The Impact of Corporate Real Estate Holdings on Corporate Performance and Risk: Evidence from Korea

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< Abstract >

The purpose of this study was the examination of the impact of corporate real estate (CRE) holdings on returns to shareholders as well as systematic risk for firms. The study drew on data from 673 Korean firms in 33 industries other than real estate. Korea in many respects is a particularly valuable case study for CRE holdings in light of the fact that it maintains one of the highest CRE ratios among major industrialized economies. Korea has also experienced often drastic changes, including the IMF bailout in 1997. Overall, the results showed a significant negative correlation between CRE holdings and abnormal returns to shareholders. With respect to systematic risk, the results indicated that higher CRE holdings ratios posed less systematic risk. Furthermore, this paper found variation across the sub-sample period when analyses were conducted to see if structural changes affected the relations of CRE holdings and firm performance and risk. The results of the IMF bailout provide evidence to support claims that massive CRE holdings are likely to result in lower abnormal returns and higher systematic risk, exactly contrary to the situation before the IMF bailout. The results for the post IMF bailout period show CRE holdings have a significant negative correlation with abnormal returns and systematic risk. Furthermore, results by industry also exhibit substantial variation across industries, both in terms of abnormal stock returns and systematic risk.

Key Words: corporate real estate, firm performance, systematic risk, Korea

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1. Introduction

Many non-real estate companies around the world hold significant amounts of real estate. In the United States alone, corporations are estimated to hold over $1 trillion in various forms of real estate, amounting to at least five times the amount held by publicly traded real estate firms (Deng and Gyourko, 2000). Brounen and Eichholtz (2005) found that on average, the corporate real estate (CRE)[1] holdings ratios of non-real estate companies accounted for 26% of their total assets in the U.S. The total value of corporate real estate in Germany, France, and the United Kingdom was estimated at approximately $1,000 billion, $700 billion and $710 billion respectively, while the total combined market capitalization of the institutional property portfolio in these countries was at $117 billion, $92 billion and $226 billion. In these countries, the average CRE represents 17%, 18%, 29% of firms' total assets (Brounen and Eichholtz, 2005).

Asian countries are no exception. Korea in particular is one of the highest CRE holding countries. In Singapore, total gross real estate holdings amounted to about $145.7 billion and property constituted about 24.5% of these non-real estate companies' tangible assets as of December 2001 (Liow, 2004). CRE in Hong Kong and Japan represent on average 30% and 31% of firms' total assets as of 2000 (Brounen and Eichholtz, 2005). Korea's CRE holding ratios were even higher at 41.1% as of 2000. In 2007 numbers for Korea remained higher than other countries, even though the ratios had decreased to 35.9% (Bank of Korea, 2007). The total real estate value of non financial firms in Korea was $2,394 billion, including plants and equipment as of 2007, while the value held by real estate companies was estimated at $14.2 billion (National Statistical Office of Korea, 2008).

Why should non-real estate firms exhibit a similar preference for holding land and buildings the around world? One possible explanation is that it will improve returns to shareholders. In fact, modern portfolio theory suggests that real assets will provide diversification opportunities when held in a portfolio, since real estate has a low correlation with market composite index returns standing for general economic situation. Furthermore, it has also been suggested that owning real estate is less costly than leasing for major companies, since real estate can serve as collateral (Whited, 1992; Fazzari and Petersen, 1993). Furthermore, Asian countries' higher CRE holdings than their Western counterparts may in significant measure be attributable to land scarcity and

[1] Corporate real estate (CRE) refers to the land and buildings owned by companies that are not primarily engaged in real estate business. The corporate real estate (CRE) variable in most previous studies is used a broad sense, PPE (Property + Plant + Equipment), rather than a narrow sense such as Land, Buildings and Property.

high population density (Glasock et al., 2002). Cultural preferences for real estate and relatively low property taxes may also play a role.

Contrary to this view, most of the few empirical studies have shown that real estate holdings do not, as a rule, improve the stock market performance of "property-intensive" non-real estate firms. Recent studies like those from Deng and Gyourko (1999), Seiler et al. (2001), Liow (2004) and Brounen and Eichholtz (2005) indicate that there is no relationship between CRE and stock performance of firms, or even a negative correlation. Several explanations for this relationship have been set forth. CRE may offer no diversification benefit because the economic risk of a business may be incorporated into the returns there from (Seiler et al., 2001) and because high CRE holdings can weaken a firms' core business competencies due to the commitment of scarce capital to investments outside firms' core competencies (Linneman, 1998).

Examining the impact of CRE holdings on Korean firms' performance is worthwhile for the following reasons: First, CRE holding ratios in Korea are the highest among major developed economies. This indicates that Korea may be a special case in the corporate real estate literature. It is thus meaningful to determine whether Korea, as a special case, produces findings contrary to recent studies that indicate a negative correlation between CRE and a firm's performance. Had the results of this study proved different from those of other recent papers, it would have disproved any widespread generalizations on the negative impact of CRE on firms' performance. Had they proven similar to existing studies, however, the results hereinafter delineated would serve to support existing conventions, thereby bolstering doubts about the actual necessity for Korean non-real estate firms to own massive amounts of real estate.

Furthermore, Korea is also valuable as an example to verify whether or not a financial crisis and legislative change in the real estate arena will affect CRE and the performance of firms. Korea experienced an IMF bailout in 1997, and many firms that had invested massively in land purchases went bankrupt thereafter. Since then new legislation has been enacted, including the "Special Purpose Companies for Mortgage-Backed Bonds Act" in 1999, the "Korean Real Estate Investment Trust Act" passed in 2001 (hereinafter "REITs Act"), and the Real Estate Fund Act launched in 2004. These changes may have had significant influence on companies' CRE holdings ratios (Laposa and Charlton, 2001).

The purpose of this study, then, will be to analyze the impact of real estate ownership in Korea on systematic risk and the risk-adjusted return for corporations. If real estate does provide diversification benefits, then firms with significant real estate holdings should achieve a higher rate-of-return for a given level of risk. Furthermore, this paper deploys the same analysis across three

periods, i.e. the pre IMF bailout period, the IMF bailout period itself, and the post IMF bailout period, in order to explore what influence the financial crisis had on CRE and on firms' performance. This study uses land and property (i.e. land and buildings) as a real estate variable, since real estate means land or property in general. PPE (i.e. "property, plants, and equipment") was also used as a point of comparison with existing studies. Methodologically, this study deploys a two stage least squares methodology to investigate effects on performance of corporate real estate holdings.

The remainder of this paper is organized as follows: Section 2 reviews the relevant empirical literature. Section 3 describes the research data used in the analysis and the corresponding methodology. Section 5 presents the empirical results. The paper then provides a summary and conclusions.

2. Review of the Literature

Previous studies regarding CRE have focused on topics like the current role and position of real estate departments, and the impact of real estate management decisions on firm value. Among these two areas, the former has received the lion's share of attention. Krumm (1999) suggests that the majority of the CRE research available is primarily focused on describing the current role and position of real estate departments. Such research describes CRE in terms of the enhancement of organizational efficiency. Studies regarding the latter topic, i.e. company value, were mainly performed in the USA and UK from the late 1980s, when restructuring and reorganization was particularly widespread. Rodriguez et al. (1996) reviewed approximately 25 existing papers regarding the impact of real estate management decisions using evidence attained from the capital markets. Real estate decisions reviewed included leasing, acquisitions, mergers and purchases, joint-ventures, dispositions, sell-offs, liquidations, sales-and-leasebacks, spin-offs, and CRE unit formation

The effects of these decisions on risks and returns to stockholders have been studied sporadically. Glascock et al. (1989, 1991) and Myer et al. (1992) used standard event study methodology to analyze market reactions to the announcements of corporate real estate divestures. Both studies find a positive abnormal return, which suggests that shareholders appear to benefit when companies sell their properties. By the same token, Slovin et al. (1990) and Rutherford (1990) document positive price reactions to the announcement of sale-leasebacks of real estate. These

event studies indicate that shareholders appreciate management efforts to restructure their business real estate. However, this does not necessarily imply that real estate ownership *per se* harms a firm's stock performance in general.

