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Determinants of Corporate Capital Structure in Korea

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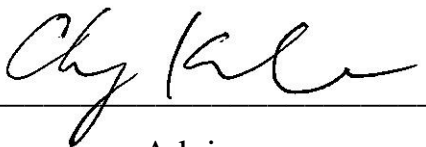
Determinants of Corporate Capital Structure in Korea

A thesis
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Master of Science

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7/15/2015 of submission

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Advisor

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Determinants of Corporate Capital Structure in Korea

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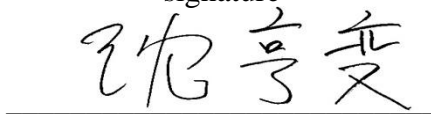
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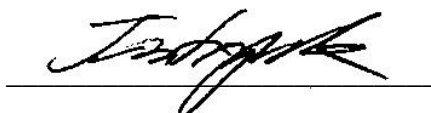
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Abstract

This study empirically analyzed the flows and determinants of the capital structure of Korean listed firms from 1999 to 2013. The results showed that the effect of firm size, growth rate of sales, and profitability on leverage was consistent with that of the studies conducted before the financial crisis of 1997, while the effect of tangible fixed assets and non-debt tax shields on leverage has changed to a significantly positive relationship, contrary to the pre-financial crisis studies. Specifically, firm size and growth rate of sales showed a significantly positive relationship with leverage, while profitability showed a significantly negative relationship with leverage. Tangible fixed assets showed a negative relationship with short-term liabilities and a positive relationship with long-term liabilities. Moreover, depreciation, which represents the size of investment cost along with tangible fixed assets, showed a significantly positive relationship with leverage. Regarding *chaebols* (the major South Korean family-owned business conglomerates), even the 6th–30th largest *chaebol* groups maintained a high level of debt ratio, and the strength of the *chaebol* variable as a determinant of capital structure in Korea has decreased compared to the past.

Furthermore, the study applied the panel data analysis method to Korean public corporations for the period of 2009–2013, and it was found that firm size and profitability had a significant relationship with leverage, while growth rate of sales did not. That is, firm size was significantly positively related with leverage, while profitability was significantly negatively related with debt ratios. In addition, it was found that the 1st–5th largest *chaebols*, the 6th–30th largest *chaebols*, and market-based public corporations have recently decreased short-term debt but increased long-term debt.

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Determinants of Corporate Capital Structure in Korea

1. Introduction

The Korean Government had implicitly allowed *chaebol* groups (the major South Korean family-owned business conglomerates) to use excessive debt until the financial crisis in 1997 from the time it had promulgated the myth of economic success with an industrial policy based on the strong leadership of the Government. A number of studies attributed the crisis partly to the Government's policy of allowing *chaebols* to have high debt ratios (Lee, Lee, & Lee, 2000). Subsequently, the Government introduced and uniformly applied the target debt ratio (200%¹) to Korean firms in order to overcome the crisis after 1997. As a result, Korean firms had to painfully reduce leverage to meet the target debt ratio (김지홍&고윤성, 2006). In previous studies, a few authors suggested that one of the determinants of the capital structure of Korean firms is the Government (Bahng, 2008). However, in response to the Government's strenuous efforts to reduce firms' leverage since the 1997 financial crisis, Korean firms have chosen a strategy of adding more manipulative practices, such as earnings management, rather than reducing their leverage. It is sometimes mentioned that Korea could overcome the global economic crisis of 2007–2008, which started from the US, earlier than advanced Western countries thanks to the efforts of Korean firms.

Earlier studies on the determinants of financial structure initiated in advanced countries have gradually expanded to developing countries (Demirguc-Kunt & Maksimovic, 1994). This suggests that the sign of the coefficient of explanatory variables may change depending on the characteristics of the capital market, macro-economic environment, and time period. In the past, Korea has experienced two large crises: the Asian financial crisis of 1997 and the global economic crisis of 2007–2008. With these crises, it was thought that empirical study would be needed to investigate how the capital structure of Korean firms has changed and how the determinants of capital structure in corporate finance could explain the Korean capital market. Thus, this study empirically analyzed the flows and determinants of Korean listed firms from 1999 to 2013 inclusive. In addition to the determinants of capital structure covered in the existing corporate finance literature, the study analyzed the determinants of capital structure according to different classifications of *chaebols* and the effect of the determinants on the leverage of individual firms by short-term and long-term debts. In addition, the study applied the empirical analysis method used for listed firms to Korean public corporations for the period of 2009–2013 and estimated and interpreted the results. That is, the present study focused on multi-faceted comparison and estimation in relation to the determinants of capital

¹debt-equity ratio

structure, including *chaebols* and non-*chaebols*, listed firms and public corporations, and before and after the economic crisis.

The empirical analysis of this study suggests that the effect of firm size, growth rate,² and profitability on leverage was consistent with those of the studies conducted before the financial crisis of 1997 (Lee et al., 2000). At the same time, the effect of tangible fixed assets and non-debt tax shields on leverage has changed to a significantly positive relationship, contrary to those previous studies. While the 6th–30th largest *chaebol* groups maintained a high level of debt ratio, the 1st–5th largest *chaebol* groups saw their debt ratio and profitability remain unchanged. Thus, the strength of the *chaebol* variable as the determinant of capital structure in Korea has decreased compared to the past. In public corporations, firm size and profitability showed a significant relationship with debt ratio, like listed firms, while growth rate did not show any relationship with debt ratio. In recent years, the short-term debt ratio of *chaebols* and market-driven public corporations has decreased, while their long-term debt ratio has been on the rise again.

The structure of this study is as follows. Chapter 2 describes the flow of the capital structure of Korean listed firms. Chapter 3 investigates the determinants of capital structure, outlines the research methods, and presents the results of an empirical analysis. Chapter 4 compares and discusses the results of the empirical analysis where the determinants of capital structure were applied to public corporations in Korea. Chapter 5 discusses the conclusion and limitations of this study.

2. Capital Structure of Listed Firms

This section describes the trend of debt ratios by year from 1999 to 2013. The debt ratio used here is the debt to total asset ratio. Further analysis was performed by dividing debts into short-term debts and long-term debts depending on the maturity of debts. In addition, each debt ratio was analyzed in detail by large business group (*chaebol*) ranking.³ Based on the result, the study analyzes the determinants before and after the financial crisis of 1997 and the global economic crisis.⁴ It further analyzes the determinants of leverage of public corporations in Korea.

²This is taken as the growth rate of sales in this paper.

³Large business groups (*chaebols*) were categorized into the 1st–5th largest, the 6th–30th largest, and other firms, based on the size of total assets according to the Korea Fair Trade Commission.

⁴The comparison with the time before the financial crisis in 1997 was based on The Determination of Corporate Debt in Korea (Lee, 2000).

2.1 Data Collection⁵

Using data from FnGuide,⁶ a database provided by the Korea Listed Companies Association, this study based its analysis on the financial data of Korean firms listed on the Korea Exchange (KRX) from 1999 to 2013. The study included only non-financial companies among all listed firms and excluded the firms having experienced a rapid change in their financial structure due to M&A or a partial transfer of capital to adjust for outliers.

As for the financial statements of listed companies used in this study, consolidated financial statements were used in a proactive perspective, as the accounting standard of Korea changed to IFRS from 2011.

Data for analysis were in the form of panel data, a combination of yearly cross-sectional data and each 14-year time series dataset. Data from 1999 were included to represent the debt ratio trend or to be used as an indicator of “growth rate,” an independent variable. The final panel data consisted of 1,707 firms and 20,422 observations over 15 years.

2.2 Capital Structure of Listed Firms

The capital structure of a firm is associated with the firm’s financing decisions by which debt capital or equity is determined. This section shows the change in the debt and profitability of the listed firms that comprise the sample. By dividing the debts into short-term and long-term debts depending on the maturity of the debts, each change of the capital structure of the listed firms is shown next in detail. In addition, an interpretation of graphs follows.

Figure 1 shows the comprehensive trends of leverage and return on assets (ROA) for all the listed firms over the 1999–2013 period. The ratio of total debt to total assets dropped from 59.5% in 1999 to 45.5% in 2006 and rose to 48.1% in 2008 (Figure 1.1). Subsequently, the ratio remained between 46.5–47.5%. On the other hand, ROA decreased by year (Figure 1.2). It dropped from 4.3 in 2000 to 1.3 in 2004 and fell from 3.0 in 2005 to -0.5 in 2008. Even though the number rose to 3.1 in 2010, it fell continuously to 0.03 in 2013. These figures indicate the existence of the external shock of the global financial crisis.

⁵Statistical package STATA 13.0 was employed for the analysis of panel data.

⁶The FnGuide provides both consolidated and individual financial statements.

