	-0.032 [d]	-0.001	-0.004[b]	0.003	0.002
In	-0.083	-0.055 [d]	-0.011	0.004	-0.001	0.012	0.016
Re	0.002	-0.001	0.131 [a]	0.000	-0.001	0.004	0.015
Co	-0.110	-0.030	-0.059 [a]	0.005	-0.005[b]	0.025 [a]	0.067

Notes: a, b, c, d, are statistically significant at the 1%, 5%, 10% and 15% confidence levels, respectively.
Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

Tables 9 and 10 contain the regression results of Models (6) and (7), which investigate whether the effect of CRER on abnormal returns and systematic risks is different for firms with different debt levels. The test results in Table 9 show that for the overall sample, the coefficients of CRER, a_1+a_2, a_1+a_3, are all insignificant, except that $a_1 + a_3$ of Spec.1 is significantly positive at the

15% level, which does not hold in Spec.2. It shows that regardless of the debt level of a firm, the CRER has no significant effect on the abnormal returns of stocks. This result is different from that of Tuzel (2010). He shows that a higher CRER can earn higher returns for both high leverage as well as low leverage sorted portfolios. The reason may lie in that, as Table 7 shows, for Chinese firms, DR has no significant effect on abnormal returns[8], and the impact of CRER on abnormal returns has not been affected by the debt level. The estimated coefficients of LD*CRER and MD*CRER for the overall sample in both Specs.1 and 2 are insignificant, which suggest that there is no statistical difference between the effects of CRER on abnormal returns for firms with different debt levels. Meanwhile, the regressions results for the sub-samples show that only in a very few cases is the difference significant. For instance, in Spec.1, the medium debt firms in retail will obtain significantly higher abnormal returns than high debt firms by holding real estate. However, this result is not robust in Spec.2.

Table 8 Estimation Results of Model (5)

Spec.1	Constant	CRER	DR1	SIZE	MARKET	R^2 adju.
Overall	2.287 [a]	-0.192 [a]	0.213 [a]	-0.056 [a]	0.083 [a]	
	I1	I2	I3	I4	I5	0.164
	-0.081 [c]	0.023	-0.142 [b]	-0.031	-0.109 [b]	
Ma	4.261 [a]	-0.360 [b]	0.271 [d]	-0.152 [a]	0.193 [a]	0.036
El	2.133 [a]	-0.267	-0.024	-0.041	-0.121 [d]	0.115
Tr	2.457 [b]	-0.207	-0.054	-0.068	0.211 [b]	0.005
In	3.768 [b]	0.659	1.112 [a]	-0.142 [b]	0.140	0.046
Re	4.022 [a]	-0.332 [a]	0.161	-0.140 [a]	0.074	0.180
Co	1.751	0.294	0.151	-0.032	-0.077	0.176
Spec.2	Constant	CRER	DR2	SIZE	MARKET	R^2 adju.
Overall	2.515 [a]	-0.210 [a]	0.207 [b]	-0.064 [a]	0.084 [a]	
	I1	I2	I3	I4	I5	0.162
	-0.085 [b]	0.005	-0.168 [a]	-0.028	-0.098 [c]	
Ma	5.029 [a]	-0.358 [c]	0.184	-0.184 [a]	0.210 [a]	0.035
El	2.106 [a]	-0.274	0.078	-0.041	-0.121 [d]	0.116
Tr	1.287	0.187	-0.651	-0.015	0.223 [b]	0.102
In	5.196 [a]	0.323	0.035	-0.191 [a]	0.112	0.016
Re	4.266 [a]	-0.349 [a]	0.133	-0.148 [a]	0.070	0.178
Co	2.022 [c]	0.327	0.164	-0.043	-0.079	0.173

Notes: a, b, c, d, are statistically significant at the 1%, 5%, 10% and 15% confidence levels, respectively.
Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

[8] In Table 7, the coefficients of DR1 and DR2 for the overall sample and most of the sub-samples are insignificant.