On the other hand, there are few empirical studies regarding the relationship between CRE ownership and company performance. The only papers that have examined the relationship between corporate real estate ownership and performance have so far been Deng and Gyourko (1999), Seiler et al. (2001), Liow (2004), and Brounen & Eichholtz (2005). Gyourko (1999) and Seiler et al. (2001) examined this matter using data from the United States market while Liow (2004) used data from Singapore. Brounen et al. (2005) for their part drew on comparative analysis using data from nine countries. To the best of the author's knowledge, most studies come from the USA and the UK, with very little work performed on Asian countries (i.e. Liow (2004) and Cheong et al. (1997)). More details about previous studies are described as follows:

To test for and isolate the unique aspects of company returns for firms with relatively high levels of real estate ownership, Deng and Gyourko (1999) examined firm level returns for 717 companies in 57 different non-real estate industries in the US from 1984 to 1993. They found firms with high degrees of real estate concentration and high levels of risk (greater than 0.9, as measured by "beta") do experience lower returns. On the other hand, there was no significant correlation between the particular components of firm returns and high degrees of real estate concentration with low levels of risk.

Seiler et al. (2001) attempted to ascertain the effect of corporate real estate ownership on systematic risk and risk-adjusted return to the shareholders. They used a sample of 80 firms in the US from 1985-1994 using two-stage least square equations as their empirical methodology. They found no evidence supporting claims of diversification benefits to be found from holding real assets at the corporate level.

Liow (2004) examined whether real estate can improve the stock market performance of property-intensive non-real estate firms in Singapore by using a data set consisting of 75 non-real estate corporations that hold at least 20 percent of their assets in properties. The results suggested that the inclusion of real estate in a corporate portfolio appears to be associated with lower returns, higher total risks, higher systematic risks, and lower abnormal return performance. It is therefore likely that non real estate firms hold properties for reasons other than improving their stock market performance.

Broune and Eichholtz(2005) explored the effect of corporate real asset ownership on systematic and risk-adjusted return to shareholders internationally by using a data set comprising a

sample of 4,636 companies from 18 industries and 9 countries. Overall, real estate ownership appeared to be driven by industrial rather than national differences and was on a decreasing trend over time (which may be due to the increased popularity of leasing). When analyzing the stock performance of companies, Broune and Eichholtz found a significant negative correlation between real estate ownership and a firm's systematic risk. With respect to stock returns, this study's results indicate that returns are the lowest among firms with the highest real estate ownership levels in each industry. After controlling for variation in risk, the remaining patterns of return differ strongly across industries.

Table 1. Comparisons with the Previous Literature

	Deng et al. (1999)	Seiler et al.(2001)	Liow(2004)	Broune et al. (2005)	Cheong et al. (1997)
Real estate variable	PPE/Total asset	PPE/Total asset	Property/Total tangible asset	PPE/Total asset	Land/Paid in capital
Sample country and period	U.S.A, 1984-1993	U.S.A, 1985-1994	Singapore, 1997-2001	9 countries*, 1992-2000	Korea, 1987-1991
Raw returns	n.a.	n.a.	Positive: 46.7% Negative: 53.3%	Negative	Insignificant (except High < Low debt firms)
Risk	n.a.	n.a.	Positive	n.a.	n.a.
Systematic risk	n.a.	Insignificant	Positive	Negative (exception: Electronics)	n.a.
Abnormal returns	Negative	7 sub samples: Negative 2 sub samples: Positive	Negative	Insignificant (only significant in Comm. and Biz service)	n.a.

* The nine countries are Australia, Hong Kong, Japan, France, Germany, Netherlands, U.K., Canada and U.S.

Cheong et al. (1997) investigated the relationship between changes in real estate prices and the value of firms. Their findings used a yearly cross-sectional test from 1987-1991, and indicated that the proportion of a firm's real estate holdings to total assets had no significant effect upon return to shareholders. Nevertheless, Cheong et al. (1997) found that the higher the debt ratio of the firm, the lower the co-efficient of real estate holdings. According to Cheong and Kim this meant that expectations of real estate price hikes raised the value of assets currently held by the firm. On the other hand, however, expectations for increases in real estate prices caused a value loss to the

firm by increasing potential investment costs for future growth opportunities.

However, Cheong et al's (1997) results require further research to explain the current Korean situation, and its similarities and differences with other countries. Test samples from 1987-1991 did not reflect variations in the real estate market in Korea. That is, during the test sample period, 1987-1991, the land price index dramatically increased (over 20% annually on average). However, the land price index decreased from 1992–1994 due to the collapse of the real estate bubble, and in 1998 just after the IMF bailout (1997). Furthermore, regime changes like the IMF bailout and new systems deployed in the real estate market were not considered in the study. Moreover, Cheong et al. (1997) did not test the effect of corporate real asset ownership on systematic risk (beta) and risk-adjusted return to the shareholders, while using two-stage least square equations as the empirical methodology, as with previous studies.

3. Research Data and Design

3.1 Data

The empirical analysis presented herein is based on a sample of firms listed on the KOSPI (the Korea Composite Stock Price Index) Board, as well as monthly stock files obtained from the KIS-Value III by the Korea Information Service (KIS), and the Stock DB from the Korea Securities Research Institute (KSRI). All financial data regarding income statements and balance sheets were also obtained from KIS-Value III. All firms were categorized into 33 industrial sectors using two-digit Korea Standard Industrial Classifications (KSIC). More detailed information regarding the KSIC is presented in Appendix 1. Real estate companies and financial companies like banks, securities, and insurance firms were excluded, due to the fact that real estate companies handle real estate, while the asset bases of financial companies are difficult to compare with those of other firms.

This study's time frame is from 1985 to 2007, a comparatively long duration. By choosing this time frame, this paper could more accurately determine the ways in which a financial crisis and structural change in the real estate market would affect CRE and company performance in Korea. This study also examined the ways which CRE and firms' performance in Korea varied over time.

Variables used throughout the analysis included real estate holdings ratios, debt ratios, and firm sizes. These variables were computed from the KIS-Value III data. Specifically, real estate holdings ratios were categorized into three sub-variables including RE_1 (Land Holding Ratio), RE_2 (Property Holding Ratio), and RE_3 (PPE Holding Ratio). This was done to perform discrete

analysis of the impact of CRE on a particular firm's value (in the cases of RE_1 and RE_2) and for the purposes of comparison with previous studies (in case of RE_3). Detailed definition of real estate holdings variables used herein will be denoted as per the following equations, (1), (2) and (3), while other variables will be described in the next chapter, 3.2, "Methodology."

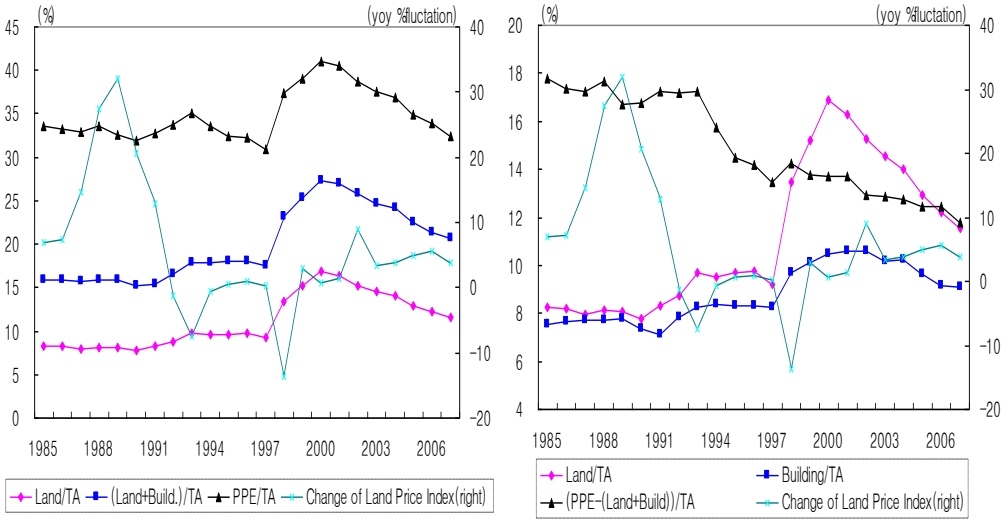
$$RE\_1 = \text{Land/Total Asset} \quad (1)$$

$$RE\_2 = (\text{Land} + \text{Buildings})/\ \text{Total Asset} \quad (2)$$

$$RE\_3 = \text{PPE (Property + Plant + Equipment)}/\ \text{Total Asset} \quad (3)$$

For this analysis, the final sample was selected after a further data refinement process. Firms were included only if they had at least 60 months of consecutive monthly returns, the standard in the finance literature for estimating stable betas (a key first step in an empirical strategy). Furthermore, each firm must have balance sheet information about land, property, plants, and equipment, long term debt, liabilities, and total asset information. Accordingly, the final sample includes stock returns and balance sheet data from 673 firms in 33 non-real estate industries. For industry analysis, 14 industries were used, as some industries did not have enough firms for observation.

