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The Implied Cost of Equity Capital and Corporate Governance Practices*

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Abstract

This paper examines the relation between corporate governance practices and the implied cost of equity capital through a sample of firm-year observations from 2001 to 2004. Enhanced corporate governance improves financial reporting quality, thereby lowers the cost of equity capital. To examine this relation, this paper uses a unique data set on firm-level corporate governance practices provided by the Korea Corporate Governance Service (KCGS). This study finds that sound corporate governance practices are negatively related to the implied cost of equity capital estimates. Among several advantages of sound corporate governance practices, shareholder rights protection has the most significant effect on lowering the implied cost of equity capital. Board of directors and disclosure policy are also important in reducing the implied cost of equity capital. Overall, consistent with our expectations, the result shows that sound corporate governance practices reduce the implied cost of equity capital through a reduction in agency problems and information asymmetry.

Keywords: The Implied Cost of Equity Capital; Corporate Governance Practices; Shareholder Rights Protection; Information Asymmetry; Simultaneous Estimation.

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1. Introduction

The purpose of this study is to provide empirical evidence of the effects corporate governance practices have on the cost of equity capital with regard to agency problems and information asymmetry. Corporate governance has been the most crucial issue in emerging financial markets since the 1997 Asian financial crisis. Notorious accounting scandals in developed markets have also increased public interest in the issue of corporate governance. The limited transparency or firm opacity to outside investors has been a subject of serious concern and, consequently, has raised the awareness of the importance of sound corporate governance systems as a way to protect outside shareholder rights.

According to Bushman and Smith (2001), many researchers (Dechow, Sloan, and Sweeney, 1996; Francis, Philbrick, and Schipper, 1994; Sweeney, 1994; Defond and Subramanyam, 1998) had already addressed the role of financial accounting information with reference to the operation of various corporate governance practices, such as board of directors, shareholder litigation, debt covenants, and audit function. As is generally known, financial accounting information is an important source of firm-specific information which shareholders use when monitoring managers and concentrated owners. Accordingly, sound quality of financial reporting practice can alleviate agency problems, thereby enhances the economic performance of firms. As a result, this can also reduce external financing costs.

Figure 1 shows the links among corporate governance practices, quality of financial reporting, and the cost of external financing. Sound quality of financial reports mitigates adverse selection and agency problems because reliable financial reporting practice reduces the information asymmetry problem and better disciplines managers and concentrated owners. In addition, improved corporate disclosure practice can help decrease the transaction costs and liquidity risk between the firm and investors or among investors (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000; Verrecchia, 2001; Bushman and Smith, 2001). Therefore, sound quality of financial reports can reduce the cost of equity capital and enhance the firm performance.

Recent theoretical research has made an important progress in explaining how a firm-specific information risk is priced and cannot be diversified (O'Hara, 2003; Easley and O'Hara, 2004; Leuz and Verrecchia, 2005). Based on the theoretical research,

several accounting studies have been conducted to investigate whether financial reporting quality, when weakened by poor corporate governance practices, increases firms' exposure to information risk and, consequently, increases the cost of equity capital (Aboody, Hughes, and Liu, 2004; Francis, LaFond, Olsson, and Schipper, 2004, 2005; Chen, Shevlin, and Tong, 2005). These studies show that the information quality of firms is strongly associated with the cost of capital.

This study undertakes an empirical analysis of the direct relation between the corporate governance practices of Korean listed firms and the implied cost of equity capital. It is based on studies that investigate the role of corporate governance in improving financial reporting quality which in turn influences the cost of equity capital. Several papers examine "corporate governance risk" in terms of the implied cost of capital.[1] Ashbaugh-Skaife, Collins, and LaFond (2005), Cheng, Collins, and Huang (2006), and Chen, Chen, and Wei (2003) investigate the same hypothesis and find that better governed firms have a lower implied cost of equity capital. These studies use an ex ante measure of required returns, that is, the implied cost of equity capital because using historical returns to estimates expected returns results in imprecise risk estimates (e.g., Fama and French, 1997; Claus and Thomas, 2001; and Gebhardt, Lee, and Swaminathan, 2001).

To examine the relation between corporate governance practices and the implied cost of equity capital, this study uses firm-specific corporate governance score data from the Korea Corporate Governance Service (hereafter, KCGS) for the 2001-2004 period.[2] This data set of comprehensive corporate governance practices has five categories: shareholder rights protection, board of directors, corporate disclosure, audit committee, and dividend policy. This study also uses three implied cost of equity capital measures that are estimated by a mean or median analysts' earnings forecast, which are patterned after previous studies (Gode and Mohanram, 2003; Easton, 2004; Botosan and Plumlee, 2005; Easton and Monahan, 2005). The testable hypothesis is that the implied cost of equity capital is reduced in firms with sound corporate governance practices because sound corporate governance practices mitigate the problems of adverse selection and moral hazard.

1) According to Bedard and Johnstone (2004), "corporate governance risk" is defined as the existence of risk factors because of the ineffectiveness of corporate governance practices.
2) The Korea Corporate Governance Service (KCGS) is an independent non-profit organization under the joint sponsorship of six securities-related organizations in Korea.

Consistent with the hypothesis, this study finds that firms with sound corporate governance practices have a lower implied cost of equity capital. The results also indicate that among the five corporate governance practices, shareholder rights protection is the most significant element in lowering the implied cost of equity capital. The finding with regard to the influence of a high degree of shareholder rights protection is consistent with the findings of previous studies by Cheng et al. (2006) and Ashbaugh-Skaife et al. (2005). Cheng et al. (2006) note that the impact of firm-level shareholder rights protection on potential agency costs is negatively significant. Similarly, Ashbaugh-Skaife et al. (2005) show a positive relation between concentrated ownership and the implied cost of equity capital.

This study contributes to the literature on corporate governance in several ways. First, it investigates whether global standards of corporate governance have had an economic impact on Korean listed firms, which have experienced some dramatic changes in their corporate governance practices since the 1997 Asian financial crisis. Second, it furnishes the basic descriptive information of three implied cost of equity capital estimates. This information can be used for the analysis of the investment efficiency of Korean listed firms as they compete for capital. In addition, univariate and multivariate analyses of the implied cost of equity capital are carried out to check the validity and the usefulness of the estimate measures patterned after previous studies.