As shown in Figure 2, both short-term and long-term debt ratios began to decline in the early 2000s. The long-term debt ratio presented a universal downward trend from 21.8% in 1999 to 11.5% in 2011 (Figure 2.2). The figure increased slightly to 12.3% by 2013. The short-term debt ratio sharply declined from 35.3% in 2004 to 32.5% in 2006 before the global financial crisis (Figure 2.1). The short-term debt ratio soared to 35.4% in 2008, and the figure of 35.8% in 2011 decreased to 34.2% by 2013, implying that the short-term debt ratio was affected by the financial crisis more than the long-term debt ratio.

Figure 3 shows the total debt ratio for the three groups of firms classified by their affiliation with *chaebols*. Although the figure of the other firms went down to 44.6% in 2006 (Figure 3.3), that of the 6th–30th largest *chaebols* declined to 54.7% in 2007 (Figure 3.2). The ratio of the 1st–5th largest *chaebols* was 51.0% in 2005, the lowest level before the economic crisis (Figure 3.1). Therefore, we can say that the leverage of the 6th–30th largest *chaebols* was higher than that of the 1st–5th largest *chaebols* as well as that of the other firms.

Figure 4 shows the ROA rates of the 1st–5th largest *chaebols*, the 6th–30th largest *chaebols*, and the other firms. Their lowest points in the economic crisis were 3.15 in 2008, 1.73 in 2009, and -0.83 in 2008, respectively. The ROA of the 1st–5th largest *chaebols* went up to 6.55 in 2010 and then declined to 4.28 in 2013 (Figure 4.1). However, the figure of the 6th–30th largest *chaebols* increased to 4.85 in 2010 and dropped to 0.45 in 2013 (Figure 4.2). The figure for the other firms was 2.84 in 2010 and then, unfortunately, dropped rapidly to -0.13 in 2013 (Figure 4.3). In later years, the profits of the 1st–5th largest *chaebols* overwhelmed those of the 6th–30th largest *chaebols* as well as the other firms.

Figure 5 compares the three groups with respect to the short-term debt ratio. The figure of 34.8% in 2005 of the 1st–5th largest *chaebols* went up to 36.9% in 2008 and 36.5% in 2011 but dropped sharply to 33.0% in 2013 (Figure 5.1). The figure of 36.1% in 2007 of the 6th–30th largest *chaebols* went up to 38.1% in 2008 and remained at 37.0% in 2013 (Figure 5.2). In the case of the other firms, the short-term debt ratio was 32.0% in 2006 and went up rapidly to 35.2% in 2008 and 35.7% in 2011. It then dropped to 34.1% in 2013 (Figure 5.3).

Figure 6 shows the differences in the long-term debt ratio between the three groups. First, the long-term debt ratio of the 1st–5th largest *chaebols* declined from 26.8% in 1999 to 15.4% in 2009, but it rose to 19.2% in 2013 (Figure 6.1). In the case of the 6th–30th largest *chaebols*, the ratio went down from 22.1% to 16.4% in 2005 but rose to 19.8% in 2009 and then fell slightly to 19.5% in 2013 (Figure 6.2). Unlike the 1st–30th largest *chaebols*, the long-term debt ratio of the other firms dropped

21.5% in 1999 to 10.9% in 2011 despite the global financial crisis, reaching 11.5% in 2013 (Figure 6.3).

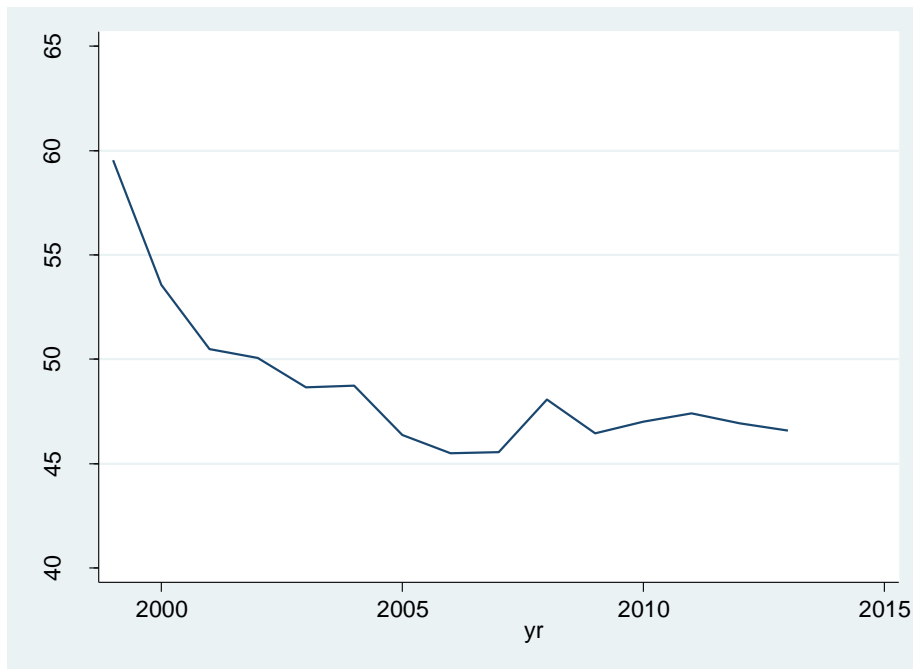
The summary is as follows. First, the debt ratio of listed companies has generally decreased since the 1997 financial crisis, regardless of *chaebols* and the maturity of debts. However, the debt ratio increased due to the global economic crisis in 2007–2008 and then decreased once again. Second, short-term debt ratios were more affected by the economic crisis. This indicates that companies responded to the crisis by temporarily increasing short-term debt ratios. Since the financial crisis in the late 1990s, companies have been forced to maintain the target debt ratio of 200%, which allowed companies to defend themselves effectively from external shocks by adjusting their short-term debt ratios during the global economic crisis. Third, the debt ratio of the 6th–30th largest *chaebols* was at a higher level than those of the 1st–5th largest *chaebols* and other firms, and these *chaebols* were consistent with those that led the increase of debt ratios before the 1997 financial crisis. This seems to be because the fact that the 6th–30th largest *chaebols* have the highest leverage of the three groups is attributable to firm size, among other determinants of capital structure. On the other hand, the lower leverage of the 1st–5th largest *chaebols* can be explained by the fact that they do not have to rely on external financing thanks to high profitability. This is consistent with pecking order theory. Fourth, there is a significant disparity in profitability between the 1st–5th largest *chaebol* firms and the other firms. In recent years, the profitability of the 1st–5th largest *chaebols* remained unchanged, while that of other firms, including the 6th–30th largest *chaebols*, significantly decreased. Finally, the short-term debt ratio of both *chaebol* groups greatly decreased, while their long-term debt ratio substantially increased again.

Figure 1

Leverage and ROA (Listed Firms)

These figures are the comprehensive trends of leverage and ROA for all the listed firms over the 1999–2013 period.