Fig.1 Changes in the Land Price Index, Land, Buildings, and PPE Holding Ratios of Non-Real Estate Firms from 1985–2005 in Korea



*All firms which have data related to real estate are included in the figure's statistics even though they were excluded in empirical research due to an insufficient data series.

Changes in the land price index from 1985–2007 based upon the land price index released by the Ministry of Construction are illustrated in Figure 6. As shown in the figure, the national land price from 1985–2007 kept increasing (excepting 1992-1994, and 1998). In particular, land prices increase at over 20%, a historic high, from 1988–1990. On the other hand, from 1992–94 changes in the land price index decreased, due to the collapse of the real estate market. In 1998 just after the IMF bailout (1997), land prices decreased by 13.6%, a phenomenon not seen in Korea since the 1960s.

On the left side of Fig. 6, the real estate holding ratios-RE_1, RE_2 and RE_3 show three phases, a stable increase, sharp increase, and stable decrease by year. Accordingly, three time frames, pre IMF bailout (1985-1995), IMF bailout (1996-2000), and post IMF bailout (2001-2007) were designated when analyzing the impact of CRE on firms' performance over time. From 1985-1996, RE_1 and RE_2 increased from 8.3%, 15.8% to 9.8%, 18.1% on average, while overall RE_3 showed little decrease from 33.6% to 32.2%, with small fluctuations. From 1997-2000, the ratios sharply increased from 9.2%, 17.5%, and 31.0% to 16.9%, 27.4% and 41.1%. This was not due to massive purchases of real estate by non real estate Korean firms, but rather due to the "Asset Revaluation Law," which was amended on April 10th, 1998 and abolished on December 31st, 2000. The Asset Revaluation law permitted revaluation of all land bought before the end of 1997. Accordingly, many firms' revaluations had been done by firms to improve their financial statements, which had worsened drastically due to the economic and financial crisis. On the other hand, from 2001-2007, the ratios decreased moderately to 11.6%, 20.7% and 32.5%. This was due both to the Asset Revaluation Law expiring at the end of 2000, as well as company restructuring, including asset disposal, which helped to improve the financial structure.

Land and buildings ratios in 2007, which divide land and buildings by firms' total assets, were higher in the late 1980s as illustrated in the right side of Fig. 6. This holds true even while excluding the positive effect of the amendment of the asset revaluation law in 1998 on real estate holdings ratios. That is, the buildings ratio that the asset revaluation law had not affected gradually increased across time, providing evidence to support the increase of land and buildings ratios. However, plant and equipment ratios dividing plant and equipment by the firms' total assets in 2007 dramatically dropped to 11.8% from 17.8% in 1985. This is one of the reasons that cases using RE_1 or RE_2 as the real estate holding ratio were used for this empirical study, instead of RE_3, which was widely used in previous studies.

The statistics regarding the sample breakdown are presented in Table 2 and Appendix 2, which report the sample distributions across industries by number of firms. Appendix 2 shows that the number of firms in Tobacco Products, Business Services, and Amusement Services are rather

small, while firms in Chemicals and Electronic Parts & Computer Equipment are relatively large. Table 2 reports descriptive statistics for corporate real estate ownership across three sub-sample periods and 14 industries used in this empirical study. The observed CRE holdings ratios exhibit very significant differences across industries, with CRE holdings ratios in the year 2007 ranging from 5.8% (RE_1), 10.8% (RE_2), and 13.9% (RE_3) for Buildings and Heavy Construction to 18.5% (RE_1), 29.7% (RE_2) for Textile Mills and 51.2% (RE_3) for Paper. However, for RE_3, one must be careful when comparing these ratios across industries: the ratio includes not only property, but also plants and equipment. Subsequently, with respect to patterns for each period, RE_1, and RE_2 show difference from RE_3. RE_1 and RE_2 continued to increase across the Before IMF bailout period, During the IMF bailout period, and After the IMF bailout period, while RE_3 in the After IMF bailout period recorded the same or slightly lower values compared to the IMF bailout period across industries excepting Apparel, Stone and Clay, Transportation Equipment, Buildings and Heavy Construction, and Business Consulting. Those industries showed that RE_1 and RE_2 in the After IMF bailout period decreased compared to ones During the IMF bailout period, in contrast to other industries.

Table 2. Corporate Real Estate Holding Ratios by Industry and Period

Major Industries	# of Firms	RE Var. [b]	Before [c]	IMF [d]	After [e]	Avg
All sectors	673[a]	RE_1	8.7	13.3	14.0	11.9
		RE_2	16.7	23.1	24.2	21.2
		RE_3	32.3	36.6	36.0	34.7
Food.	31	RE_1	9.3	15.7	17.3	13.5
		RE_2	18.1	26.3	28.6	23.5
		RE_3	39.4	41.6	40.6	40.2
Textile Mills	29	RE_1	12.2	18.0	26.9	18.5
		RE_2	22.8	29.2	39.0	29.7
		RE_3	39.0	41.9	48.6	42.8
Apparel	24	RE_1	11.7	20.1	18.0	16.7
		RE_2	18.8	30.8	28.9	26.5
		RE_3	24.2	33.4	31.9	30.1
Paper	22	RE_1	7.6	10.2	12.3	10.3
		RE_2	15.0	20.9	25.4	21.0
		RE_3	42.2	49.9	58.4	51.2
Chemicals	64	RE_1	12.0	15.9	18.4	15.4
		RE_2	19.7	25.4	27.8	24.2
		RE_3	41.9	44.2	42.9	42.8
Medical Chemicals	37	RE_1	7.7	9.8	10.5	9.3
		RE_2	16.7	20.4	22.2	19.7
		RE_3	23.7	24.9	27.3	25.4
Stone, Clay, Glass, and Concrete	26	RE_1	10.3	18.0	15.9	14.0
		RE_2	20.7	29.8	27.0	24.9
		RE_3	45.9	49.0	44.3	45.9
Primary Metals	43	RE_1	10.0	12.8	14.9	12.6
		RE_2	17.3	22.2	24.9	21.5
		RE_3	35.6	46.8	45.2	42.1
Electronic Parts, Computers, and Communications Equipment	66	RE_1	5.7	7.8	8.6	7.6
		RE_2	15.4	17.3	19.2	17.6
		RE_3	34.4	32.5	33.1	33.3
Misc. Machinery and Equipment	24	RE_1	7.9	11.5	13.4	11.2
		RE_2	16.3	23.1	22.3	20.6
		RE_3	31.2	32.5	30.1	31.0
Transportation Equipment	38	RE_1	8.1	15.7	11.8	11.5
		RE_2	16.7	24.9	21.1	20.6
		RE_3	38.2	44.7	37.6	39.4
Buildings and Heavy Construction	56	RE_1	3.7	7.7	7.4	5.8
		RE_2	7.4	14.2	12.8	10.8
		RE_3	12.0	16.7	14.6	13.9
Wholesale and Retail trade	55	RE_1	9.6	16.0	15.1	13.3
		RE_2	17.1	26.4	28.0	23.6
		RE_3	25.0	32.2	32.5	29.7
Business Advisory	26	RE_1	9.1	14.2	13.0	11.7
		RE_2	18.2	24.5	21.3	20.7
		RE_3	36.2	39.8	30.7	34.8

a) The number for all firms is greater than the sum of 16 industries because industries having fewer than 20 were excluded in this table.

b) RE_1 = Land/Total Asset, RE_2 = (Land+Buildings)/Total Assets,
RE_3 = PPE (Property+Plant+Equipment)/Total Asset
c) Before: 1985-1995, d) IMF: 1996-2000, e) After: 2001-2007