This study is organized as follows. Section 2 reviews the literature on the relation between corporate governance practices and the cost of equity capital. Section 3 describes the research design and empirical measure of the implied cost of equity capital. Section 4 discusses the main results and section 5 gives the conclusions of this study.

2. Research Hypothesis Development

2.1 Financial Reporting Quality and the Cost of Equity Capital

As noted, prior studies suggest that a decrease in information asymmetry should reduce the cost of equity capital through reduced transaction costs and estimation risk.

Early studies on the relation between accounting information and information risk are well surveyed by Callahan, Lee, and Yohn (1997). They summarize abundant research on the relation between earnings announcements and information asymmetry. The early theoretical model of information asymmetry primarily focuses on public disclosure reducing information asymmetry in the stock market. A later model shows that information asymmetry may be closely related to informed trading prior to earnings announcements. Following these models, three broad categories of empirical research have been introduced: accounting disclosure, accounting information quality, and managers' behavior.[3] Overall, empirical research related to information asymmetry concludes that improving the information environment through corporate disclosure can reduce transaction costs and hence, the cost of capital.

Recently, Easley and O'Hara (2004) emphasize the important role of accounting information accuracy in asset pricing. They develop a model that shows how differences in public and private information affect the cost of equity capital. For example, the required risk premium increases with the amount of private information relative to total information (private and public), but decreases with the precision of public and private information. Leuz and Verrecchia (2005) develop a model to analyze the link between information quality and the cash flows of firms. This model captures the fundamental relation between the improvement of the efficiency of firms' investment decisions and an increase in expected cash flow.

Recent empirical studies on financial reporting quality use the direct estimation of cost of equity capital instead of the bid-ask spread, which is the limited information of the cost of equity capital.[4] Francis et al. (2004, 2005) examine the relation between earnings quality or accrual quality and the cost of capital. Their empirical results support the negative relation between the accounting-based and market-based earnings attributes and the cost of capital. In addition, by decomposing the accrual quality into innate factors and discretionary factors, they also find that the cost of equity capital depends on the accrual quality.

3) Three categories of empirical research are performed by using the bid-ask spread of stock markets as a proxy. The findings are as follows. First, accounting disclosures can affect the degree of firms' information risk captured in quoted spreads. Second, better accounting information quality can lower the bid-ask spread. Third, managers' behavior to decrease earning volatility may affect the transactional efficiency of stock markets.

4) Callahan et al. (1997) address the limitation of the bid-spread as an empirical proxy. Since the typical S&P 100 firm has a quoted spread of 1/8, 1/4, or 3/8 more than eighty percent of the time, the information carried by spread is limited.

Similarly, Aboody et al. (2005) examine the argument that earning quality affects the cost of capital in two stages. Their empirical results indicate that the pricing of the earnings quality and the degree of the pricing are pronounced in firms with higher exposure to the earnings quality factor. Finally, Hribar and Jenkins (2004) examine the effect of accounting restatement on the cost of equity capital. They find that because accounting restatements can cause revisions in overall earnings quality, accounting restatements also result in lower expected future earnings and a higher cost of equity capital for firms.

2.2 Development of the Hypothesis

Several studies directly address the issue that "corporate governance risk" which arises from a weak governance system can affect firms' cost of equity capital (Ashbaugh-Skaife et al., 2005; Cheng et al., 2006; Chen et al., 2003).

Ashbaugh-Skaife et al. (2005) investigate the impact of governance attributes, such as financial information quality, ownership structure, shareholder rights, and board structure, on firms' cost of equity capital. Their results show that both financial information quality and board structure are negatively related to the implied cost of equity capital estimates, whereas concentrated ownership in the form of a number of blockholders is positively related to the implied cost of equity capital.

Cheng et al. (2006) investigate the effect of firm-level shareholder rights on the cost of equity capital. According to their results, weak firm-specific shareholder rights and any changes in them are positively correlated with a cost of equity capital. Mashruwala, Rajgopal, and Shevlin (2006) examine the impact of an exogenous accounting scandal shock on the cost of equity capital. Their results indicate that high quality governance does have a favorable impact on firms' cost of equity capital. Botosan (1997) and Botosan and Plumlee (2002) investigate the relation between the cost of equity capital and disclosure behavior. The findings support that voluntary disclosure or annual report disclosure is associated with a lower cost of equity capital.

Chen et al. (2003) investigate the role of disclosure levels, firm-level corporate governance, and country level investor protection in reducing the cost of equity capital in nine Asian countries. Hail and Leuz (2006) examine international differences between legal institutions and securities regulations and firms' cost of equity capital. The re-

sults of both studies are consistent with the prediction that firm-level and country-level investor protection and legal institutions affect the implied cost of equity capital.

The effect of dividend policy on the implied cost of equity capital may be difficult to detect because dividends effects are determined by agency consideration, information considerations, and tax consideration. Bhattacharya (1979), Miller and Rock (1985), and John and Willaiams (1985) show that the signaling effects of dividends decrease information asymmetry, which decrease the cost of equity. Jensen (1986) argues that dividends reduce the agency cost of free cash flow and, therefore, the cost of equity. Easterbrook (1984) shows that dividends are to keep firms in the capital market lowering the cost of monitoring managers. On the contrary, Dhaliwal, Krull, Li, and Moser (2005) argue that simply examining the relation between the implied cost of capital and dividend yield may not be consistent with the prior literature because of the dividend tax effect. Thus, they set the model to isolate the tax effect from the information and agency effect and find that the implied cost of equity capital increases in the tax-penalized portion of dividend yield. This result can be interpreted that the relation between dividend yield and the implied cost of equity capital should increase in the magnitude of the dividend tax.[5] Based on previous studies of the relation between corporate governance and the cost of equity capital, the following hypothesis is proposed.

H: Companies with sound corporate governance practices have a lower cost of equity capital.

3. Model Development and Research Design

3.1 The Regression Models

This paper sets the main models by using the corporate governance score (*CGS-CORE*) constructed by the KCGS to estimate the relevance with three proxies of the implied cost of equity capital (i.e., *R_gm*, *R_peg*, and *R_mpeg*). The three measures of

5) Many prior studies find the positive relation between stock return and dividend yield. See Litzenberger and Ramaswamy (1979, 1980, 1982), Blume (1980), Naranjo, Nimalendran and Ryngaert (1998), and Dhaliwal, Li, and Trezevant (2003).

implied equity capital costs are estimated by mean or median analysts' earnings forecast (i.e., *R_gmmn*, *R_gmmd*, *R_pegmn*, *R_pegmd*, *R_mpegmn*, and *R_mpegmd*). All three models have the same set of one-year lagged control variables, which are derived from previous studies. The three pooled cross-sectional models are as follows.