As we can see in Table 10, the results of Spec.1 show that the coefficients of CRER, $a_1 + a_2$ and $a_1 + a_3$ for the overall sample are -0.014, -0.282 and -0.198, respectively, and only $a_1 + a_2$ is significant. The coefficients of LD*CRER and MD*CRER are -0.268 and -0.184, respectively, while the former is significant at the level of 5% and the latter is not significant. These results indicate that only the low debt firms can experience a significant decrease in systematic risk by holding real estate, and the negative effect of CRER on systematic risk for them is significantly greater than that of firms with high debt. In Spec.2, the coefficient of CRER for the overall sample is -0.053, not significant, while $a_1 + a_2$ and $a_1 + a_3$ are -0.257 and -0.319, respectively, and significant at the levels of 1% and 5%. These results show that the CRE holdings of medium and low debt firms are associated with significantly lower systematic risks. Meanwhile, the coefficient of MD*CRER is -0.267 with a significance of 15%, which indicates that firms with medium debt will reduce more systematic risk by holding real estate than firms with high debt. Moreover, we find that the negative effect of CRER on systematic risk for low debt firms is a little less than that for medium debt firms, which is in contrast with the results of Spec.1. This may be because the DR used in Spec.2 is long-term, while the average long term debt ratio (LTDR) for the low, medium and high debt groups are 0.11%, 2.85% and 18.3% respectively. The average LTDR of the low debt group is very close to that of medium debt group, which may lead to a reverse relationship between the results of the two groups.

The regression analysis on the sub-samples in both specifications show that for manufacturing, transportation and retail, the CRER of low debt firms is associated with significantly lower systematic risk, while for retail, the high debt firms can significantly decrease their systematic risks by holding real estate. Moreover, the significant coefficients of LD*CRER and MD*CRER all show that the CRE of firms with lower debt levels will have better performances in terms of decreasing systematic risks of stock returns. This may be because, as Table 8 has illustrated, DR1 and DR2 are both significantly positive associated with a firm's systematic risk. Therefore, the risk lowering of CRE holdings may be weakened by the risk rising of debt, thus we cannot observe a significant relationship between the CRER and systematic risk for high debt firms.

Table 9 Estimation Results of Model (6)

Spec.1	Constant	CRER	LD1*CRER	MD1*CRER	LD1	MD1	SIZE	MB	MARKET	a1+a2	a1+a3	R^2 adju.
Overall	-0.042[b]	0.000	0.004	0.018	-0.007	-0.008[b]	0.002[d]	0.000	0.011[a]	0.004	0.018[d]	
				I1	I2	I3	I4	I5				0.010
				0.008[b]	-0.004	0.009[d]	0.003	0.008 [c]				
Ma	-0.029	0.001	0.013	0.011	-0.007[c]	-0.007	0.001	0.000	0.015[a]	0.014	0.012	0.020
El	-0.041	-0.005	0.066	-0.066	-0.022	0.012	0.001	0.005[d]	0.019[a]	0.061	-0.071[c]	0.060
Tr	0.009	0.042	-0.026	-0.055	0.002	0.022 [d]	0.000	-0.003	0.002	0.016	-0.012	0.029
In	-0.082	0.060	-0.145	-0.102	0.023	0.004	0.003	-0.001	0.013	-0.084[d]	-0.042	0.025
Re	-0.061	-0.020	0.022	0.043[c]	-0.024[a]	-0.009	0.004	-0.002	0.003	0.002	0.023	0.040
Co	-0.152[d]	-0.004	-0.053	-0.016	-0.002	0.005	0.007	-0.002	0.022[a]	-0.057	-0.020	0.040
Spec.2	Constant	CRER	LD2*CRER	MD2*CRER	LD2	MD2	SIZE	MB	MARKET	a1+a2	a1+a3	R^2 adju.
Overall	-0.046[c]	0.012	-0.006	-0.018	-0.001	0.001	0.002[c]	-0.001	0.011[a]	0.006	-0.006	
				I1	I2	I3	I4	I5				0.008
				0.008[b]	-0.004	0.008 [d]	0.002	0.009 [b]				
Ma	-0.039[c]	0.006	0.006	-0.001	0.002	0.002	0.002	0.000	0.015[a]	0.012	0.005	0.018
El	-0.026	-0.023	-0.067	0.076	0.021	-0.022	0.001	0.004	0.020[a]	-0.090	0.053	0.043
Tr	0.087	0.002	0.042	-0.038	-0.016[d]	-0.012	-0.003	-0.002	0.004	0.044 [d]	-0.036	0.024
In	-0.061	-0.107	0.042	0.052	-0.007	0.000	0.003	-0.001	0.013	-0.065	-0.055	0.019
Re	0.03	0.006	-0.006	-0.018	-0.019 [c]	-0.007	-0.001	-0.001	0.004	0.000	-0.012	0.015
Co	-0.095	0.058	-0.083	-0.146[b]	0.021 [d]	0.023[b]	0.004	-0.004[d]	0.024 [a]	-0.025	-0.089 [b]	0.050

Notes: a, b, c, d, are statistically significant at the 1%, 5%, 10% and 15% confidence levels, respectively.
Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

Table 10 Estimation Results of Model (7)