3.2 Methodology

This study quantified and examined the impact of CRE holdings ratios on stock performance, using the following two stage approach. In the first stage, the study used a single index model, which quantifies both the historic return and risk characteristics, is deployed herein. The basic idea is that for each stock, total return can be broken down into unique and systematic components. This is crucial to control for systematic risk (or beta) as theory suggests that is the primary reason why returns vary across firms. After controlling for risk differences across firms, this study then examines whether the unique aspects of returns (i.e., parts not related to market risk) are related to the company's real estate concentration level. A single index model and a definition of the variables used in this study are as below.

$$R_{it} - R_{ft} = \alpha_{it} + \beta_{it}\left[R_{mt} - R_{ft}\right] + \varepsilon_{it} \quad (4)$$

R_{it} : The total stock returns of firm i over period t

R_{ft} : The risk free rate of return over period t,
Korea monetary stabilization bond (1 year)

R_{mt} : The KOSPI (Korean Composite Stock Index) return over period t

β_{it} : Systematic risk of firm i over period t

α_{it} : The abnormal stock return of firm i over period t, the idiosyncratic component of the monthly excess return of firm i over period t, Jensen's alpha

The second stage examines if the systematic risk of firms and the unique components of returns are associated with concentration of real estate ownership. To analyze the relationship between corporate real estate ownership and stock performance this study used a two-stage least squares procedure. This is because applying OLS would yield estimates of coefficients that suffer from the simultaneity bias, which causes inconsistency in the estimates in this situation for the independent variable; CRE holding ratios are endogenous. Due to real estate's low systematic risk (beta), it might be expected that firms with relatively high real

estate holdings would be associated with lower betas compared to their peers. On the other hand, one might also conclude that firms with relatively low betas to start with will have low costs of capital and therefore will be capable of acquiring real estate at a more competitive price. Low risk firms will therefore be more likely to end up with relatively high corporate real estate ownership levels. This creates a situation in which simultaneous relationships can be at work. Two-stage least squares regressions were estimated based on the following equation:

$$\alpha_{it} = \gamma_0 + \gamma_1 \hat{RE}_{it} + \gamma_2 Debt_{it} + \gamma_3 Size_{it} + \sum_{i=1}^{2} \gamma_i PD_i + \sum_{i=1}^{13} \gamma_i ID_i + \delta_{it} \quad (5)$$

$$\beta_{it} = \rho_0 + \rho_1 \hat{RE}_{it} + \rho_2 Debt_{it} + \rho_3 Size_{it} + \sum_{i=1}^{2} \gamma_i PD_i + \sum_{i=1}^{13} \rho_i ID_i + \eta_{it} \quad (6)$$

$\hat{RE}_{it}$: The corporate real estate holdings ratios (RE_1, RE_2, RE_3) of firm i over period t, instrument variables

$Debt_{it}$: Debt ratio= long-term debt/total assets

$Size_{it}$: Firm size= log (total asset)

PD_i: Period dummy variables, 1 for Before IMF bailout, 2 for IMF bailout period

ID_i: Industry dummy variables (1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade)

where α_{it}, β_{it} are derived from a equation (4), $\hat{RE}_{it}$, an instrument variable, is the predicted value of the percentage of real asset holdings from a reduced-form equation due to an endogenous variable, $Debt_{it}$ represents the leverage ratio, $Size_{it}$ is the natural log of total assets, PD_i is time dummy variables representing three periods, ID_i is industry dummy variables representing 14 industries in Table 2, and δ_{it}, η_{it} are the regression error terms.

$Debt_{it}$ and $Size_{it}$ are used as a control variable for the following reasons. $Debt_{it}$ has been known as very related to a firm's systemic risks. Firms that have higher levels of debt

are considered riskier and should therefore have higher systematic risk, as measured by beta, and display higher returns to compensate for the greater risk. Subsequently, $Size_{it}$ is included as a control variable because it often is related to differences in firm returns (Fama and French, 1993). Furthermore, instead of using the observed CRE holdings ratios, this model uses a model predicted by CRE from a reduced form equation, with the lagged CRE ratios, company size, firm leverage, and a poor performance dummy as instrumental variables. A regression was estimated based on the following equation:

$$\hat{RE}_{it} = \omega_0 + \omega_1 RE_{it-1} + \omega_2 Debt_{it} + \omega_3 Size_{it} + \omega_4 PerfD + \sum_{i=1}^{13} \omega_i ID_i + \psi_{it} \qquad (7)$$

where $PerfD_i$ is the performance dummy variable of firm i that divides the sample into firms with annual net income plus and minus. $PerfD_i$ is included as a control variable because it has been documented that in times of financial slumps firms are more likely to sell their real estate holdings in order to increase their financial strength.

4. Empirical Results

Chapter 4.1 focuses on the relation between CRE holdings ratios and the risk-adjusted return of the firms, while Chapter 4.2 focuses on the relation between CRE ratios and systemic risk. Reporting the empirical results, this study focused on RE_2 (Land + Buildings ratios) among three CRE holdings ratios because real estate is close to land and buildings by definition. The coefficients regarding RE_1 and RE_3 are presented in each Appendix 3-6 and Appendix 9-12, and comparisons with RE_1 and RE_3 were provided in the text or footnotes when needed.

4.1 Abnormal Performance

Panel A of Table 3 shows the results on the effect that the percentage of real asset holdings (RE_2) has on the risk-adjusted return of the firm for the overall-sample period. The coefficient regarding the corporate real estate ratio is negative and is statistically significant. RE_1 and RE_3 also have the same results as RE_2. Furthermore, the coefficients on the period and industry dummy variables reported in Appendix 7 indicate that there is a significant variation in the risk-adjusted return of the three sub-sample periods and fourteen industries. In particular, the fact that

all coefficients for the periods are significant indicates that there were structural changes across three different time frames in Korea. In order to test the robustness of this outcome this study also ran the same set of regressions over separate periods.

Table 3. Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Excess Return

		Independent Variables			Adj R^2
		RE_2	Size	Debt	
Panel A: Overall		**-0.007***	0.061**	-0.004**	0.05
Panel B: By Period	Pre IMF bailout	**0.004****	-0.009	-0.005**	0.04
	IMF bailout	**-0.018****	-0.116**	-0.004**	0.11
	Post IMF bailout	**-0.006****	0.215**	-0.004**	0.08

Note: RE_2=(Land+Buildings)/Total Assets, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets, Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Panel B of Table 3 shows that coefficients for RE_2 in three sub-sample periods are all significant, but sign of coefficients are different. The coefficient in the Pre IMF period is positive, while the other two are negative. This may be accounted for by several factors. Before the IMF bailout, firms having massive amounts of real estate might have had more positive effects such as low financing costs, portfolio diversification, and large capital gains, than negative ones such as business risks. For example, it was difficult for firms to borrow large sums of money without real estate because the collateral oriented financial system had dominated, and business diversification could have been achieved by engaging in different businesses or buying real estate. Furthermore, the sharp increase in land prices in the late 1980s and early 1990s provided an opportunity to get capital gains to massive CRE holdings' companies.

However, during and after the IMF bailout, negative effects were worse than positive effects caused by CRE holdings. Many debt-ridden companies went bankrupt subsequent to the currency crisis in 1997. Among these failed companies, many had invested so massively in land purchases that their assets surpassed their debt. As land and buildings were not sold in a timely fashion, such companies ultimately faced liquidity shortages, eventually going bankrupt. After the IMF bailout, many corporations underwent voluntary restructuring, including real estate disposal, and

tried to maximize their utilization of CRE. This might have contributed to the firms' core business, allowing them to obtain competitive advantage through increased corporate capital-usage and real estate asset management efficiency. The coefficients for RE_3 widely used in previous studies were the same as for RE_2, except that RE_3's was insignificant before the IMF bailout.[2]

Table 4 lists the 2SLS regression summaries by industry. The sector-by-sector analysis indicates that the effect of corporate real estate ownership on out performance is to a large extent driven by the sector the company operates in. Although this study generally found negative effects, the regression coefficient differs quite substantially. For Paper, Medical, Glass, Transportation Equipment, and Buildings and Heavy Construction, effects were negative and significant. On the other hand, positive and statistically significant coefficients were found for Textile Mills, Wholesale, and Retail. That is, these results indicate that corporate real estate performance effects are partly sector-driven, which is understandable given the variance in the strategic importance of real estate for companies in different industries.[3]

The relationship between leverage and excess returns is clearer from the results. The relationship is consistently negative and significant for all regressions over the overall sample period, three sub-sample periods, and 14 industries. This indicates the high debt ratio has worsened firms' performance. On the other hand, the size coefficient was found to be positively significant for the overall sample period, and for the post IMF bailout period of the sub samples, was found to be negatively significant. In the case of industry, the coefficients on the size variables indicate that there is significant variation in the risk-adjusted returns of 14 industries.