Cost of equity capital = f [*CGSCORE* (*FAC1-FAC5*), Control variables]

$$\begin{aligned} R\_gm\ (R\_peg, R\_mpeg) = {} & \alpha + \beta_1 CGSCORE\ (FAC1\text{-}FAC5) + \beta_2 LNTASSET \\ & + \beta_3 BETA + \beta_4 BM + \beta_5 ANALYST + \beta_6 DISP \\ & + \beta_7 LEV + \beta_8 ROAVAR + \beta_9 ALTMAN + \beta_{10} RETVOL \\ & + \beta_{11} RD + \beta_{12} ADV + \beta_{13} PPE + \beta_{14} Year\ Dummy \\ & + \beta_{15} Industry\ Dummy + \varepsilon \end{aligned} \quad (1)$$

Dependent Variables

R_gmmn = the implied cost of equity capital estimated by Gode and Mohanram (2003). The mean value of analysts' earnings forecasts is used;

R_gmmd = the implied cost of equity capital estimated by Gode and Mohanram (2003). The median value of analysts' earnings forecasts is used;

R_pegmn = the implied cost of equity capital implied by the PEG ratio, where PEG refers to the price-earnings growth model. The mean value of analysts' earnings forecasts is used;

R_pegmd = the implied cost of equity capital implied by the PEG ratio, where PEG refers to the price-earnings growth model. The median value of analysts' earnings forecasts is used;

R_mpegmn = the implied cost of equity capital implied by the modified PEG ratio. The mean value of analysts' earnings forecasts is used;

R_mpegmd = the implied cost of equity capital implied by the modified PEG ratio. The median value of analysts' earnings forecasts is used.

Test Variables

CGSCORE = corporate governance overall score, consisting of five categories:

FAC1 = shareholder rights protection score;

FAC2 = board of directors score;

FAC3 = corporate disclosure score;

FAC4 = audit committee score;

FAC5 = dividend policy score.

Control Variables

LNTASSET = firm size measured by the natural logarithm of total assets of the firm;

BETA = stock beta calculated by the capital asset pricing model over a 60-month period;

BM = book to market as a ratio of the book value of equity to the market value of equity;

ANALYST = natural logarithm of the number of analysts' estimates in December of a given year

DISP = dispersion in one-year-ahead analyst consensus earnings forecasts divided by the absolute value of one-year-ahead analyst consensus earnings forecasts in December of a given year;

LEV = leverage estimated as long-term debt scaled by the market value of equity;

ROAVAR = the standard deviation of the return on assets (ROA) measured over the previous five years;

ALTMAN = Altman's Z-score estimated using Altman's equation (1968);

RETVOL = return volatility estimated as the standard deviation of residuals from the market model regression using daily returns over a one-year period;

RD = Research and development (R&D)/sales;

PPE = Property, plant, and equipment (PP&E)/sales;

ADV = advertisement expenses/sales;

TOBINQ = Tobin's Q measured by the market value of equity plus the book value of debt scaled by total assets;

ROA = return on assets measured as income before extraordinary items scaled by beginning total assets.

3.2 Research Variables

3.2.1 Dependent Variables—The Implied Cost of Equity Capital Measures

Because some research indicates that realized returns which use many firms or long periods (one to five years) are not a good proxy for the cost of equity capital, this study uses several measures of implied equity capital costs as suggested by other studies (Fama and French, 1997; Claus and Thomas, 2001; Gebhardt, Lee, and Swa-

minathan, 2001, Gode and Mohanram, 2003; Easton, 2004).[6] Moreover, many studies show that the estimates of implied equity capital costs, which use forward-looking information (e.g., earnings forecasts), are highly correlated with traditional risk proxies such as return volatility, firm size, analyst following, Beta, and book-to-market ratio.[7]

This study utilizes the three measures of the implied cost of equity capital of Gode and Mohanram (2003) and Easton (2004) to ensure the validity of the research results.[8] All three measures use price and analysts' earnings forecasts in the valuation equations, but differ primarily with respect to their assumptions about long-term growth rates and dividends. Each measure is estimated by using either a mean analyst earnings forecast or a median analyst earnings forecast as suggested by Gu and Wu (2003)[9] to provide a reasonable sample of the different estimation techniques available.

First, this study follows Gode and Mohanram's (2003) model while incorporating the Ohlson-Juettner concept of the cost of equity capital. Gode and Mohanram (2003) provide a parsimonious Ohlson-Juettner model that does not require forecasts of the book value of equity. The Gode and Mohanram model (hereafter, *R_gm*) relates the current price (P) to one-year-ahead earnings forecasts (eps_1), forthcoming dividends per share (dps_1), two-year-ahead earnings forecasts (eps_2), and an assumed perpetual growth rate (g). To estimate the implied cost of equity capital, this study sets the per-

6) Fama and French (1997) argue that the cost of equity estimates based on the CAPM or related asset-pricing models (e.g., the Fama-French three factor model) are imprecise. They identify three potential problems with the risk premium computed from past realized returns: 1) difficulties in identifying the right asset-pricing model; 2) imprecision in the estimates of factor loadings; and 3) imprecision in estimates of the factor risk premium. Furthermore, prior research linking average realized return and various risk proxies does not show satisfactory results (Fama and French, 1992; Elton, 1999; Claus and Thomas, 2001).

7) Gebhardt et al. (2001), Gode and Mohanram (2003), and Easton (2004) provide evidence that the implied cost of equity capital is a valid measure for the expected rate of return using price and analysts' earnings forecasts in the valuation equation. However, recent research (e.g., Guay, Kohari, and Shu, 2004; Botosan and Plumlee, 2005, Easton and Monahan, 2005) using U.S. data gives mixed evidence of the validity of the implied cost of equity capital.

8) This paper is not intended to provide evidence of the relative superiority of one measure over another. Instead, this paper focuses on how different estimation procedures affect the regression results with respect to corporate governance practices and the cost of equity capital.