1.1 Leverage (Total debt/Total assets)



1.2 ROA

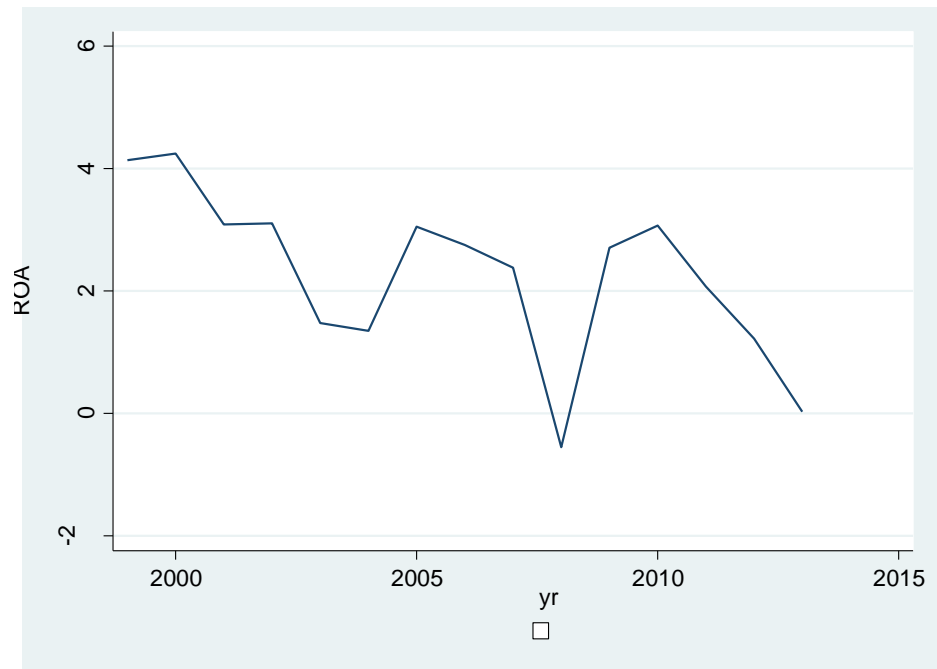
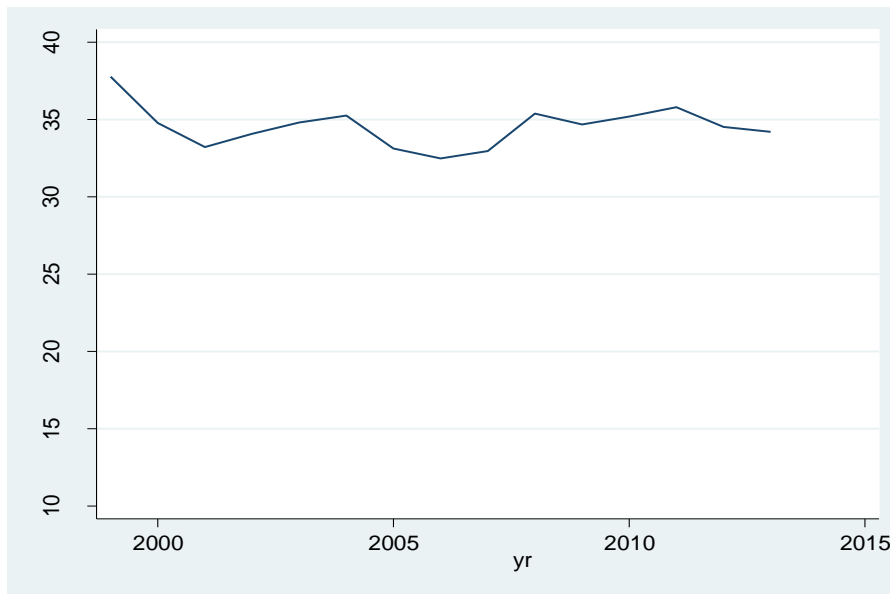


Figure 2

Short-term and Long-term Leverage

These figures show the short-term and long-term leverage for all the listed firms over the 1999–2013 period. The Y-axis values are adjusted for comparison between the graphs

2.1 Short-term debt/Total assets



2.2 Long-term debt/Total assets

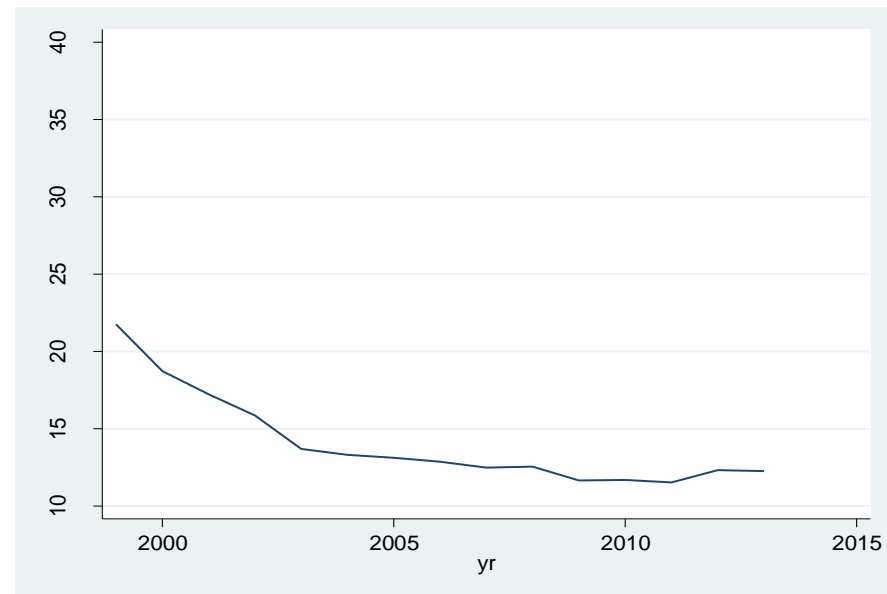


Figure 3

Leverage by Group

These figures show the total debt ratio for the three groups of firms classified by their affiliation with *chaebols*.

3.1 Total debt/Total assets of top 5 *chaebols*

3.2 Total debt/Total assets of top 6–30 *chaebols*

3.3 Total debt/Total assets of other firms

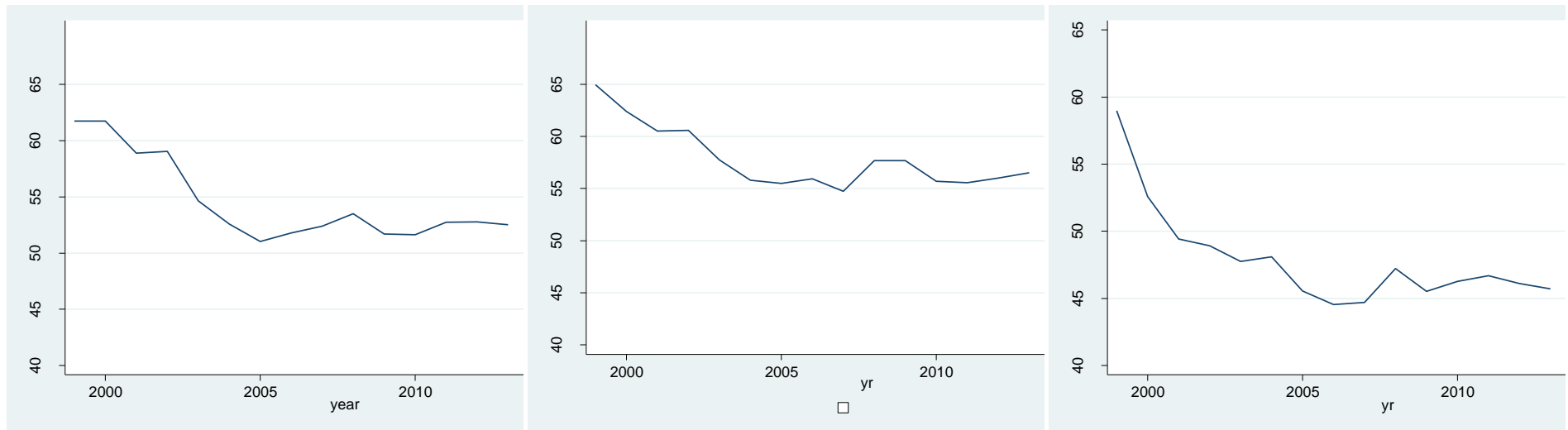


Figure 4

ROA by Group

These figures show the ROA rates of the 1st–5th largest *chaebols*, 6th–30th largest *chaebols*, and other firms.

4.1 ROA of top 5 *chaebols*

4.2 ROA of top 6–30 *chaebols*

4.3 ROA of other firms



Figure 5

Short-term Leverage by Group

These figures compare the three groups with respect to the short-term debt ratio.

5.1 Top 5 chaebols

5.2 Top 6–30 chaebols

5.3 Other firms

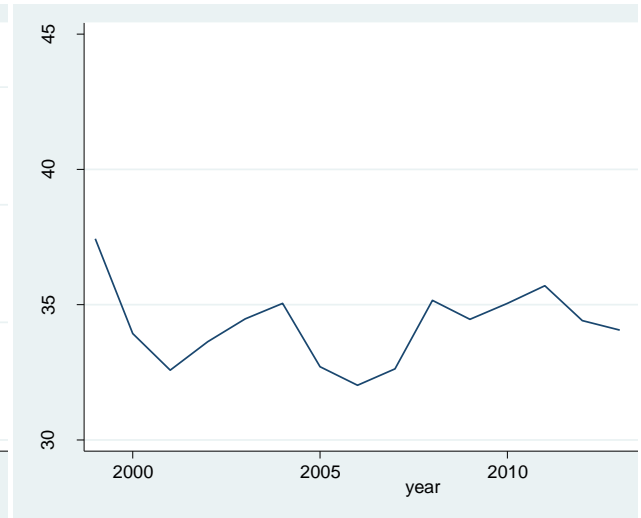
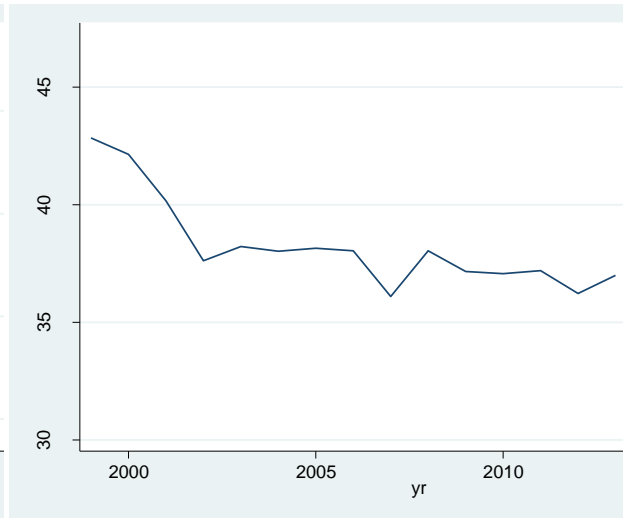
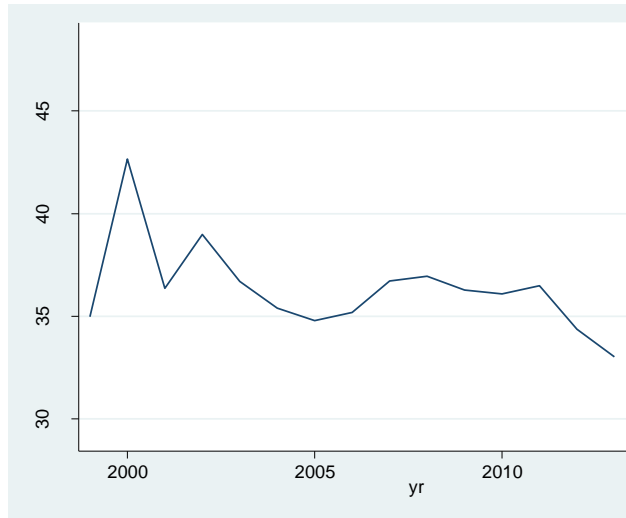