[2] The only difference between the coefficients for RE_1 and RE_2 is that RE_1's coefficient is insignificant but RE_2's one is significant in the post IMF bailout period..

[3] For Transportation Equipment and Buildings and Heavy Construction, coefficients are negative and significant whatever CRE holdings variables are used. The coefficients for RE_1 are insignificant in Paper, Medical, and Glass where RE_2 is significant. On the other hand, for Misc. Machinery, the coefficient for RE_1 is negative and significant, contrary to for RE_2. In case of RE_3 widely used in previous studies, there are no industries that the coefficient is positively significant. For Chemicals and Primary Metals, the coefficients for RE_3 are negative and significant, contrary to ones for RE_2.

Table 4. Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Excess Return

Industries	Independent Variables			Period dummy		
	RE_2	Size	Debt	i=1	i=2	Adj R^2
Food	0.005	0.15**	-0.015**	-0.66**	-0.24	0.13
Textile Mills	**0.015***	-0.31**	-0.009**	-0.02	-0.04	0.07
Apparel	-0.010	-0.24*	-0.015**	-0.04	-0.61**	0.16
Paper	**-0.068****	-0.03	-0.002	0.38**	0.44	0.16
Chemicals	0.001	0.03	-0.006**	0.004	-0.04	0.02
Medical	**-0.031****	0.0004	-0.015**	-0.88**	-0.45**	0.14
Glass and Concrete	**-0.012****	0.07	-0.008**	-0.19	-0.71**	0.08
Primary Metals	0.0003	0.10*	-0.015**	0.33**	-0.07	0.07
Electronic Parts	-0.009	0.18**	-0.001**	0.42**	0.80**	0.06
Misc. Machinery	-0.006	0.23**	-0.005**	-0.05	0.25	0.04
Transportation Equipment	**-0.047****	-0.11**	-0.022**	-0.10	-0.42*	0.15
Buildings and Heavy Construction	**-0.015***	0.09	-0.005**	-0.42**	-0.93**	0.06
Wholesale and Retail	**0.006***	0.12**	-0.004**	-0.21	-0.21	0.06
Business Consulting	-0.002	0.001	-0.014**	-1.04**	-0.65**	0.24

Note: RE_2 = (Land+Buildings)/Total Assets, Size = log (Total Asset), Debt = Long-Term Debt/Total Assets, Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

4.2 Systematic Risk

Regarding the effects of CRE holdings (RE_2) on the systematic risk of firms I conducted a similar analysis, which regresses systematic risk (beta) on the predicted RE_2 and the controlling variables for all companies, and then repeats the analysis over three sub-sample periods and on a sector-by-sector basis. The results listed in Panel A of Table 5 show the results for the overall-sample period. The coefficient for RE_2 is negative and is statistically significant, like that of RE_1 as reported in Appendix 5, while the one for RE_3 reported in Appendix 9 is negative but insignificant. Locking corporate financial resources in relatively safe real estate assets apparently reduces a firm's systematic risk exposure. Furthermore, the coefficients for RE_2 on the time

period and industry dummy variables reported in Appendix 8 indicate that there is a significant variation in systematic risks across the three periods and fourteen industries. In order to test the robustness of this outcome I also ran the same set of regressions for separate periods.

Panel B of Table 5 indicates coefficients for RE_2 in the three sub-sample periods are all significant, but the signs of coefficients are different. The coefficients (except for the IMF period) are negative and significant, while only one the IMF period shows a positive and significant value. The reason why the results from the IMF period are different from the others is likely due to negative effects of CRE holdings (including business risk) outweighing positive ones due to the financial crisis. On the other hand, the CRE holdings ratio (RE_2) had a notable negative impact on systematic risk and risk adjusted return of firms for the IMF period. That is, the CRE holdings ratio (RE_2) diminishes the systematic risk of firms but does not improve risk adjusted return of shares for the post IMF period. The coefficients for RE_3 widely used in prior studies are the same as those for RE_2, except RE_3's was insignificant before the IMF bailout.[4]

Table 5. Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Beta

		Independent Variables			Adj R^2
		RE_2	Size	Debt	
Panel A: Overall		-0.001**	0.045**	0.0002**	0.12
Panel B: By Period	**Before**	-0.004**	0.01**	-0.001	0.06
	IMF	0.002*	0.078**	0.0003**	0.13
	After	-0.002**	0.057**	0.0001*	0.17

Note: RE_2= (Land+Buildings) /Total Assets, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets, Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Table 6 exhibits the 2SLS regression summaries by industry. The sector-by-sector analysis of the impact of CRE holdings on systematic risk exhibits variations across different industries. Eight of 14 industries, including Textile Mills, Apparel, Paper, Chemicals, Glass, Primary Metals, Transportation Equipment, and Wholesale and Retail, have negative and significant coefficients. Only Food has a positive and significant coefficient, while others have statistically insignificant

[4] The coefficient for RE_1 is the same as one for RE_2 for every sub-sample period.

ones. These results thus indicate that a firm's systematic risk effects are partly sector-driven, which is to be expected given variance in the strategic importance of real estate for companies in different industries.[5]

Table 6. Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Beta

Industries	Independent Variables			Period dummy		
	RE_2	Size	Debt	i=1	i=2	Adj R^2
Food	**0.003****	0.038**	0.0003	-0.06**	-0.04	0.06
Textile Mills	**-0.004****	0.06**	0.0007**	-0.16**	-0.08*	0.11
Apparel	**-0.004****	0.033	0.0001	-0.27**	-0.06	0.15
Paper	**-0.005****	0.019	0.002**	-0.14**	0.02	0.07
Chemicals	-0.002	0.049**	0.0009**	-0.08**	0.02	0.12
Medical	0.002	0.040**	-0.001**	-0.01	0.01	0.03
Glass and Concrete	**-0.003****	0.069**	0.001**	-0.14**	0.03	0.20
Primary Metals	**-0.004****	0.041**	0.0003	-0.05*	0.02	0.09
Electronic Parts	0.002	0.052**	0.0002*	-0.27**	-0.13**	0.20
Miscellaneous Machinery	0.001	0.045**	0.0003	-0.13**	-0.04	0.06
Transportation Equipment	**-0.005****	0.044**	-0.0005	-0.12**	-0.03	0.18
Buildings & Heavy Construction	0.006	-0.012	-0.0005*	-0.19**	-0.08**	0.06
Wholesale and Retail	**-0.001***	0.059**	-0.0000	-0.09**	-0.04	0.08
Business Advisory	-0.002	0.042**	0.0001	-0.16**	-0.01	0.21

Note: RE_2 = (Land+Buildings)/Total Asset, Size = log (Total Assets), Debt = Long-Term Debt/Total Assets, Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

* and ** both indicate two-tailed significance at the 10 and 5 percent level.

The relationship between firm size and systematic risk is also clearer from the results. The relationship is positive and significant for all regressions over the overall sample, three sub-sample periods, and 11 industries. This indicates that large firm size increases a firms' systematic risk. The debt ratio coefficient was also found to be positively significant for the overall sample period during the IMF and post IMF bailout periods for the sub samples, while it was found to be insignifi-

[5] For Textile Mills, Apparel, Chemicals, and Transportation Equipment, their coefficients are negative and significant whatever CRE holdings variables are used. However, the food industry' coefficients are positive and significant across all three CRE holdings variables. Furthermore, RE_1's coefficient is positively significant in Medical and Misc. Machinery and negatively significant in Business Consulting but RE_2's ones are not significant in each industry. On the other hand, RE_3's coefficient is not significant in Paper and Wholesale and Retail but RE_2's are positively significant in each industry. For Electronic Parts, RE_3's coefficient is positive and significant, contrary to RE_2's.

cant for the pre IMF bailout period. By industry, coefficients on the debt ratio variable indicated a significant variation in the firm's systematic risk for 14 industries.