9) Gu and Wu (2003) find a significantly positive relation between earnings skewness and analyst forecast bias after controlling for various other factors. Specifically, analysts' forecasts are more optimally biased for the fourth quarter earnings than for other quarterly earnings, because earnings are more negatively skewed in the fourth quarter than in the other quarters. Thus, they argue that the optimal forecast is the median instead of the mean earnings.

petual growth rate at 0.04 as reflected in the inflation rate and dividends per share as the average for the past three years. In addition, this study constrains earnings per share such that $eps_2 > eps_1 > 0$ because a negative short-term growth rate is not meaningful:

$$P = \frac{eps_1}{r_{gm}} + \frac{eps_2 + r_{gm} \times dps_1 - (1 + r_{gm}) \times eps_1}{r_{gm}(r_{gm} - g)} \tag{2}$$

Second, this study follows Easton's (2004) model based on the PEG ratio (hereafter, *R_peg*) and modified PEG ratio (hereafter, *R_mpeg*).[10] The *R_peg* ratio requires only data on price and earnings growth to calculate the implied cost of equity capital, indicating that the dividend and the perpetual rate of change in abnormal growth in earnings is equal to 0. The *R_mpeg* ratio relaxes the assumption that dps_1 is equal to 0. Easton (2004) explains that each approach is a variation on the discounted cash flow valuation or discounted dividend model. Therefore, these models of implied equity capital costs rely on the same underlying theory, but individual applications differ slightly with respect to the assumptions regarding growth estimation.

$$p = \frac{eps_2 - eps_1}{r_{peg}^{\ 2}} \tag{3}$$

$$p = \frac{eps_2 + r_{mpeg} \times dps_1 - eps_1}{r_{mpeg}^{\ 2}} \tag{4}$$

These three models are also described by Easton and Monahan (2005). They explain that *R_gm* may be better estimates than *R_peg* and *R_mpeg* because *R_gm* avoids the restrictive assumption of *R_peg* and *R_mpeg* by assuming a perpetual growth rate.

Several prior studies evaluate the implied cost of equity capital estimates. Botosan and Plumlee (2005) discuss the similarity of *R_gm* estimates and *R_peg* estimates. They find that the average correlation between *R_gm* and *R_peg* is 0.86, which indicates that *R_peg* is a special case of *R_gm*. Further, Botosan and Plumlee (2005) as-

10) According to Easton (2004), the PEG ratio is equal to the PE ratio (that is, P_0/eps_1) divided by the short-term rate of growth in earnings expressed in a percentage (that is, $100*(eps_2-eps_1)/eps_1$).

sess the relative reliability of five estimates of implied equity capital costs. According to their results, *R_peg* is one of the most reliable estimates, and is related to market risk, leverage risk, information risk, residual risk, and growth. Easton and Monahan (2005) evaluate the relative reliability of seven "accounting-based measures of expected returns." Strikingly, they find that none of the expected return proxies are reliable in the U.S. context, after controlling for information surprises that are attributable to changes in expectations about future cash flows and future discount rates. They also find that long-term growth forecasts and analysts' forecast accuracy are related to this unreliability.[11] According to the pattern of other studies, this study uses six dependent variables that are derived from the three models of implied equity capital costs.

3.2.2 Test Variables—The Corporate Governance Score Measures

The corporate governance score that is used in this study has a significant advantage over corporate governance variables that have been used in previous studies. The overall corporate governance score integrates several aspects of corporate governance practices within possible limits. This solves the correlated omitted variables problem in that each of the five elements that are correlated with each other predicts the cost of equity capital separately. Therefore, this study can examine the respective effects and the overall effect of corporate governance practices on the cost of equity capital.

The corporate governance score is divided into five categories.[12] The shareholder rights protection (*FAC1*) category consists of three parts: shareholder rights provisions, controlling ownership structure, and related party transactions. Board of directors (*FAC2*) consists of two parts: board structure and meeting procedures. Corporate disclosure (*FAC3*) is related to management transparency and the voluntary and mandatory disclosure behaviors of the corporation. Audit committee (*FAC4*) includes audit committee structure and procedures. Dividend policy (*FAC5*) consists of the dividend yield, dividend payout ratio of the past three years, and treasury stock purchases. See Appendix for the detail information on corporate governance score pro-

11) Botosan and Plumlee (2005) also comment on the impact of potential biases in analysts' forecasts or stock prices. To find out more about the potential impact of biases, see Botosan and Plumlee (2005).

12) As the construction of the data set is somewhat different across years, the data set is reconstructed with five sub-indexes in accordance with each other.

vided by KCGS.[13)]

3.2.3 Firm-Specific Control Variables

The control variables that are included in the models are primarily taken from prior studies (Gebhaldt et al., 2001; Barth, Kasznik, and McNichols, 2001; Gode and Mohanran, 2003; Ali, Hwang, and Trombley, 2003; Barron, Byard, Kile, and Riedl, 2002; Botosan and Plumlee, 2005).

Firm size, Beta, and book to market

Firm size can be a proxy for firms' characteristics, especially firms' information environments. Thus, the relation between firm size (*LNTASSET*) and the implied cost of equity capital should be negative. Beta (*BETA*) captures the systematic component of stock price variability, and the coefficient on *BETA* is expected to be positive. Book to market (*BM*) captures the differences in firms' growth opportunities. Firms with a larger *BM* ratio are expected to have a higher cost of equity capital.

Analyst following and dispersion

Firms with a considerable analyst following *(ANALYST)* are regarded as being in a better information environment, which is associated with a lower cost of equity capital through reduced transaction costs and/or estimation risk. Therefore, this study expects a negative coefficient on analyst following. In contrast, the coefficient on the dispersion of analysts' earnings forecasts *(DISP)* is expected to be positive as the width of the range of dispersion is equal to the increase in risk or opacity.

Leverage, earning variability, and return volatility

A large debt in a firm's capital structure can induce great financial risk. Thus, a positive association between the cost of equity capital and leverage *(LEV)* is expected (Fama and French, 1992). Greater earnings variability *(ROAVAR)* and return volatility *(RETVOL)* mean a greater risk of unfavorable earnings and return news. Therefore, this study expects positive coefficients on earning variability and return volatility.

13) Black, Jang, and Kim (2006a), Park, Park, and Hwang (2005), Yoon and Oh (2005), and Choi and Yoon (2006) use the same data set, but they examine only the one-year cross-sectional data provided by the KCGS.