Figure 6

Long-term Leverage by Group

These figures show the differences in long-term debt ratio between the three groups.

6.1 Long-term leverage of top 5 *chaebols*

6.2 Long-term leverage of top 6–30 *chaebols*

6.3 Long-term leverage of other firms



3. Determinants of Corporate Capital Structure in Korea

In the previous section, we reviewed the trends of debt ratio and profitability from 1999 to 2013 using graphs. It was shown that debt ratios varied by period, debt maturity, and *chaebol* group. In this section, the determinants of the capital structure of Korean firms will be explored. As before, an empirical analysis will be performed using short-term and long-term debt ratios by period, maturity, and *chaebol* group.

3.1 Determinants of Capital Structure Choices

The modern theory of capital structure in corporate finance started with a joke-like idea: “The number and shape of the pieces don’t affect the size of the pizza”⁷(Modigliani & Miller, 1958). This idea brought attention to the existence of market incompleteness in the real world caused by factors such as tax, agency cost, and financial distress. Scholars have come to think that each firm can have a different optimal capital structure to maximize firm value. In the meantime, a theory has emerged, claiming that leverage can give a certain signal to investors due to information asymmetry (Ross, 1977). This idea has extended and evolved into pecking order theory, which posits that management tends to prefer internal funds and use new shares as a last resort when raising capital (Myers, 1984). Based on the preceding theories, the study of the determinants of corporate capital structure has emerged as a new field in corporate finance.

The representative determinants of debt ratio include firm size, profitability, tangible asset ratio, non-debt tax shields, and uniqueness, most of which are included in the study as explanatory variables.

3.1.1 Firm size

Compared to small firms, large firms engage themselves in various businesses and, thus, have less volatility in cash flow and lower default risk (Titman & Wessels, 1988). The biggest concern of financial institutions about firms is bankruptcy costs related to default risk. Consequently, financial institutions have a more favorable attitude toward large firms, because the bigger a firm is, the lower its bankruptcy cost (Ferri & Jones, 1979). In addition, the monitoring cost for management is lower in large firms, because more information is exposed to the outside in large firms. That is, large firms are much freer from moral hazard and adverse selection (Chittenden, Hall, & Hutchinson, 1996). For these reasons, the debt ratio of large firms can increase relatively safely.

⁷MM proposition 1: “The value of a firm should be unaffected by its capital structure in perfect capital markets.”

3.1.2 Growth rate

Many previous studies on the determinants of capital structure have stated that growth rate and leverage have a negative or insignificant relationship (Demirguc-Kunt & Maksimovic, 1994). This is due to agency costs; that is, firms with diverse growth potential give up their investment alternatives, because their profits are transferred to creditors, although the NPV is greater than 0 (Myers, 1977). This implies that shareholders would reduce leverage to avoid agency costs. In Korea, on the contrary, a positive relationship was found between growth rate and leverage. Scholars attributed this empirical finding to the fact that Korean firms preferred raising funds through debts to the capital market, because the stock market in Korea has not been fully developed (Lee et al., 2000). Firms with high growth rates are in greater need of short-term financing. If growth rate has a significant effect on leverage, it is thought to have a higher effect on short-term debt ratios than on long-term debt ratios.

3.1.3 Profitability

The findings of empirical studies on the determinants of capital structure are consistent in explaining profitability (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001). Pecking order theory implies that the debt ratio of firms with a large amount of internal funds would decrease, because they have less motivation to depend on external financing, such as debt or paid-in capital (Myers, 1977). That is, the more internal funds a firm has, the lower its debt ratio would be.

3.1.4 Asset structure

In general, tangible fixed assets have collateral value. By establishing collateral, a secured debt can be issued so that the ability to confiscate the property of a debtor can be limited (Scott, 1977). The increase of tangible fixed assets with high collateral value can be achieved by debts; thus, firms with more tangible fixed assets are capable of increasing their debt ratios. This can also be explained by information asymmetry. Firms with more tangible fixed assets can give a signal that they have high collateral value to external creditors, such as banks, and can raise debts easily. On the other hand, firms with low collateral value of assets may increase their debt ratios to reduce perquisite consumption of their employees (Grossman & Hart, 1982). The findings of the present study indicate that the relationship between tangible fixed assets and debt ratios has changed from negative to positive since the 1997 financial crisis.

3.1.5 Non-debt tax shields

The existence of a non-debt tax shield, such as depreciation and tax credit for investment, can substitute for a tax-saving effect of interest cost (DeAngelo & Masulis, 1980). A Korean study

empirically demonstrated the substitution effect of the non-debt tax shield (신승묘, 1999). Thus, firms with a high non-debt tax shield want to reduce the use of leverage. However, this is applicable only when tangible fixed assets are in a constant condition. Some argue that the increase of both non-debt tax shields and debt ratio can be simultaneously observed, because the increase of tangible fixed assets, which can be collateral, increases non-debt tax shielding, such as by depreciation (신동령, 1991).

3.1.6 Industry classification

One study reported that the debt ratio of the equipment industries, such as shipbuilding and aviation, is relatively high regardless of country (위정범, 1998). Therefore, it can be inferred that the heavy industries have debt ratios that differ from those of the food or food production industries. On the contrary, the debt ratio of industries that manufacture products requiring specialized services or parts would be relatively low, because the industries are sensitive to the management of the debt ratio due to the high bankruptcy costs from the increased risk of default (Titman, 1984). The study included a dummy variable to account for the industry effect. That is, the study classified all listed firms into 30 items according to the KSIC code:⁸ It first classified the firms into 12 sections, including the manufacturing industry, and then classified the manufacturing industry further into 19 sections.

3.1.7 Chaebol affiliation

Some researchers have argued that one of the causes of the 1997 financial crisis was the fact that *chaebol* firms took a leading role in high debt ratios. Moreover, one study showed that the debt ratio of the 6th–30th largest *chaebols* had increased considerably (Lee et al., 2000). In order to examine how *chaebols* affected the debt ratio 15 years after the beginning of the 21st century, the present study set the dummy variables for the 1st–5th largest *chaebols*, the 6th–30th largest *chaebols*, and other firms.

3.2 Empirical Methods

This section describes the equations and variables used in the empirical analysis of this study. The study explored the difference between short-term debt ratios and long-term debt ratios by maturity and

⁸ See appendix.

used equations to investigate the effect of group characteristics, such as *chaebol* affiliation or industrial classification, on the entire, short-term, and long-term debt ratios.

The panel data analysis proceeded based on the following equation:

$$y_{it} = \alpha + \sum_{k=1}^k \beta_k x_{kit} + \gamma \omega_t + \mu_t + \varepsilon_{it} \quad (1)$$

where y_{it} is the dependent variable pooling N cross-sectional observations and T time-series observations, and x_{kit} is the independent variable pooling N cross-sectional observations and T time-series observations. ω_t indicates the observable independent variable pooling T time-series observations, which varies over time. μ_t is unobserved time heterogeneity, which also varies over time and is constant within groups. α is a constant number, and ε_{it} is random error with mean 0 and variance σ^2 .