5. Conclusion

The purpose of this research was to examine the impact of CRE holdings on systematic risk and risk-adjusted return to corporate stockholders by drawing on Korean data. The results provide evidence in support of a negative correlation between CRE holdings ratios and abnormal stock performance. This means higher CRE holdings are a worse risk-adjusted return to stockholders. Even in Korea, with one of the highest CRE holding ratios', the results are not significantly different from studies from Deng and Gyourko (1999) and Seiler et al. (2001) on U.S. firms, and Liow (2004) on Singaporean ones. The results also indicate a negative correlation between CRE holdings ratios and systematic risk. This supports the view that CRE holdings induce diversification benefits in Korea.

Further analyses were conducted according to sub-sample period and industry. Empirical results attained to determine whether structural changes in Korea affected the relationship between CRE holdings and firms' risk and performance indicate that structural changes affect the relationship between both of them. The results before the IMF bailout provide evidence to support a positive effect for CRE holdings, both in terms of systematic risk and risk-adjusted return. However, the results during the IMF bailout are opposite to the ones before the IMF bailout. This implies that the negative effects of CRE holdings, such as business risk, are greater than diversification effects. Results after the IMF bailout are mixed, showing both negative and positive effects. That is, the impact of CRE holdings on abnormal stock performance and systematic risk are all negative. Next, sector-by-sector results on the impact of CRE holdings on stock performance and systematic risk of firms exhibit variation across different industries. These results by sub-sample period and industry imply that one must be careful when interpreting results due to industry specific factors like types and strategic importance of real estate and time specific factors like financial crises and changes in regulations.

On the other hand, further research is needed to generalize the findings herein and to examine topics related to this study. First, EVA (Economic Value Added) and MVA (Market Value Added) as dependent variables instead of systematic risk and risk-adjusted return are needed to confirm the negative impacts of CRE holdings on corporate performance. Next, immediate

concerns arising from the study include "Why do firms own or want to own massive amounts of real estate even when CRE obviously hurts firm value?"

Appendix 1: Korea Standard Industrial Classification (KSIC)

101: A00000 Agriculture
105: B00000 Mining
C00000 Manufacturing
110: C10000 Food etc.
111: C11000 Beverage and Kindred Products
112: C12000 Tobacco Products
113: C13000 Textile Mill Products
114: C14000 Apparel and Other Finished Products
115: C15000 Leather and Leather Products
116: C16000 Lumber and Wood Products, Excluding Furniture
117: C17000 Paper and Allied Products
119: C19000 Petroleum Refining and Related Industries
120: C20000 Chemicals and Allied Products, Excluding Medicinal Chemicals
121: C21000 Medicinal Chemicals
122: C22000 Rubber and Misc. Plastics Products
123: C23000 Stone, Clay, Glass, and Concrete Products
124: C24000 Primary Metal Industries
125: C25000 Fabricated Metal, Excluding Machinery, Furniture Equipment
126: C26000 Electronic Part, Computer Equipment, Communication Equipment
127: C27000 Measuring Instrument, Photo Goods, Watches
128: C28000 Electronic Equipment
129: C29000 Misc. Machinery and Equipment
130: C30000 Transportation Equipment
131: C31000 Misc. Transportation Equipment
132: C32000 Furniture and Fixtures
133: C33000 Misc. Manufacturing Industries
135: D00000 Electric, gas, and sanitary services
141: F00000 Building and Heavy Construction
145: G00000 Wholesale and Retail trade
149: H00000 Transportation and Transportation Services
158: J00000 Publishing, Motion Picture, Communications
170: M00000 Business Advisory
174: N00000 Business Services
190: R00000 Amusement and Recreation Services

Appendix 2: Mean and Standard Deviation of Key Variables by Industry (1)

Ind[1)]	N[2)]	OBS[3)]	RE_1[4)]	RE_2[5)]	RE_3[6)]	Debt_1[7)]	Debt_2[8)]	Size[9)]
#: 33	673	8652	**12.10**	**21.25**	**35.51**	**27.33**	**300.25**	**782.4**
			10.40	13.64	18.28	52.74	2670.65	3,126.8
101	5	56	**10.67**	**18.35**	**37.65**	**16.58**	**191.59**	**176.9**
			5.15	9.48	11.16	10.41	147.24	142.2
105	2	26	**5.49**	**9.11**	**18.59**	**23.32**	**184.10**	**233.4**
			3.23	6.44	12.14	8.91	104.29	151.9
110	31	520	**13.46**	**23.51**	**40.24**	**23.34**	**438.76**	**310.2**
			10.36	12.32	14.35	20.84	2762.99	365.1
111	8	110	**16.50**	**25.17**	**38.58**	**38.20**	**645.92**	**700.3**
			11.97	13.36	14.68	76.27	2073.94	881.6
112	1	2	**9.89**	**22.09**	**36.03**	**6.45**	**23.52**	**3,823.1**
			0.35	0.16	0.86	1.55	4.35	218.8
113	29	343	**18.45**	**29.69**	**42.83**	**30.00**	**333.26**	**220.9**
			13.61	15.93	17.85	43.06	1466.09	172.8
114	24	262	**16.74**	**26.48**	**30.06**	**26.57**	**178.89**	**165.8**
			13.35	16.98	16.67	35.65	704.37	160.2
115	7	63	**16.40**	**26.48**	**32.00**	**12.96**	**2459.08**	**91.9**
			10.08	12.64	12.13	10.19	16315.90	65.6
116	4	53	**30.47**	**38.12**	**52.27**	**46.53**	**242.31**	**180.4**
			16.91	15.98	18.34	90.24	637.79	93.6
117	22	271	**10.28**	**20.99**	**51.16**	**27.28**	**287.32**	**298.1**
			6.57	10.26	16.23	19.42	1584.25	442.5
119	5	58	**12.63**	**15.16**	**32.34**	**13.23**	**1915.31**	**1,657.8**
			8.01	9.11	13.41	13.45	12938.89	2,321.6
120	64	865	**15.43**	**24.20**	**42.77**	**26.02**	**164.51**	**539.3**
			12.26	13.77	15.91	33.51	814.06	839.4
121	37	598	**9.26**	**19.72**	**25.39**	**22.06**	**130.82**	**130.3**
			6.65	9.14	10.01	21.56	268.20	130.5
122	14	186	**12.87**	**23.22**	**39.06**	**21.08**	**134.60**	**278.5**
			8.90	9.59	12.94	26.66	548.67	451.5
123	26	408	**13.97**	**24.90**	**45.94**	**27.42**	**168.39**	**538.4**
			10.05	12.05	15.71	35.88	559.43	837.7
124	43	616	**12.64**	**21.50**	**42.11**	**25.58**	**175.52**	**952.7**
			8.37	10.54	16.93	28.58	988.45	2,982.2
125	10	122	**12.70**	**23.86**	**34.42**	**27.00**	**91.53**	**76.7**
			8.84	12.75	13.87	38.94	930.06	51.4
126	66	647	**7.56**	**17.63**	**33.34**	**32.56**	**174.24**	**1,187.1**
			7.41	12.09	17.36	123.98	888.53	5,396.2

Appendix 2: Mean and Standard Deviation of Key Variables by Industry (2)