R&D, advertisement, and PP&E

R&D *(RD)* and advertisement (*ADV*) are proxies for the firms' intangible assets that are positively correlated with analyst following (Barth et al., 2001).[14] Intangible assets such as R&D and advertisement are expected to have positive coefficients against the implied cost of equity capital because of the higher proportion of private information of analysts.[15] However, in the case of a firm with considerable tangible assets (*PP&E*), its recognized amount of tangible assets is more closely related to the firm's value than the recognized amount of intangible assets. Therefore, the value of tangible assets is less likely to be subject to information asymmetry and inherent uncertainty (Barth et al., 2001). Due to their information value, tangible assets can lower the implied cost of equity capital.

Industry dummy and year dummy

This study controls for industry effects because research suggests that there is a substantial variation in factor loadings across industries (Fama and French, 1997). It is also noted that industry effects are a dominant factor in explaining cross-sectional differences in the cost of equity capital (Gebhardt et al., 2001). A year dummy is also included to capture unobservable year effects. Specifically, a year dummy can control for the annual change in the risk-free interest rate effect that potentially influences the cost of equity capital.

4. Sample Selection and Descriptive Statistics

4.1 Sample Selection

This study uses a given corporate governance score based on the KCGS surveys for the 2001-2004 period. The response rate is relatively high and the total number of observations for the four years is 1,647. The score should be credible based on the

14) Since the fair value of intangible assets is typically not recognized or disclosed, firms with considerable intangible assets are more likely to have less informative prices in the absence of analyst coverage (Barth et al., 2001).

15) Analysts tend to have more difficulty in forecasting earnings for high-intangible firms than for low-intangible firms. Therefore, analysts mitigate this difficulty by impounding higher proportions of private information into their forecast (Barron et al., 2002).

purpose of the survey. The KCGS established the survey to choose well-governed firms for the Korea Corporate Governance Stock Market Price Index (KOGI), which encourages listed companies to improve their corporate governance.[16] In addition, the survey instrument is a well-constructed objective questionnaire that deals with the presence or absence of approximately 100 items of corporate governance practices. Financial statement data are taken from the KIS-FAS data base, stock price and return data are taken from the KIS-SMAT data base, and analyst earnings forecast data are taken from the FnGuide data base.

This study uses only firms with December fiscal year-ends. Firms are excluded if they belong to the financial services industry, because regulated firms have stricter corporate governance systems than unregulated firms. All of the firms in the sample have the requisite data for the implied costs of equity capital, corporate governance scores, and control variables.[17] To alleviate potential measurement error problems, observations that fall into the upper and lower one percent of dependent variables are deleted. All control variables are also Winsorized at the 1st or 99th percentile to reduce the influence of extreme values. As outlined in Panel A of Table 1, the number of final observations totals 389 through 478 firm-year observations over the 2001-2004 period for four regression models. Panel B of Table 1 provides the distribution of sample firms across different industries using one-digit Korean SIC codes. All of the models are heavily concentrated in the manufacturing industry, ranging from 71% to 74%.

16) Currently, 50 firms belong to the KOGI. According to a report by the KCGS, the KOGI is used as an underlying index for exchange-traded funds, particularly for long-term investors who seek solid returns from equity investments. For the period from January, 2003, to September, 2004, the KOSPI showed a 9% average return with a standard deviation of 1.59%, whereas the KOGI showed a 7% average return with a standard deviation of 1.49% (See "Evaluation Results of Corporate Governance in the Korean Stock Market" by the KCGS, 2004).

17) To estimate the mean and median analysts' earnings forecasts from the FnGuide database, we go through several processes. First, following Easton (2004) and Francis et al. (2005), we take all analysts' earnings forecasts released on December for the years 2001-2004. We include only firms with a December fiscal year-end. For example, for a firm-year observation with the fiscal year ending on December 31, 2001, we use an earnings forecast for the fiscal year ending December 31, 2002, and 2003, as eps_1 and eps_2, respectively. A common stock price at the observation date of December, 2001, is used as P_0. The previous three-year dps is used as dps_1. After these processes, we estimate the mean and median consensus values of individual analysts' earnings forecasts resulting in approximately 960 observations. Next, we calculate the values of all three costs of equity capital with mean and median consensus. Because of the constraint of $eps_2 > eps_1 > 0$, approximately 36% of the analysts' earnings forecasts sample was eliminated. Finally, the implied cost of equity capital estimates are merged with the corporate governance scores. During the merging process, we lost approximately 28% of the remaining sample because of missing *CGSCOREs*.

Figure 1. Links between Financial Reporting Quality and the Cost of Equity Capital

Figure 1 is reconstructed from Bushman and Smith (2001), Botosan and Plumlee (2004), and Verdi (2006). Better quality of financial reporting information mitigates adverse selection and agency problems by reducing information asymmetry and disciplining managers and concentrated owners.