Panel data deals with the cross-sectional and time-series characteristics of the sample at the same time. The data for this study were constructed from the raw data in the FnGuide database. With the panel dataset, Eq. (1) may be estimated by means of ordinary least squares techniques. When considering macroeconomic events, such as the Asian crisis in 1997 and the global financial crisis in 2008, the cross-sectional data are expected to be equally affected by the time variable. The error term is assumed to follow a normal distribution. If error includes a constant term, the model should be described separately, as in Eq. (1). If error varies over time, a time-specific fixed-effect model⁹ would be more appropriate, which was considered in the equation. The results with removal of the time-specific fixed effect are also added in the next empirical results. On the other hand, the group-specific fixed effect is reflected in the industry dummy variable in the present paper.

Accordingly, the empirical model in the present study is as follows:

$$\begin{aligned} \text{Leverage} = & \alpha + \beta_1 \text{Log}_{\text{sales}} + \beta_2 \text{Growth} + \beta_3 \text{ROA} + \beta_4 \text{Tangratio} + \beta_5 \text{Depratio} + \beta_6 \text{Chaebol}_1 \\ & + \beta_7 \text{Chaebol}_2 + \beta_8 \text{Industry} + \beta_9 \text{Year} + \varepsilon. \end{aligned} \quad (2)$$

Three different leverages defined as dependent variables are as follows:

Leverage (%): Total debt/Total assets*100

Short-term leverage (%): Short-term debt/Total assets*100

Long-term leverage (%): Long-term debt/Total assets*100

⁹ F-value in the results converges to zero, which means the panel dataset supports the fixed-effect model.

The determinants defined as explanatory variables are as follows:

Log_sales (size): Natural logarithm of sales (unit: thousand Korean won)

Growth (%): Growth rate of sales*100

ROA: Net income/Total assets

Tangratio (%): Tangible fixed assets/Total assets*100

Depratio (%): Depreciation/Total assets*100

Chaebol_1: 1 for the 1st–5th largest *chaebols*, 0 otherwise

Chaebol_2: 1 for the 6th–30th largest *chaebols*, 0 otherwise

Industry: 30 industry dummy variables

Year: 15 year dummy variables

The panel dataset in this paper includes 20,422 firms for the period from 2000 to 2013. The descriptive statistics of means and variances for the variables are presented in Table 1.

Table 1 Summary of Descriptive Statistics (Listed Firms)

Variables	2000–2013		2000–2007		2008–2013	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Total debt/Total assets(*100)	48.28	25.65	49.27	27.02	47.07	23.80
Short-term debt/Total assets(*100)	34.50	20.31	34.12	20.63	34.98	19.88
Long-term debt/Total assets(*100)	13.68	15.22	15.05	17.48	12.00	11.66
Firm Size (Log of sales)	18.29	1.718	18.04	1.681	18.60	1.713
Growth (Rate of sales*100)	19.77	61.08	21.65	62.64	17.75	59.29
ROA (Return of Assets)	2.164	21.35	2.760	23.41	1.432	18.48
Tangible fixed assets /Total assets(*100)	32.77	19.32	33.52	19.61	31.85	18.92
Depreciation/Total assets(*100)	13.19	371.6	12.46	262.8	14.08	472.1

Considering the other variables except for the leverage and ROA, which was already explained in the earlier section, some trends of the variables can be seen. Firm size (Log of sales) increased overall from 18.04 in 2000–2007 to 18.60 in 2008–2013. On the other hand, growth (Rate of sales) decreased from 21.65 in 2000–2007 to 17.75 in 2008–2013. In addition, the tangible fixed asset ratio decreased from 33.52 in 2000–2007 to 31.85 in 2008–2013, while the depreciation ratio increased from 12.46 in 2000–2007 to 14.08 in 2008–2013.

3.3 Empirical Results

The study found the determinants of the debt structure of listed firms, and the effect of the

determinants on short-term and long-term debts by maturity will be explained later in this paper. The total period was 14 years, from 2000 to 2013 inclusive, and it was further divided into two sub-periods: the period from 2000 to 2007, which was before the global economic crisis, and the period from 2008 to 2013,¹⁰ which was after the crisis. In addition, the way in which the determinants of capital structure vary by *chaebol* will be explained as well.

3.3.1 Leverage

Table 2 shows the empirical results of the analysis of each panel dataset. Regarding the relationship of leverage with firm size, from 2000 to 2013, firm size represented by sales shows a significantly positive coefficient with leverage at the confidence level of 1%. This supports the argument that larger firms can increase their debt ratios, because they can reduce the risk of bankruptcy costs from default, as they have diversified management and can have friendly relationships with financial institutions. This is consistent with the results from the two periods (i.e., 2000–2007 and 2008–2013). Growth rate was found to have a significantly positive relationship with leverage in all periods, despite the following few hypotheses. Firms with high growth rates are in greater need of financing in the short-term. According to pecking order theory, there can be a positive relationship between growth rate and leverage, because firms with less internal funds try to raise capital by increasing debt rather than issuing shares, which generates friction costs. For firms with large internal funds, however, it is difficult to predict the correlation between growth rate and leverage. Therefore, firms with great growth potential without sufficient internal funds prefer debts to paid-in capital increases.

Profitability showed a significantly negative relationship in all periods at the 1% confidence level. This indicates that firms prefer internal funding to external financing when raising funds. This pecking order theory was empirically observed in previous studies in a consistent manner.

The present study showed that tangible fixed assets have a significantly positive relationship with debt ratios. This is contrary to the results of a study investigating the period before the economic crisis in the 1990s (Lee et al., 2000). This indicates that the collateral value of tangible fixed assets has been a significant variable in increasing debt ratios since the financial crisis in 1997. If firms with higher collateral value of tangible fixed assets can receive more loans from financial institutions, there should be difference between short-term and long-term debts, with higher association with long-term debts. This will be further discussed in the next chapter.

¹⁰ The later period, from 2008 to 2013, is compared with a Government corporation in the next section.

Table 2 Empirical Results for Total Debt Ratio (Listed Firms)

Variables	2000–2013		2000–2007		2008–2013	
	(1)	(2)	(1)	(2)	(1)	(2)
Log_sales	2.267*** (0.114)	2.509*** (0.116)	2.639*** (0.170)	2.806*** (0.170)	2.152*** (0.159)	2.170*** (0.159)
Growth	0.0318*** (0.00257)	0.0293*** (0.00257)	0.0324*** (0.00359)	0.0297*** (0.00358)	0.0310*** (0.00367)	0.0302*** (0.00371)
ROA	-0.452*** (0.00723)	-0.455*** (0.00722)	-0.481*** (0.00918)	-0.483*** (0.00913)	-0.404*** (0.0120)	-0.405*** (0.0120)
Tangratio	0.222*** (0.00911)	0.211*** (0.00910)	0.214*** (0.0130)	0.200*** (0.0130)	0.219*** (0.0128)	0.220*** (0.0128)
Depratio	0.000885** (0.000401)	0.000858** (0.000400)	0.000423 (0.000789)	0.000359 (0.000784)	0.00101** (0.000456)	0.000987** (0.000456)
<i>Chaebol_1</i> (Top 1–5)	-1.313 (1.016)	-2.166** (1.015)	-2.045 (1.442)	-2.597* (1.433)	-1.490 (1.432)	-1.562 (1.434)
<i>Chaebol_2</i> (Top 6–30)	3.996*** (0.690)	3.417*** (0.689)	3.533*** (0.966)	3.146*** (0.961)	3.923*** (0.987)	3.884*** (0.988)
Constant	-6.181** (2.919)	-3.071 (2.988)	-8.462** (4.124)	-4.930 (4.149)	-9.491** (4.217)	-9.535** (4.235)
Observations	20,422	20,422	10,571	10,571	9,851	9,851
R-squared (adjusted)	0.235	0.242	0.274	0.283	0.191	0.192
Industry dummy	YES	YES	YES	YES	YES	YES
Year dummy	NO	YES	NO	YES	NO	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

It was estimated that the relationship between the ratio of depreciation and leverage was negative because of the substitution effect of the debt tax shield. However, the empirical analysis showed a significantly positive relationship between the two from 2000 to 2013. When an analysis was performed by dividing the entire period into two sub-periods, there was a positive relationship in both periods, with the period of 2008–2013 showing a more significant outcome at the confidence level of 5%. Previous studies suggested that non-debt tax shields and leverage can have a positive relationship, because investment costs, such as the depreciation of tangible assets, have a positive relationship with tangible fixed assets (신동령, 1991). This supports the results of this study showing that non-debt tax shields, along with tangible assets, had a positive relationship during the study period.

The finding of this study, which investigated the effect of *chaebols* on debt ratios, weakens the assertion that firms belonging to the 1st–5th largest *chaebols* increase debt ratios (Lee et al., 2000). Contrarily, the fact that the 1st–5th largest *chaebols* decreased their debt ratios from 2000 to 2013 was significant. Meanwhile, the 6th–30th largest *chaebols* had a significantly positive relationship with debt ratios in all periods at the confidence level of 1%. This is partly consistent with the finding that the debt ratio of the 6th–30th largest *chaebols* increased before the financial crisis in 1997.