Spec.1	Constant	CRER	LD1*CRER	MD1*CRER	LD1	MD1	SIZE	MARKET	a1+a2	a1+a3	R^2 adju.
Overall	2.456[a]	-0.014	-0.268[b]	-0.184	0.022	0.033	-0.062[a]	0.084[a]	-0.282[a]	-0.198	
				I1	I2	I3	I4	I5			0.162
				-0.089[b]	0.024	-0.154[a]	-0.038	-0.113[b]			
Ma	2.512[a]	0.179	-0.859[b]	-0.043	0.109[a]	0.032	-0.070[a]	0.146[a]	-0.680[a]	0.136	0.013
El	2.169[a]	-0.594	0.484	0.639	-0.077	-0.073	-0.041	-0.125[d]	-0.109	0.045	0.112
Tr	3.204[a]	-0.993[b]	0.689	0.832	0.018	-0.197	-0.101[a]	0.228[b]	-0.304[d]	-0.162	0.150
In	5.416[a]	-0.601	1.357	0.145	-0.339	-0.162	-0.191[a]	0.125	0.756	-0.456	0.017
Re	4.654[a]	-0.417[b]	0.193	-0.337	-0.012	0.036	-0.165[a]	0.064	-0.225[c]	-0.754[a]	0.194
Co	2.067[d]	0.705[d]	-1.304[d]	-0.052	0.225	0.039	-0.048	-0.055	-0.600	0.652	0.146
Spec.2	Constant	CRER	LD2*CRER	MD2*CRER	LD2	MD2	SIZE	MARKET	a1+a2	a1+a3	R^2 adju.
Overall	2.561[a]	-0.053	-0.204	-0.267[d]	-0.027	-0.010	-0.065[a]	0.087[a]	-0.257[a]	-0.319 [b]	
				I1	I2	I3	I4	I5			0.165
				-0.092[b]	0.003	-0.166[a]	-0.031	-0.096[b]			
Ma	2.697[a]	0.079	-0.591[b]	-0.326	0.019	0.021	-0.076[a]	0.151[a]	-0.512[b]	-0.247	0.011
El	2.010[a]	-0.047	-1.023	-1.291[d]	0.050	0.416[b]	-0.039	-0.091	-1.070	-1.338[b]	0.122
Tr	1.457[d]	-0.264	-0.570	0.109	0.267[c]	0.191	-0.027	0.149[d]	-0.835[b]	-0.156	0.014
In	5.334[a]	-0.647	2.254	0.283	-0.356	-0.118	-0.187[b]	0.084	1.607[d]	-0.364	0.019
Re	4.648[a]	-0.528[c]	0.301	-0.301	-0.160	0.031	-0.161[a]	0.062	-0.227[b]	-0.830[a]	0.192
Co	2.172[c]	-0.104	0.020	1.058	0.048	-0.229[d]	-0.046	-0.040	-0.083	0.955[c]	0.171

Notes: a, b, c, d, are statistically significant at the 1%, 5%, 10% and 15% confidence levels, respectively.
Ma—Manufacturing, El—Electricity, Tr—Transportation, In—Information, Re—Retail, Co—Conglomerate.

5. Conclusions

This paper has investigated the relationships among CRE, capital structure and stock performance of Chinese non-real estate firms, including the bidirectional relationships between debt level and CRER, the impact of CRER on stock performance, and whether this impact differs across firms with different debt levels. Our test results demonstrate that for the overall sample, DR has a positive effect on CRER, while for the industry-specific sub-samples, the effect of DR on CRER is significantly positive in manufacturing and conglomerate, significantly negative in transportation when a long-term DR is used to measure the debt level, and insignificant in other industries. Indeed, this indicates that debt financing is a necessary way for Chinese firms to hold real estate, and mainly used by firms in manufacturing and conglomerate. These results can be explained by the different debt and CRE levels of various industries. On the other hand, CRER negatively affects DR for the overall sample, and the effect of CRER is significantly negative in manufacturing, retail and transportation, significantly positive in information, and insignificant in other industries. This suggests that Chinese firms efficiently manage and operate their real estate to a certain extent, and the CRE in manufacturing, retail and transportation may have a better performance than that in other industries.

Moreover, we find that the CRER of Chinese non-real estate firms has no significantly positive impact on the abnormal returns of stocks, and even decrease those of firms in the information industry. One possible reason is that the returns gained by real estate as a kind of production factor and investment assets are weakened or even offset by the losses of over-investment and inefficient management. However, the CRE holdings can significantly decrease the systematic risks of the stock returns. This may be because there is a small positive to small negative correlation between the returns of real estate and common stock returns as Han and Liang (1995) have suggested, which may provide the firm with diversification benefits.[9] A comparative analysis on the results of the sub-samples shows that the CRE performance of transportation, retail and manufacturing is better than that of other industries, which is in line with our findings that firms in these three industries manage real estate much more efficiently.