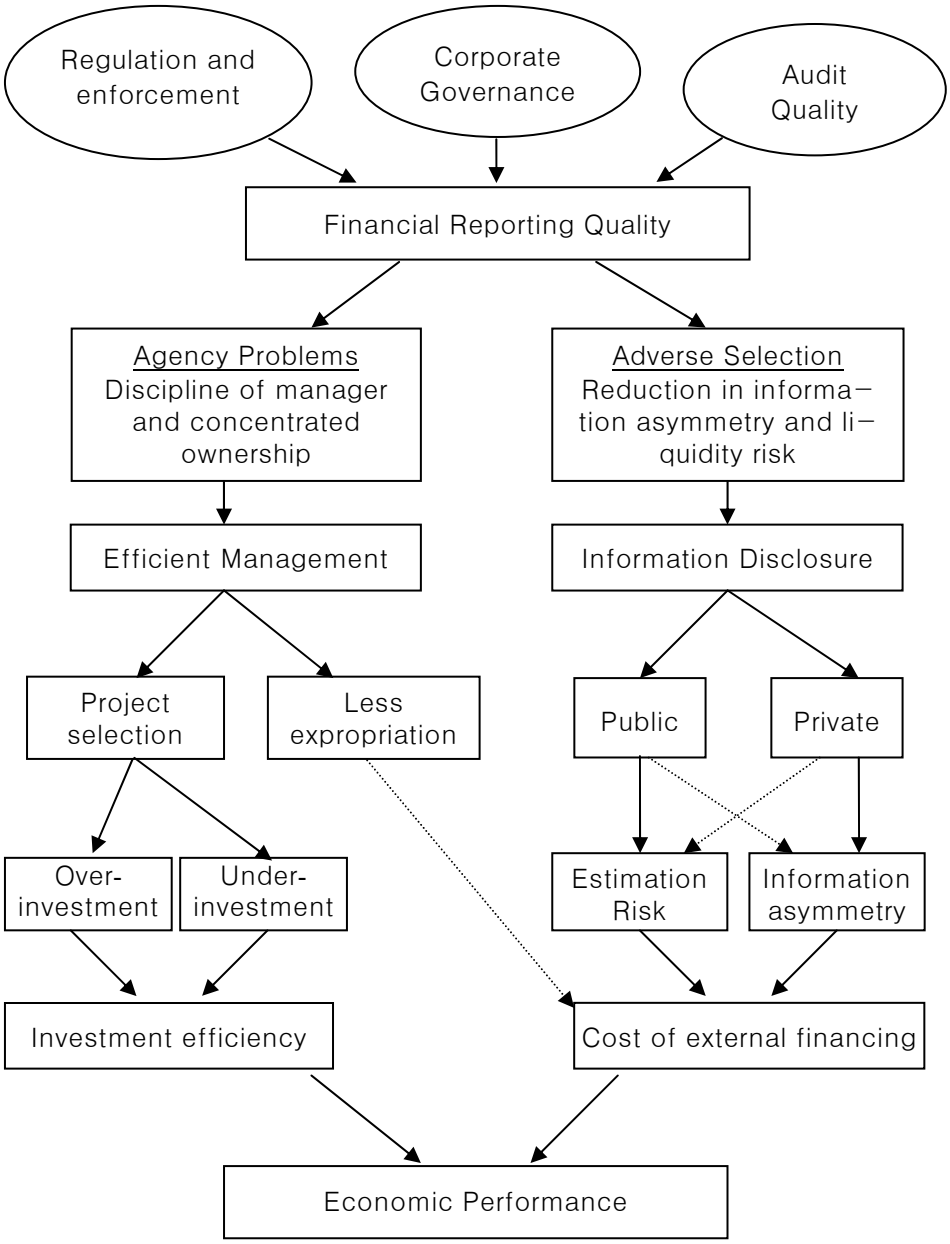


Table 1. Distribution of Samples by Year and by Industry

The sample consists of corporate governance scored nonfinancial firms listed on the Korea Stock Exchange (KSE) during the 2001-2004 period, ranging from 389 to 478. This study obtained observations from various sources, including the Korea Corporate Governance Service (KCGS), KIS FAS data base, KIS SMAT data base, and FnGuide data base. Model (1) of the implied cost of equity, R_gmmn, has 439 firm-year observations and model (2) of the implied cost of equity, R_gmmd, has 389 firm-year observations. Model (3), R_pegmn, has 475 firm-year observations and model (4), R_pegmd, has 437 firm-year observations. Model (5), R_mpegmn, has 478 firm-year observations and model (6), R_mpegmd, has 428 firm-year observations.

Panel A: Sample Distribution by Year

Year	Total Respondent	(1) R_gmmn	(2) R_gmmd	(3) R_pegmn	(4) R_pegmd	(5) R_mpegmn	(6) R_mpegmd
2001	261	93	83	100	94	100	91
2002	553	135	124	148	137	146	131
2003	426	108	86	118	100	121	101
2004	407	103	96	109	106	111	109
Total	1,647	439	389	475	437	478	428

Panel B: Sample Distribution by Industry

Title of Industries	(1) R_gmmn	(2) R_gmmd	(3) R_pegmn	(4) R_pegmd	(5) R_mpegmn	(6) R_mpegmd
Fishing		1	1	1	1	1
Manufacturing	318	288	343	320	340	313
Utilities	19	15	24	17	22	16
Construction	34	31	35	36	41	36
Wholesale and Retail	30	23	33	26	33	26
Transportation	13	11	14	14	14	14
Telecommunications	9	9	9	9	10	9
Business Services	13	9	12	12	13	11
Education Services	1	1	2	1	2	1
Recreation, Culture, and Health Services	2	1	2	1	2	1
Total (Firm)	439 (232)	389 (220)	475 (239)	437 (235)	478 (234)	428 (227)

4.2 Descriptive Statistics and Pearson Correlations of Variables

4.2.1 Descriptive Statistics

Table 2 presents summary statistics of the regression variables. Panel A provides the descriptive statistics for six implied cost of equity capital estimates that are based

Table 2. Descriptive Statistics for Variable Measures

Panel A: Dependent Variables								
Variables	N	MEAN	STD	MIN	Q1	MEDIAN	Q3	MAX
R_gmmn	439	0.177	0.078	0.046	0.118	0.163	0.222	0.416
R_gmmd	389	0.199	0.086	0.051	0.133	0.183	0.256	0.450
R_pegmn	475	0.167	0.069	0.052	0.113	0.154	0.210	0.357
R_pegmd	437	0.188	0.087	0.039	0.125	0.173	0.247	0.439
R_mpegmn	478	0.149	0.075	0.020	0.094	0.134	0.190	0.384
R_mpegmd	428	0.170	0.090	0.020	0.106	0.155	0.228	0.451
Panel B: Test Variables								
CGSCORE	478	0.467	0.101	0.259	0.396	0.449	0.521	0.823
FAC1	478	0.140	0.050	0.033	0.103	0.133	0.170	0.293
FAC2	478	0.138	0.050	0.030	0.100	0.133	0.170	0.293
FAC3	478	0.082	0.054	0.000	0.056	0.083	0.120	0.260
FAC4	478	0.037	0.030	0.000	0.010	0.030	0.060	0.143
FAC5	478	0.045	0.040	0.000	0.013	0.030	0.075	0.145
Panel C: Control Variables								
LNTASSET	478	27.223	1.408	24.755	26.089	26.999	28.213	31.299
BETA	478	0.887	0.338	0.010	0.655	0.878	1.101	1.721
BM	478	2.231	1.796	0.302	0.991	1.688	2.928	10.651
ANALYST	478	4.859	1.353	1.098	3.891	5.308	5.918	6.987
DISP	478	0.531	1.718	0.048	0.166	0.244	0.358	28.143
LEV	478	1.087	1.960	0.004	0.142	0.440	1.174	13.202
ROAVAR	478	0.041	0.066	0.002	0.015	0.024	0.043	0.553
ALTMAN	478	0.982	0.564	0.312	0.641	0.895	1.188	4.233
RETVOL	478	0.030	0.010	0.012	0.023	0.028	0.035	0.066
RD	478	0.003	0.006	0.000	0.000	0.000	0.004	0.034
PPE	478	0.757	0.510	0.128	0.396	0.619	0.972	2.744
ADV	478	0.010	0.019	0.000	0.000	0.001	0.010	0.098
TOBINQ	478	0.895	0.320	0.318	0.697	0.823	1.005	2.049
ROA	478	0.071	0.093	-0.503	0.025	0.063	0.114	0.743

The variables are defined as follows.