3.3.2 Short-term and long-term leverages

Table 3 illustrates the effects of each variable on short-term and long-term leverages. First, there was a significantly positive relationship between firm size and short-term and long-term leverages. One notable thing here is that short-term debts have a higher positive value. However, the coefficient has decreased since the global financial crisis. Regarding the relationship between growth rate and short-term and long-term debt ratios, there was a period when no significant relationship was found with long-term debts but in which the relationship with short-term debts was more significant. This partly supports the theory that firms with high growth rates increase short-term debt ratios to reduce agency costs but that such firms are in greater need of short-term financing and prefer debt issuance to paid-in capital increases when they lack internal funds. With regard to the relationship between profitability and short-term debt ratios, the value of ROA showed a significantly negative relationship with debt ratios at the confidence level of 1%, regardless of debt maturities, as firms with high profitability prefer internal funds to debt issuance.

Regarding the association between tangible fixed assets and short-term and long-term liabilities, tangible fixed assets had a significantly positive relationship with long-term liabilities at the 1% level, while there were some periods in which tangible fixed assets had either a significantly negative or an insignificant relationship with short-term liabilities. This obviously shows that a large part of tangible

fixed assets had a positive relationship with long-term liabilities. This supports the idea that tangible fixed assets have a positive relationship with long-term liabilities, not short-term liabilities, because the former act as collateral. This also means that firms with higher collateral value of tangible fixed assets can get more long-term debts issued from financial institutions.

As for the reason that the relationship has changed from negative to positive since the Asian crisis in 1997, it is thought to be related to the attitude of financial institutions toward firms in the long-term financial market. When financial institutions have a favorable attitude toward firms, they buy long-term debts, even if their collateral value decreases. However, when they are not favorable, they do not buy long-term debts, inevitably making firms reduce the ratio of long-term liabilities. However, there was an empirical result showing a negative relationship between tangible fixed assets and debt ratios in the 1st–5th largest *chaebols* from 2000 to 2013 in the present research. This can be explained by the fact that even if the collateral value of the 1st–5th largest *chaebols* decreases, creditors, including National Pension and financial institutions, buy long-term debts. This is because they are conscious of the brand value of the *chaebols*, and as a result, the long-term liabilities of the *chaebols* increase, even though the ratio of their tangible assets decreases. Since short-term liabilities are not associated with the value of collateral, tangible fixed assets do not affect short-term liabilities. The increased assets of firms can be explained by the increase in internal funds, liabilities, or paid-in capital. The increase of tangible fixed assets is related to investment costs, such as depreciation, and indicates increased loans or more paid-in capital increases in the capital market. In the past, firms were better off increasing liabilities than relying on the stock market, where friction costs are incurred, because they preferred long-term debts as a financial practice rather than raising funds by paid-in capital increases. Although the ratio of tangible fixed assets decreases due to the increase of the current asset ratio, such as financial assets, long-term liabilities have rather increased due to the favorable relationship with financial institutions, which seems to explain the past negative relationship in Korean firms. However, the uniform target debt ratio of 200% was implemented after the financial crisis in 1997, which indicates that the relationship with financial institutions was not as favorable as it was before in terms of borrowing funds, and thus, firms have to inevitably reduce long-term liabilities, unlike in the past. Consequently, the effect of the collateral value of tangible assets on long-term liabilities became more significant, resulting in the positive relationship between tangible fixed assets and debt ratios.

Depreciation, an example of a non-debt tax shield, showed a significantly positive relationship only when conducted by whole periods from 2000 to 2013, and it did not provide meaningful support when it was analyzed by short-term and long-term liabilities. It was however found that its relationship with short-term liabilities was more significant than its relationship with long-term liabilities.

For the short-term and long-term liabilities by *chaebol*, the decrease of short-term liabilities in the 1st–5th *chaebols* was significant, while the increase of long-term liabilities was significant. In particular, for the period of 2008–2013, the short-term liabilities of the 1st–5th largest *chaebols*, as well as the 6th–30th largest *chaebols* decreased while the long-term liabilities increased. This is also illustrated in Figures 5.1 and 6.

3.4. Comparison with Period before Economic Crisis

In summary, the pattern of the determinants of capital structure in Korea has changed over the two economic crises. Since the Asian financial crisis, the relationship between tangible fixed assets and debt ratios has changed to a significantly positive one, which was explained by the unfavorable relationship with financial institutions due to the Government's policy to reduce liabilities in this study. This indicates that the role of tangible fixed assets as collateral became important in the 2000s. The capital structure of *chaebols* has also changed. The amounts of debt of the 1st–5th largest *chaebols* and the 5th–30th largest *chaebols* were not significantly different before the Asian financial crisis in 1997, but this changed considerably in the 2000s. In particular, the difference in the effects of profitability on leverage became obvious before and after the Asian financial crisis. The relationship between depreciation as a non-debt tax shield and debt ratios has proved a positive one since the global economic crisis; thus, the fact that the relationship between tangible fixed assets and debt ratios has changed to a positive one since the 1997 Asian crisis is also thought to be related to its significantly positive relationship with non-debt tax shields.

Table 3 Empirical Results for Short-term and Long-term Debt ratio

(Listed Firms)

Variables	Short-term Debt/Total Assets			Long-term Debt/Total Assets		
	2000–2013	2000–2007	2008–2013	2000–2013	2000–2007	2008–2013
Log_sales	2.041*** (0.0962)	2.197*** (0.136)	1.909*** (0.137)	0.304*** (0.0689)	0.390*** (0.113)	0.145* (0.0784)
Growth	0.0237*** (0.00213)	0.0258*** (0.00287)	0.0220*** (0.00318)	0.00551*** (0.00152)	0.00341 (0.00238)	0.00845*** (0.00182)
ROA	-0.354*** (0.00598)	-0.368*** (0.00731)	-0.330*** (0.0103)	-0.0990*** (0.00428)	-0.112*** (0.00607)	-0.0731*** (0.00590)
Tangratio	-0.0168** (0.00754)	-0.0499*** (0.0104)	0.0166 (0.0110)	0.238*** (0.00539)	0.262*** (0.00862)	0.210*** (0.00630)
Depratio	0.000724** (0.000331)	0.00100 (0.000627)	0.000603 (0.000392)	0.000142 (0.000237)	-0.000677 (0.000521)	0.000410* (0.000224)
<i>Chaebol_1</i> (Top 1–5)	-4.176*** (0.841)	-2.811** (1.147)	-5.610*** (1.231)	2.558*** (0.602)	0.857 (0.953)	4.502*** (0.705)
<i>Chaebol_2</i> (Top 6–30)	-0.631 (0.571)	0.855 (0.769)	-2.294*** (0.848)	3.887*** (0.409)	1.904*** (0.639)	6.290*** (0.486)
Constant	-7.449*** (2.474)	-5.816* (3.321)	-12.00*** (3.638)	6.973*** (1.771)	4.349 (2.758)	4.281** (2.082)
Observations	20,422	10,571	9,851	20,422	10,571	9,851
R-squared (adjusted)	0.191	0.236	0.145	0.168	0.157	0.185
Industry dummy	YES	YES	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4. Application to the Government Corporation

Following a similar methodology to that used to analyze the determinants of the capital structure of listed firms, panel data analysis was performed on public corporations. This analysis was attempted under the assumption that a meaningful outcome can also be drawn in public corporations, like the analysis of the determinants of leverage in listed firms. Unlike the data of listed firms, which were unbalanced panel data, the data of public corporations were strongly balanced. This seems to be due to the fact that public corporations are required to announce uniform financial statements on their websites every year. Data were collected from the website of Alio¹¹(www.alio.go.kr) for five years from 2009 to 2013 inclusive. Public corporations were categorized into five groups by nature, and those with rapid change in financial structure were excluded from the sample to adjust for outliers. The final panel data consisted of 1,096 observations from 293 corporations.

Table 4 Summary of Descriptive Statistics (Government Corporation)

Period	2009–2013	
	Mean	Standard Deviation
Total debt/Total assets (*100)	50.29	32.65
Short-term debt/Total assets (*100)	27.52	23.69
Long-term debt/Total assets (*100)	24.70	27.16
Growth (Rate of sales*100)	16.75	65.78
Corporation Size (Log_sales)	11.26	1.977
ROA (Return of Assets)	2.779	12.17

¹¹Alio data is issued by the Ministry of Strategy and Finance in the Republic of Korea.