[9] We collected the quarterly Shanghai Stock Exchange Composite Index and the average housing price and land price of Beijing, Shanghai, Tianjin and Chongqing, which are the municipalities under the Chinese central government's direct administration. The data spans from 2001 Q1 to 2009 Q4. Then, we tested the correlation between the returns of market index and the returns of house and land, and find that the housing return of Beijing is negatively correlated with the market index return, while there are only small positive correlations between the housing returns of the other three cities with the market index return. Moreover, the land returns of the four cities are all negatively correlated with the market index return.

In addition, we find that the CRER has no significant effect on abnormal returns of stocks regardless of a firm's debt level, and the differences between these effects across firms with different levels of debt are not statistically significant, while in terms of the effect of CRER on systematic risk, it is significantly negative for firms in the low debt group, and insignificantly negative for firms in the high debt group. There is a significant difference between the effects in systematic risks for high and low debt firms. The CRER of lower debt firms can significantly reduce much more systematic risks than that of high debt firms.

Acknowledgment

We acknowledge the support from the National Natural Science Foundation of China (70672104) and the Program for New Century Excellent Talents in Universities funded by the Ministry of Education in China (Contract #: NCET-05-0811). We also greatly appreciate the insightful comments and suggestions from an anonymous referee.

References

Brounen, D., Colloander, G.C. and Eichholtz, P.M.A.E. (2005). Corporate Real Estate and Stock Performance in the International Retail Sector, *Journal of Corporate Real Estate*, **7**, 4, 287-299.

Brounen, D., Eichholtz, P.M.A.E. (2005). Corporate Real Estate Ownership Implications: International Performance Evidence, *The Journal of Real Estate Finance and Economics*, **30**, 4, 429-445.

Cheong, K. and Kim, S.K. (1997). Corporate Real Estate Holdings and the Value of Firm in Korea, *Journal of Real Estate Research*, **13**, 3, 273-295.

Deng, Y.S. and Gyourko, J. (2000). Real Estate Ownership by Non-real Estate Firms: An Estimate of the Impact on Firm Return, University of Southern California, July.

Dong, Y., Leung, C.K.Y. and Cai, D. (2011). What Drives Fixed Asset Holding and Risk-adjusted Performance of Corporate in China? An Empirical

Analysis, Available from:
http://mpra.ub.uni-muenchen.de/29128/1/MPRA_paper_29128.pdf.

Du, J., Leung, K.Y.C. and Chu, D. (2007). Return Enhancing, Cash-rich or Simply Empire-building? An Empirical Investigation of Corporate Real Estate Holdings, working paper, Department of Economics, Chinese University of Hong Kong, Hong Kong, October.

Du, H., Ma, Y., and An, Y. (2011). The Impact of Land Policy on the Relation between Housing and Land Prices: Evidence from China, *The Quarterly Review of Economics and Finance*, **51**, 2, 19-27.

Fama, E. and French, K. (1993). Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics*, **33**, 1, 3-56.

Fama, E. and French, K. (1995). Size and Book to Market Factors in Earnings and Returns, *Journal of Finance*, **50**, 1, 131-155.

Han, J. and Liang, Y. (1995). The Historical Performance of Real Estate Investment Trusts, *Journal of Real Estate Research*, **10**, 2, 235–261.

Hukubun, F.N. (2005). Effect of Capital Structure Changes on Stock Return Performance of LQ-45 Stocks Listed in Jakarta Stock Exchange Pre and Post Financial Crisis, Universities Kristen Petra.

Levin, A., Lin, C. and Chu, C.C. (2002). Unit Root Tests in Panel Data: Asymptotic and Finite-sample Properties, *Journal of Econometrics*, **108**, 1, 1–24.

Liow, K.H. (1999).Corporate Investment and Ownership in Real Estate in Singapore: Some Empirical Evidence, *Journal of Corporate Real Estate*, **1**, 4, 329-342.

Liow, K.H. (2004). Corporate Real Estate and Stock Market Performance, *Journal of Real Estate Finance and Economics*, **29**, 1, 119-140.

Seiler, S.J., Chatrath, A. and J. R. Webb. (2001). Real Estate Ownership and the Risk and Return to Stockholders, *Journal of Real Estate Research*, **22**, 1,199-212.

Tuzel, S. (2010). Corporate Real Estate Holdings and the Cross-section of Stock Returns *Review of Financial Studies*, **23**, 6, 2268-2302.