R_gmmn = the implied cost of equity capital estimated by Gode and Mohanram (2003). The mean of analysts' earnings forecasts is used;
R_gmmd = the implied cost of equity capital estimated by Gode and Mohanram (2003). The median of analysts' earnings forecasts is used;
R_pegmn = the implied cost of equity capital implied by the PEG ratio. The mean of analysts' earnings forecasts is used;
R_pegmd = the implied cost of equity capital implied by the PEG ratio. The median of analysts' earnings forecasts is used;
R_mpegmn = the implied cost of equity capital implied by the modified PEG ratio. The mean of analysts' earnings forecasts is used;
R_mpegmd = the implied cost of equity capital implied by the modified PEG ratio. The median of analysts' earnings forecasts is used.
CGSCORE = corporate governance overall score, consisting of five categories:
FAC1 = protection of shareholder rights score;
FAC2 = board of directors score;

FAC3	=	corporate disclosure score;
FAC4	=	audit committee score;
FAC5	=	dividend policy score.
LNTASSET	=	firm size measured by the natural logarithm of the total assets of the firm;
BETA	=	stock beta calculated by the capital asset pricing model over a 60-month period;
BM	=	book to market as a ratio of the book value of equity to the market value of equity;
ANALYST	=	natural logarithm of the number of forecast estimates in December of a given year;
DISP	=	dispersion in one-year-ahead analyst consensus earnings forecasts divided by the absolute value of one-year-ahead analyst consensus earnings forecasts in December of a given year;
LEV	=	leverage estimated as long-term debt scaled by the market value of equity;
ROAVAR	=	the standard deviation of return on assets (ROA) measured over the previous five years;
ALTMAN	=	Altman's Z-score estimated using Altman's equation (1968);
RETVOL	=	return volatility estimated as the standard deviation of residuals from the market model regression using daily returns over a one-year period;
RD	=	R&D/sales;
PPE	=	ADV/sales;
ADV	=	PPE/sales;
TOBINQ	=	Tobin's Q measured by the market value of equity plus the book value of debt scaled by total assets;
ROA	=	return on assets measured as income before extraordinary items scaled by beginning total assets.

on pooled data across sample years. The implied cost of equity capital estimates range from 14.9% for *R_mpegmn* to 19.9% for *R_gmmd*. The implied cost of equity capital using mean consensus is slightly different from the implied cost of equity capital using median consensus in the magnitude and firm-year observation numbers. The implied cost of equity capital estimated using median consensus usually has fewer observations but larger values than the implied cost of equity capital estimates using mean consensus.

Figure 2 and Figure 3 show the relation between the implied cost of equity capital estimates and corporate governance scores grouped by ten deciles. Even though the relation is not monotonically downward, it seems that there is a negative association between the six estimates of the cost and the corporate governance scores. *R_gmmn*, *R_pegmn*, and *R_mpegmn* show a similar pattern in the graph in Figure 2. *R_gmmd*, *R_pegmd*, and *R_mpegmd* also show the same pattern in the graph in Figure 3. As previous studies suggest, these results are expected because *R_peg* and *R_mpeg* are special cases of *R_gm*. In addition, the rank ordering of the estimates in the graphs

that are shown in Figures 2 and 3 is identical with that of previous studies, with *R_gm* establishing the ceiling and *R_mpeg* establishing the floor (Easton, 2004; Botosan and Plumlee, 2005).

Figure 2. The Implied Costs of Equity Capital Using Mean Consensus

Figure 2 shows the relation between the implied costs of equity capital using mean analyst earnings forecasts and the rank of corporate governance scores grouped by ten.

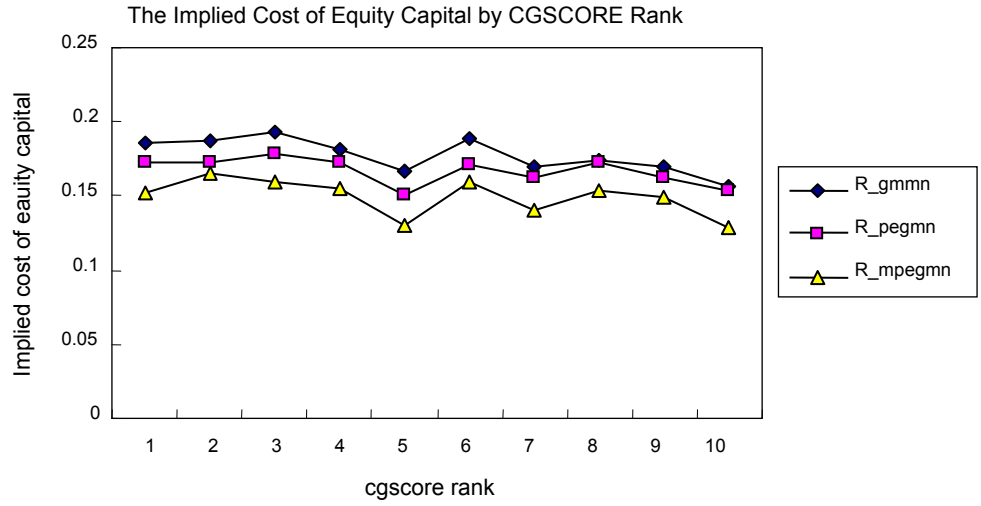
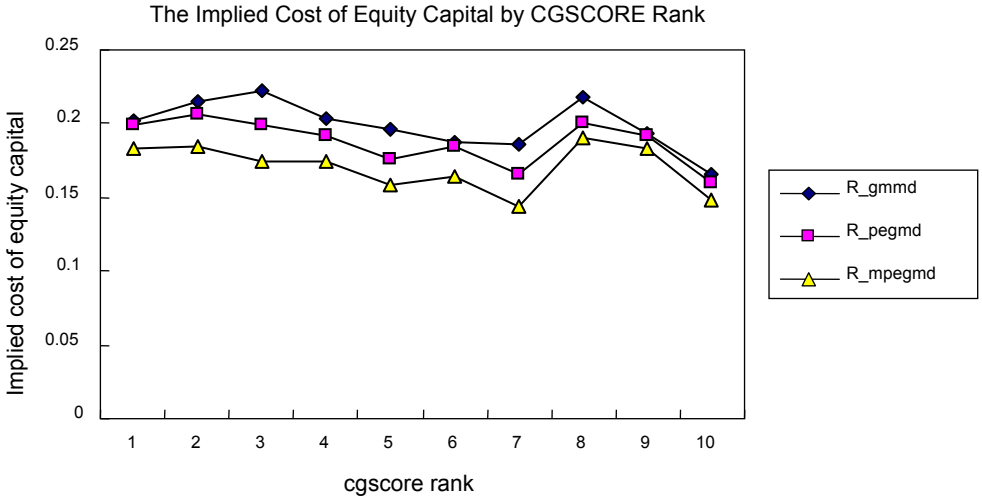