Based on the results in Table 4, a comparison was made with the results of the data analysis of listed firms (2008–2013) in Table 1. It was thought that the comparison, not through more specific data, would be helpful to analyze and understand the general pattern of public corporations. The mean total debt ratio was 50.29, and its standard deviation was 32.65, higher than those of listed firms with more variation by corporation. This indicates that public corporations use more debts than listed firms with more variation by corporation. The mean short-term debt was 27.52, lower than that of listed firms, 34.98, while the mean long-term debt was 24.70, higher than that of listed firms, 12.00. The fact that the long-term debt of public corporations was much higher implies they may have a stable cash flow¹² and creditors have more confident and favorable attitudes toward buying long-term debts from them compared to listed firms. The growth rate (16.75) and firm size (11.26) were lower than those of listed firms (17.75, 18.6) with more deviation. In contrast, the ROA of public corporations was 2.78, higher than that of listed firms (1.43) with less deviation. This indicates that while the sales growth or firm size of public corporations was smaller than that of the average of listed firms, their profitability was higher than that of listed firms.

With regard to the determinants of leverage, as seen in the descriptive statistics above, it was predicted that public corporations would show different results from listed firms. As shown in Table 5, firm size and debt ratio had a significantly positive relationship, like listed firms. This indicates that the debt ratio of public corporations with larger sales was higher. Unlike listed firms, public corporations received higher credit ratings, as they were established for the purpose of the Government. Thus, it was considered that they were less affected by default risk or bankruptcy costs. Nevertheless, the fact that their debt ratio was higher indicates that creditors, especially financial institutions, offer more loans to larger corporations. In addition, monitoring costs for the management of large corporations decrease as more information is exposed to the outside. Next, the profitability index showed a significantly negative relationship with leverage. In principle, this also indicates that the profitability of public corporations is involved in decision making related to liabilities. That is, corporations with high profitability have a lower debt level. This implies that pecking order theory, where firms with high profitability prefer internal funds to external financing, can be applied to corporations with high profitability. This in particular indicates that the effect of decreasing leverage on long-term liabilities was much larger than it was on short-term liabilities. Although the long-term debt ratio of public corporations was higher than that of listed firms, corporations with high profitability had lower long-term debt ratios. Thus, it can be understood that solving the long-term debt issue of public corporations requires the public corporations to increase their profitability. However, growth rate did not show a significant relationship with leverage. This indicates that the

¹² Regarding cash flow as a determinant, further research would be needed.

higher growth rate of public corporations does not necessarily mean that they use more short-term or long-term liabilities. That is, the decision of public corporations to use debts has nothing to do with the growth rate of the corporations. This can be interpreted in two ways. First, public corporations are established with their own purposes and do not intend to engage in unreasonable investments despite high growth potentials. Second, as with the interpretation of pecking order theory, although corporations with high growth rates need short-term funds, they do not have to rely on debts, because they have internal funds.

Concerning the group variable, the short-term debt ratio of market-based public corporations (Group 1) significantly decreased for the period of 2009–2013 at the 1% level, while the long-term debt ratio significantly increased at the 5% level. This is consistent with the finding for the firms belonging to *chaebol* groups listed on the Korean market from 2008 to 2013. It was found that market-based public corporations have made decisions similar to those of *chaebol* groups in relation to short-term and long-term liabilities since the global economic crisis. In addition, fund-management-based (Group 3) or commissioned-service-based (Group 4) public corporations, not market-based or quasi-market-based (Group 2) public corporations, had a tendency of higher leverage, especially with long-term liabilities. In other words, agencies without marketability had higher debt ratios, especially long-term liabilities, than agencies with marketability. With the rationale used to describe the determinants of the long-term debt ratios of listed firms, the difference between listed firms and public corporations can be interpreted as indicating that public corporations are in close and favorable relationships with Government or financial institutions. This shows that public corporations' more favorable relationships with the Government compared to listed firms increase long-term debt ratios, as if the relationships have collateral value. In listed firms, there could be a positive relationship between tangible fixed assets and long-term debt ratios, because the role of tangible fixed assets as collateral became important. This raises the possibility that the relationship between public corporations and the Government also explains the high debt ratios of public corporations, such as the tangible fixed assets of listed firms.

Table 5 Empirical Results for Leverage (Government Corporation)

VARIABLES	Total debt/Total assets		Short-term debt/ Total assets		Long-term debt/ Total assets	
	(1)	(2)	(1)	(2)	(1)	(2)
Log_sales	3.050*** (0.593)	3.046*** (0.594)	1.017** (0.443)	1.016** (0.443)	1.457*** (0.534)	1.453*** (0.535)
ROA	-0.463*** (0.0868)	-0.465*** (0.0870)	-0.143** (0.0656)	-0.143** (0.0658)	-0.344*** (0.0811)	-0.347*** (0.0814)
Growth	0.0108 (0.0149)	0.0113 (0.0150)	0.00453 (0.0111)	0.00442 (0.0111)	0.00667 (0.0132)	0.00742 (0.0132)
Group_1	-8.740* (5.005)	-8.711* (5.011)	-18.32*** (3.728)	-18.32*** (3.734)	10.50** (4.283)	10.51** (4.286)
Group_2	1.837 (4.421)	1.859 (4.426)	-1.608 (3.293)	-1.611 (3.297)	3.331 (3.754)	3.341 (3.757)
Group_3	25.52*** (5.612)	25.55*** (5.618)	0.518 (4.180)	0.520 (4.186)	28.03*** (4.868)	28.08*** (4.872)
Group_4	11.15*** (2.352)	11.15*** (2.354)	2.666 (1.752)	2.666 (1.755)	9.233*** (2.065)	9.225*** (2.066)
Constant	13.25** (6.445)	13.92** (6.642)	16.26*** (4.815)	15.97*** (4.972)	4.738 (5.851)	5.757 (6.040)
Observations	1,053	1,053	1,050	1,050	976	976
R-squared (adjusted)	0.105	0.103	0.029	0.026	0.094	0.093
Year dummy	NO	YES	NO	YES	NO	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

Various attempts have been made in Korea to analyze the determinants of corporate leverage, which started in countries with developed capital markets. Studies have also analyzed the level of corporate leverage among countries with less developed capital markets, attempted to explain it with the assumption of non-linear relationships, or added new explanatory variables. The implications of this study are two-fold. First, it analyzed and described the status and determinants of the capital structure of Korean firms before and after both the Asian financial crisis and the global economic crisis. Second, it additionally analyzed the determinants of the capital structure of public corporations in Korea. However, the financial statements provided by public corporations were limited, making a systematic panel analysis difficult. For example, only unaccumulated five-year data were available, and to make it worse, independent variables were limited in number, because financial statement items were not specific, which inevitably led to the lower R^2 . In addition, this type of study has been conducted by state agencies, such as the Korea Institute of Public Finance, with regard to the characteristics of individual corporations. However, it is anticipated that a more systematic analysis can be performed when more data on public corporations are available and accessible for the purpose of research. It is possible that the variables provided by Alio as of 2015, such as “net income by ownership,” can be used as data to analyze the effect of agency cost in public corporations. Meanwhile, it is likely that a question can be raised as to the confidence of the sample data of this study. FnGuide also pointed out the fact that it may be difficult to compare the data before and after 2011, when the accounting standard of listed firms changed. Although it is difficult to make a simple comparison with specific numbers, it may not be a problem to use it as basic data to explain the determinants of capital structure, because there were many periods with very low p values, and a large part was consistent with previous studies. In recent years, studies on Chinese firms have been published in Korea as well(진이흔&강호정, 2012). If the studies on the determinants of capital structure started in advanced countries, where capital markets are highly developed, like the US, are conducted in the Chinese market, where the power of the central government is stronger than that of Korea, a more meaningful conclusion that can be inductively or deductively inferred in the future can be drawn with regard to corporate finance.

In conclusion, the determinants of leverage for Korean listed firms from 2000 to 2013 are as follows. First, there is a significantly positive relationship between firm size and leverage. Second, there is a significantly positive relationship between growth rate and leverage. However, growth rate has a stronger positive relationship with short-term liabilities than long-term liabilities. Third, a significantly negative relationship is found between profitability and leverage. Profitability has a stronger negative relationship with short-term liabilities than long-term liabilities. Fourth, a

significantly positive relationship is shown between tangible fixed assets and leverage. This relationship has been reversed from negative to positive since the financial crisis in 1997. Tangible fixed assets have a negative relationship with short-term liabilities and a positive relationship with long-term liabilities. Tangible fixed assets have a negative relationship with the 1st–5th largest *chaebols* and a positive relationship with other firms. Fifth, depreciation, which represents the size of investment cost, along with tangible fixed assets, have a significantly positive relationship with leverage. Furthermore, a panel data analysis was performed on the data of public corporations from 2009 to 2013, and it was found that firm size and profitability have a significant relationship with leverage, while growth rate does not have a significant relationship with leverage. In addition, it was found that the 1st–5th largest *chaebols*, the 6th–30th largest *chaebols*, and market-based public corporations have recently had a decrease in short-term debts but an increase in long-term debts.