Ind	N	OBS	RE_1	RE_2	RE_3	Debt_1	Debt_2	Size
127	5	42	**5.82**	**15.05**	**27.33**	**35.44**	**225.60**	**707.8**
			3.74	7.20	9.37	45.83	675.01	876.6
128	19	264	**11.68**	**20.40**	**32.57**	**20.06**	**477.40**	**216.6**
			8.13	9.98	13.66	20.63	3980.92	380.6
129	24	263	**11.22**	**20.56**	**30.98**	**23.53**	**256.06**	**421.7**
			10.69	13.54	15.99	67.47	1009.01	1,530.6
130	38	454	**11.54**	**20.60**	**39.40**	**21.74**	**599.32**	**1,286.1**
			10.35	11.52	14.18	14.78	4695.63	3,714.8
131	4	52	**11.68**	**18.87**	**34.03**	**22.32**	**184.45**	**2,620.7**
			9.49	10.13	11.53	21.58	364.78	4,228.8
132	5	32	**15.06**	**31.65**	**36.58**	**56.55**	**345.93**	**162.4**
			11.07	18.50	18.87	108.39	2193.76	82.8
133	2	27	**24.38**	**38.30**	**42.61**	**42.92**	**20.79**	**231.2**
			8.85	8.94	7.69	28.71	2414.30	70.8
135	10	85	**7.37**	**10.82**	**49.80**	**17.33**	**129.92**	**8,507.7**
			3.26	3.05	13.08	11.25	61.93	19,719.2
141	56	761	**5.82**	**10.77**	**13.94**	**36.16**	**423.97**	**850.6**
			5.90	10.16	12.11	47.30	1773.03	1,215.4
145	55	726	**13.27**	**23.55**	**29.65**	**28.99**	**352.32**	**763.4**
			11.35	18.70	20.78	82.27	3240.56	1,932.0
149	18	278	**13.83**	**19.97**	**50.02**	**38.92**	**139.91**	**1,279.8**
			11.71	14.96	17.17	26.06	2728.16	2,693.7
158	11	79	**10.55**	**25.23**	**38.70**	**22.89**	**189.29**	**2,751.1**
			10.74	19.03	18.75	16.39	464.03	5,236.0
170	26	368	**11.71**	**20.71**	**34.75**	**24.64**	**220.30**	**1,589.9**
			8.51	10.61	15.16	19.62	691.09	2,915.2
174	1	5	**9.30**	**20.90**	**45.18**	**8.95**	**42.30**	**553.5**
			1.40	3.59	8.64	0.81	4.32	87.1
190	1	10	**6.37**	**12.80**	**16.49**	**18.49**	**-196.89**	**62.2**
			3.63	7.01	8.82	10.60	1195.39	13.4

1. IND means the Korea Standard Industrial Classification (SIC) code. See Appendix1 for a list of KSIC codes and industry names.
2. N indicates the number of firms in the sample.
3. N of Observations in the sample.
4. RE_1= land/total asset
5. RE_2 = (land + buildings)/ total asset
6. RE_3 = PPE (property + plant + equipment)/ total asset
7. Debt_1= long-term debt/total asset
8. Debt_2= liabilities/ stockholder's equity
9. SIZE is total asset, measured in billion Korean Won.

Appendix 3: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Excess Return

	Independent Variables			**Period dummy**													
	RE_1	Size	Debt	i=1	i=2												
Overall	**-0.04***	0.06**	-0.04**	-0.20**	-0.27**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				-0.01	-0.08	0.35**	0.54**	0.21*	0.08	-0.26**	0.11	0.42**	0.31**	-0.03	-0.28**	-0.10	0.05
Before	**0.007****	-0.007	-0.005**	-0.03	-0.33**	-0.25*	-0.01	-0.01	0.24	0.18	-0.04	-0.13	0.21*	0.05	-0.31**	-0.30**	0.04
IMF	**-0.02****	-0.11**	-0.005**	0.00	0.41**	0.83**	1.07**	0.47**	-0.17	0.51**	0.58**	0.58**	0.34	0.18	0.61**	0.36	0.10
After	-0.004	0.218	-0.003	0.01	-0.11	0.60**	0.79**	0.22	0.14	-1.01**	-0.08	0.74**	0.31	-0.29	-0.79**	-0.23	0.08

Note: RE_1= Land /Total Assets, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 4: Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Excess Return

Industries	Independent Variables			Period dummy		
	RE_1	Size	Debt	i=1	i=2	Adj R^2
Food	0.0007	0.15**	-0.01**	-0.72**	-0.27	0.13
Textile Mill	**0.020****	-0.31**	-0.01**	0.02	0.01	0.07
Apparel	-0.006	-0.23*	-0.02**	0.02	-0.60**	0.16
Paper	0.025	0.15	-0.005	1.31**	0.98**	0.07
Chemicals	0.005	0.03	-0.006**	0.031	-0.02	0.02
Medical	-0.014	-0.02	-0.016**	-0.74**	-0.35**	0.11
Glass and Concrete	-0.009	0.08	-0.008	-0.15	-0.70	0.07
Primary Metal	0.002	0.10**	-0.015**	0.34**	-0.06	0.07
Electronic Part	-0.014	0.18**	-0.001**	0.42**	0.80**	0.06
Misc. Machinery	**-0.030****	0.20**	-0.05**	-0.17	0.15	0.06
Transportation Equip.	**-0.045****	-0.10**	-0.023**	-0.03	-0.38*	0.13
Build. and Heavy Con.	**-0.026***	0.09	-0.005**	-0.43**	-0.94**	0.06
Wholesale and Retail	**0.010***	0.12**	-0.004**	-0.21	-0.22	0.06
Business Advisory	0.001	0.002	-0.014**	-1.02**	-0.65**	0.24

Note: RE_1 = Land/Total Asset, Size = log (Total Assets), Debt = Long-Term Debt/Total Assets, Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

and ** both indicate two-tailed significance at the 10 and 5 percent level.

Appendix 5: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Beta

	Independent Variables			**Period dummy**													
	RE_1	Size	Debt	i=1	i=2												
Overall	**-0.002****	0.045**	0.0002*	-0.12**	-0.04**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				-0.06**	0.02	0.03	-0.06**	-0.09**	-0.04**	0.00	-0.02	-0.07**	0.00	0.00	0.04**	0.07**	0.12
Before	**-0.005****	0.01	-0.001	0.05**	0.02	0.02	-0.06**	-0.10**	-0.15**	-0.01	0.01	-0.07**	0.00	0.04	-0.07**	0.04	0.06
IMF	**0.002***	0.076**	0.0003**	0.04	-0.01	0.04	-0.09**	-0.09*	-0.02	0.08	-0.03	-0.05	0.06	0.02	0.05	0.11**	0.13
After	**-0.002****	0.057**	0.0001	0.09**	0.00	0.02	-0.06**	-0.08**	0.00	-0.04	-0.05**	-0.09**	-0.02	-0.05**	0.12**	0.09**	0.17

Note: RE_1 = Land/Total Asset, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 6: Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Beta

Industries	Independent Variables			Period dummy		
	RE_1	Size	Debt	i=1	i=2	Adj R^2
Food	**0.003****	0.038**	0.0004	-0.07**	-0.04	0.06
Textile Mill	**-0.004****	0.06**	0.0007**	-0.16**	-0.08**	0.10
Apparel	**-0.005****	0.027	0.000	-0.26**	-0.05	0.15
Paper	**-0.008****	0.022	0.002**	-0.13**	0.02	0.08
Chemicals	-0.0008	0.05**	0.0009**	-0.07**	-0.017	0.11
Medical	**0.006****	0.036**	-0.001**	-0.004	0.017	0.05
Glass and Concrete	**-0.006****	0.066**	0.0015**	-0.15**	0.03	0.22
Primary Metal	**-0.005****	0.041**	0.0001	-0.04*	0.019	0.10
Electronic Part	-0.0002	0.05**	0.0002*	-0.28**	-0.13**	0.19
Misc. Machinery	**0.003***	0.046**	0.0002	-0.11**	-0.025	0.07
Transportation Equip.	**-0.006****	0.043**	-0.0005	-0.12**	-0.025	0.19
Build. and Heavy Con.	0.003	-0.013	-0.0005*	-0.18**	-0.07**	0.06
Wholesale and Retail	-0.001	0.059**	0.0000	-0.09**	-0.036	0.08
Business Advisory	**-0.005****	0.045**	0.0003	-0.18**	-0.016	0.23

Note: RE_1 = Land/Total Asset, Size = log (Total Assets), Debt = Long-Term Debt/Total Assets,
Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

* and ** both indicate two-tailed significance at the 10 and 5 percent level.