The issue of high leverage in *chaebols*, which was considered to be the cause of the Asian financial crisis in 1997, is also related to a moral hazard implicitly approved by the Government. In order to address this issue, which was pointed out by scholars, the Government strongly urged listed firms to maintain a target debt ratio of 200%. Firms could not expect cooperative relationships from financial institutions anymore. As such, the 1997 Asian financial crisis changed the capital structure of firms considerably, and firms had to act differently with regard to making decisions on capital structure. Since the Government could not create a favorable investment environment for firms, Korea could not expect a high growth rate and sound profitability in the 2000s. Firms responded to the change with earnings management to reduce their debt ratios rather than decreasing their debt itself. However, as Asian countries continued to maintain lower debt ratios, they were able to keep the global growth rate from dropping during the 2007–2008 global financial crisis, which started from the US, by raising short-term debt ratios. The painful experience they had faced became the driving force that helped them to cope with the global economic crisis effectively. This indicates that the role of a nation, which used to be an external variable in macroeconomics as well as in corporate finance, is important.

It is now difficult to expect to re-write the myth of success in a strong industrial policy led by the Government, like in Korea. It is important to be responsive and effective directing the progress of the national economy. It is the role of not only the nation, but also academia. Otherwise, we must accept external shocks, such as economic crises, and new strategies. It is senseless to suffer failures to find the right direction for the future, which is why we must pay attention to the debt issues of each economic agent, including private firms, public corporations, and both government and private sectors.

Appendix 1 Top 30 *Chaebols* in Korea

<i>Chaebols</i> ¹³	Total Assets (billion won)	Equity-Assets Ratio (%)	# of Subsidiaries	# of Listed Subsidiaries
1. Samsung	331,444(13.92%)	43.7	74	17
2. KEPCO ¹⁴	186,573(7.84%)	43.3	24	3
3. Hyundai Motor	180,945(7.60%)	50.9	57	11
4. SK	145,171(6.10%)	52.3	80	16
5. LG	102,060(4.29%)	50.2	61	11
6. Lotte	91,666(3.85%)	52.9	74	8
7. Posco	83,810(3.52%)	64.9	46	7
8. HHI	58,395(2.45%)	44.2	26	3
9. GS	58,087(2.44%)	47.1	80	8
10. KOGAS	42,461(1.78%)	51.5	3	11
11. Nonghyup	40,767(1.71%)	14.4	32	2
12. Hanjin	39,522(1.66%)	18.1	48	6
13. Hanwha	37,063(1.56%)	16.4	51	6
14. KT	34,974(1.47%)	41.8	57	9
15. Doosan	30,021(1.26%)	42.6	22	6
16. Shinsegae	25,243(1.06%)	51.4	29	7
17. CJ	24,121(1.01%)	52.7	73	9
18. LS	20,367(0.86%)	47.3	51	7
19. DSME	18,497(0.87%)	28.0	19	1
20. Kumhoasiana	18,261(0.77%)	26.8	26	4
21. Dongbu	17,789(0.75%)	16.2	64	8
22. Daelim	16,258(0.68%)	46.1	22	3
23. Booyoung	15,665(0.66%)	44.6	14	0
24. Hyundai	14,113(0.59%)	16.1	20	3
25. OCI	12,131(0.51%)	48.5	26	7
26. S-oil	12,003(0.50%)	45.1	2	1
27. Hyundai Department Store	11,960(0.50%)	73.1	35	6
28. Hyosung	11,211(0.47%)	27.8	44	6
29. Daewoo E&C	10,348(0.43%)	26.5	16	1
30. Dongkuk Steel	10,073(0.42%)	36.4	16	4
	1,700,999(71.5%)	40.7 ¹⁵	1,192	191

¹³Fair Trade Commission designated the ranking of the *chaebols* based on asset size as of April 1, 2014

¹⁴Two of them are Government enterprises listed on the KRX. Other Government enterprises in *chaebol* lists were excluded in this paper.

¹⁵Simple average

Appendix 2 Industry Classification

Industrial code	Code	Industry
A	1	Agriculture, Fishing
B	1	Mining of Metal Ores, Non-metallic Minerals, Except Fuel
C	2	Manufacture of Food Products, Beverage and Tobacco Products
C	3	Manufacture of Textiles, Except Apparel
C	4	Manufacture of Wearing Apparel and Fur Articles
C	5	Tanning and Dressing of Leather, Manufacture of Luggage and Footwear
C	5	Manufacture of Wood and of Products of Wood and Cork, Except Furniture
C	6	Manufacture of Pulp, Paper, and Paper Products
C	7	Printing and Reproduction of Recorded Media
C	8	Manufacture of Coke, Refined Petroleum Products, and Nuclear Fuel
C	9	Manufacture of Chemicals and Chemical Products
C	10	Manufacture of Pharmaceuticals, Medicinal Chemicals, and Botanical Products
C	11	Manufacture of Rubber and Plastic Production
C	12	Manufacture of Other Non-metallic Mineral Products
C	13	Manufacture of Basic Metals
C	14	Manufacture of Fabricated Metal Products
C	15	Manufacture of Electronic Components, Computer, Radio, Television, and Communication Equipment and Apparatuses
C	16	Manufacture of Medical, Precision, and Optical Instruments, Watches, & Clocks
C	17	Manufacture of Electrical Equipment
C	18	Manufacture of Other Machinery and Equipment
C	19	Manufacture of Motor Vehicles, Trailers, and Semitrailers
C	20	Manufacture of Other Transport Equipment, Furniture, Articles n.e.c.
D	21	Electricity, Gas, Steam, and Water Supply
E	21	Sewage, Waste Management, Materials Recovery, and Remediation Activities
F	22	Construction
G	23	Wholesale and Retail Trade
H	24	Transportation
I	25	Accommodation and Food Service Activities
J	26	Information and Communications
L	27	Real Estate Activities and Renting and Leasing
M	28	Professional, Scientific, and Technical Activities
N	29	Business Facilities Management and Business
P	30	Education
R	30	Arts, Sports, and Recreation Related Services

Based on Korea Standard Industry Classification 9th

REFERENCES

- Bahng, S. (2008). Capital structure changes in Korea from 1981 to 2005: Evidence and implications. *Journal of Economic Research*, 13(2), 211-237.
- Booth, L., Aivazian, V., Demirguc-Kunt, A., & Maksimovic, V. (2001). Capital structures in developing countries. *The Journal of Finance*, 56(1), 87-130.
- Chittenden, F., Hall, G., & Hutchinson, P. (1996). Small firm growth, access to capital markets and financial structure: Review of issues and an empirical investigation. *Small Business Economics*, 8(1), 59-67.
- DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8(1), 3-29.
- Demirguc-Kunt, A., & Maksimovic, V. (1994). Capital structures in developing countries: Evidence from ten countries. The World Bank.
- Ferri, M. G., & Jones, W. H. (1979). Determinants of financial structure: A new methodological approach. *The Journal of Finance*, 34(3), 631-644.
- Grossman, S. J., & Hart, O. D. (1982). Corporate financial structure and managerial incentives. In *The economics of information and uncertainty* (pp. 107-140). Chicago: University of Chicago Press.
- Lee, J. W., Lee, Y. S., & Lee, B. S. (2000). The determination of corporate debt in Korea. *Asian Economic Journal*, 14(4), 333-356.
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 261-297.
- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147-175.

- Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance*, 39(3), 574-592.
- Ross, S. A. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics*, 23-40.
- Scott, J. H. (1977). Bankruptcy, secured debt, and optimal capital structure. *The Journal of Finance*, 32(1), 1-19.
- Titman, S. (1984). The effect of capital structure on a firm's liquidation decision. *Journal of Financial Economics*, 13(1), 137-151.
- Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance*, 43(1), 1-19.
- 김지흥, & 고윤성. (2006). 외환위기이후의부채비율감소와이익조정행위에관한연구. *회계저널*, 15(2), 119-144.
- 신동령. (1991). 연구논문; 한국제조기업의재무구조결정요인에관한연구. *경영학연구*, 21(1), 131-152.
- 신승묘. (1999). 연구논문: 법인세부담이자본구조에미치는영향에관한실증연구. *세무학연구*, 14(단일호), 371-398.
- 위정범. (1998). 부채비율 200% 달성을위한정책방안. *한국경제연구원정책보고서*.
- 진이흔, & 강호정. (2012). 중국상장기업의자본구조결정요인. *한국콘텐츠학회논문지*, 12(4), 401-406.