Appendix 7: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Excess Return

	Independent Variables			**Period dummy**													
	RE_2	Size	Debt	i=1	i=2												
Overall	**-0.007***	0.061**	-0.004**	-0.24**	-0.29**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				-0.05	-0.06	0.36**	0.55**	0.24*	0.09	-0.25**	0.12	0.42**	0.33**	-0.03	-0.28**	-0.10	0.05
Before	**0.004***	-0.009	-0.005**	-0.02	-0.33**	-0.25*	-0.006	-0.001	0.25	0.18	-0.03	-0.14	0.22*	0.06	-0.32**	-0.30**	0.04
IMF	**-0.018****	-0.116**	-0.004**	-0.06	0.43**	0.84**	1.09**	0.50**	-0.15	0.51**	0.58**	0.59**	0.39*	0.17	0.61**	0.38	0.11
After	**-0.006****	0.215**	-0.004**	-0.02	-0.08	0.61**	0.81**	0.27	0.16	-1.00**	-0.07	0.74**	0.33	-0.28	-0.80**	-0.23	0.08

Note: RE_2= (Land+Buildings) /Total Assets, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 8: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Beta

	Independent Variables			**Period dummy**													
	RE_2	Size	Debt	i=1	i=2												
Overall	**-0.001****	0.045**	0.0002**	-0.12**	-0.04**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				0.06**	0.003	0.03	-0.06**	-0.09**	-0.04**	0.002	-0.02	-0.07**	0.006	0.003	0.04**	0.07**	0.12
Before	**-0.004****	0.01**	-0.001	0.03	0.01	0.02	-0.06**	-0.09**	-0.15**	-0.01	0.004	-0.07**	0.001	0.04	-0.07**	0.04	0.06
IMF	**0.002***	0.078**	0.0003**	0.05	-0.02	0.04	-0.09**	-0.09**	-0.02	0.08	-0.03	-0.05	0.05	0.02	0.05	0.11**	0.13
After	**-0.002****	0.057**	0.0001*	0.09**	-0.002	0.02	-0.06**	-0.08**	0.001	-0.03	-0.05**	-0.09**	-0.02	-0.05**	0.12**	0.08**	0.17

Note: RE_2= (Land+Buildings) /Total Assets, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 9: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Excess Return

	Independent Variables			**Period dummy**													
	RE_3	Size	Debt	i=1	i=2												
Overall	**-0.008****	0.079**	-0.004**	-0.21**	-0.28**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				-0.20**	-0.16*	0.30**	0.54**	0.21*	-0.01	-0.17	0.12	0.33**	0.35**	-0.02	-0.30**	-0.16	0.05
Before	0.003	-0.016	-0.005**	0.02	-0.30**	-0.23*	-0.01	0.02	0.29**	0.17	-0.03	-0.11	0.21*	0.07	-0.32**	-0.28*	0.04
IMF	**-0.015****	-0.073**	-0.004**	-0.32	0.22	0.74**	1.03**	0.41**	-0.38	0.64**	0.57**	0.41**	0.39*	0.22	0.56**	0.28	0.12
After	**-0.008****	0.231**	-0.003**	-0.17	-0.16	0.54**	0.79**	0.25	0.07	-0.87**	-0.07	0.66**	0.34	-0.25	-0.82**	-0.29	0.09

Note: RE_3= PPE (Property + Plant + Equipment)/ Total Asset, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 10: Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Excess Return

Industries	Independent Variables			Period dummy		
	RE_3	Size	Debt	i=1	i=2	Adj R^2
Food	0.001	0.15**	-0.014**	-0.72**	-0.27	0.13
Textile Mill	0.006	-0.29**	-0.009**	-0.18	-0.15	0.06
Apparel	-0.008	-0.23*	-0.015**	-0.002	-0.60**	0.16
Paper	**-0.026****	0.19	0.000	0.75**	0.54*	0.10
Chemicals	**-0.015****	0.07**	-0.005**	-0.03	-0.07	0.05
Medical	**-0.021****	0.001	-0.015**	-0.77**	-0.41**	0.13
Glass and Concrete	-0.006	0.11*	-0.008**	-0.01	-0.69**	0.07
Primary Metal	**-0.009***	0.13**	-0.013**	0.25	-0.13	0.07
Electronic Part	-0.003	0.19**	-0.001**	0.47**	0.82**	0.06
Misc. Machinery	0.002	0.24**	-0.005**	-0.01	0.26	0.04
Transportation Equip.	**-0.029****	-0.07	-0.019**	0.08	-0.39**	0.12
Build. and Heavy Con.	-0.008	0.10	-0.005**	-0.36**	-0.92**	0.06
Wholesale and Retail	0.004	0.12**	-0.004**	-0.23*	-0.22	0.06
Business Advisory	0.003	-0.01	-0.014**	-1.04**	-0.67**	0.24

Note: RE_3= PPE (Property + Plant + Equipment)/ Total Asset, Size = log (Total Assets), Debt = Long-Term Debt/Total Assets, Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

and ** both indicate two-tailed significance at the 10 and 5 percent level.

Appendix 11: Two Stage Least Square Regression Results Overall and by Period: Dependent Variable Beta

	Independent Variables			**Period dummy**													
	RE_3	Size	Debt	i=1	i=2												
Overall	-0.002	0.046**	0.0002**	-0.11**	-0.03**												
				Industry dummy													
				j=1	j=2	j=3	j=4	j=5	j=6	j=7	j=8	j=9	j=10	j=11	j=12	j=13	Adj R^2
				0.06**	-0.003	0.02	-0.07**	-0.10**	-0.05**	0.003	-0.03*	-0.07**	0.000	0.001	0.05**	0.07**	0.12
Before	-0.0007	0.014**	-0.0001	0.05*	0.004	0.01	-0.06**	-0.11**	-0.16**	-0.001	-0.005	-0.07**	-0.007	0.03	-0.06**	0.03	0.04
IMF	**0.002***	0.071**	0.0002**	0.09**	0.01	0.05	-0.08**	-0.08*	0.004	0.06	-0.02	-0.02	0.05	0.02	0.06	0.13**	0.13
After	**-0.0007****	0.059**	0.0001*	0.08	-0.02	0.02	-0.07**	-0.10**	-0.01	-0.03	-0.06**	-0.10**	-0.03	-0.05**	0.13**	0.08**	0.16

Note: RE_3= PPE (Property + Plant + Equipment)/ Total Asset, Size=log (Total Assets), Debt = Long-Term Debt/Total Assets,

Before: 1985-1995, IMF: 1996-2000, After: 2001-2007

Industry dummy: 1: Food and Kindred, 2: Textile Mills, 3: Apparel, 4: Paper, 5: Chemicals, 6: Medical Chemicals, 7: Stone, Clay, Glass, and Concrete, 8: Primary Metals, 9: Electronic Parts, Computers and Communications Equipment, 10: Miscellaneous Machinery and Equipment, 11: Transportation Equipment, 12: Buildings and Heavy Construction, 13: Wholesale and Retail trade

* and ** indicate each two-tailed significance at the 10 and 5 percent level.

Appendix 12: Two Stage Least Square Regression Results by Industry Classification: Dependent Variable Beta

Industries	Independent Variables			Period dummy		
	RE_3	Size	Debt	i=1	i=2	Adj R^2
Food	**0.003****	0.035**	0.0003	-0.08**	-0.04	0.07
Textile Mill	**-0.002****	0.06**	0.0008**	-0.12**	-0.06	0.09
Apparel	**-0.003****	0.034	0.0004	-0.25**	-0.05	0.14
Paper	0.002	0.026	0.001	-0.05	0.08	0.06
Chemicals	**-0.001****	0.056**	0.001**	-0.07**	-0.02	0.12
Medical	0.002	0.039**	-0.001**	-0.01	0.01	0.03
Glass and Concrete	-0.001	0.076**	0.001**	-0.11**	0.03	0.19
Primary Metal	0.0002	0.045**	0.001	-0.01	0.04	0.07
Electronic Part	**0.002****	0.047**	0.0002*	-0.28**	-0.13**	0.20
Misc. Machinery	0.001	0.043**	0.0003	-0.14**	-0.04	0.06
Transportation Equip.	**-0.003****	0.047**	-0.0002	-0.10**	-0.03	0.16
Build. and Heavy Con.	0.0001	-0.011	-0.0005*	-0.19**	-0.08**	0.06
Wholesale and Retail	-0.001	0.058**	-0.0000	-0.09**	-0.04	0.08
Business Advisory	-0.0006	0.041**	0.0002	-0.16**	-0.01	0.21

Note: RE_3= PPE (Property + Plant + Equipment)/ Total Asset, Size = log (Total Assets), Debt = Long-Term Debt/Total Assets, Period Dummy 1 for Before IMF bailout, 2 for IMF bailout period

* and ** both indicate two-tailed significance at the 10 and 5 percent level.

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