Figure 3. The Implied Costs of Equity Capital Using Median Consensus

Figure 3 shows the relation between the implied costs of equity capital using median analyst earnings forecasts and the rank of corporate governance scores grouped by ten.



4.2.2 Pearson Correlations among Regression Variables

Panel A of Table 3 shows the Pearson correlations of the dependent variables before and after their merging with the corporate governance data.[18] Before merging them with the corporate governance data, the implied costs of equity capital are highly correlated with each other, which is consistent with the findings of previous studies (Easton, 2004; Francis et al., 2004; Botosan and Plumlee, 2005; Easton and Monahan, 2005). However, after the merging process, some of the correlations are not significant, which indicates that the explanatory power of each implied cost of equity capital sample becomes weak. *R_ gmmn* (*R_ gmmd*) is positively and significantly related to *R_ pegmd* and *R_ mpegmd*. *R_ pegmn* and *R_ pegmd* are positively and significantly related to *R_ mpegmn* and *R_ mpegmd*, respectively. The correlation between the implied cost of equity capital and the corporate governance score shows disappointing results. Even though the implied cost of equity capital estimates show a negative association with the *CGSCORE*, only the correlation between *R_ mpegmn* and the *CGSCORE* is significant.

Panel B of Table 3 provides the Pearson correlations between the dependent variables and independent variables. *R_ mpegmn,* which has the largest number of the sample, shows the most impressive correlation results. *R_ mpegmn* correlates positively with *BM*, *DISP*, *LEV*, and *RETVOL*, and negatively with *ANALYST*. Firms with a high book-to-market ratio, large dispersion of analysts' earnings forecasts, high debt ratio, and high return volatility are more likely to have a higher implied cost of equity capital. In contrast, firms with a considerable analyst following have a lower implied cost of equity capital. *R_ gmmn* correlates positively with leverage and negatively with analyst following and R&D expenses.

Additionally, this study performs a Pearson correlation analysis of the dependent variables and tests variables for the 2003-2004 period (unreported). As the survey construction of the last two years is almost the same, the correlation results are less noisy. The overall score (*CGSCORE*) is positively correlated with each corporate governance element at the 1% significance level. Indeed, the *CGSCORE* is highly correlated with board of directors (*FAC2*), corporate disclosure (*FAC3*), and audit committee (*FAC4*), which proves the enforcement of these categories by the Korean govern-

18) Before their merging with corporate governance data, the average number of the implied costs of equity capital is approximately 610. However, after merging, the average number of observations becomes approximately 440.

ment under the Securities and Exchange Act and the regulations on disclosure.[19] *FAC2*, *FAC3*, and *FAC4* are closely related to each other, because those categories are associated with the monitoring of the function of corporate governance practices.

Table 3. Pearson Correlations of Regression Variables

Panel A: Pearson Correlations of Dependent Variables

Before merging with the CGSCORE

	R_gmmn	R_gmmd	R_pegmn	R_pegmd	R_mpegmn	R_mpegmd
R_gmmd	0.886***					
R_pegmn	0.989***	0.878***				
R_pegmd	0.878**	0.999***	0.881***			
R_mpegmn	0.978***	0.881***	0.982***	0.871***		
R_mpegmd	0.857***	0.978***	0.855***	0.983***	0.882***	

After merging with the CGSCORE

	R_gmmn	R_gmmd	R_pegmn	R_pegmd	R_mpegmn	R_mpegmd
R_gmmd	-0.038					
R_pegmn	-0.010	-0.036				
R_pegmd	0.102**	0.106**	-0.036			
R_mpegmn	0.017	-0.011	0.160***	0.015		
R_mpegmd	0.114**	0.094*	-0.070	0.268***	0.042	
CGSCORE	-0.006	0.016	-0.029	-0.028	-0.103**	-0.040

Panel B: Pearson Correlations of Dependent Variables and Independent Variables

	LNTASSET	BETA	BM	ANALYST	DISP	LEV
R_gmmn	0.013	0.008	0.076	-0.099**	-0.027	0.079*
R_gmmd	-0.065	-0.041	0.026	-0.092*	-0.063	-0.057
R_pegmn	0.019	0.049	0.113	-0.003	0.054	0.040
R_pegmd	0.017	0.009	0.082*	-0.021	0.049	0.013
R_mpegmn	-0.025	-0.004	0.299***	-0.194***	0.123***	0.253***
R_mpegmd	0.004	0.023	-0.029	-0.000	0.027	-0.037
CGSCORE	0.460***	0.110**	-0.085*	0.342***	0.002	0.023
	ROAVAR	ALTMAN	RETVOL	RD	ADV	PPE
R_gmmn	-0.068	0.004	0.062	-0.082*	0.024	0.017
R_gmmd	-0.009	0.028	-0.088*	0.012	-0.000	-0.008
R_pegmn	0.012	-0.014	0.051	-0.003	0.013	0.049
R_pegmd	-0.028	-0.013	-0.029	0.016	0.068	0.007
R_mpegmn	0.037	-0.029	0.147***	.063	-0.009	0.042
R_mpegmd	-0.060	0.012	-0.005	0.014	0.034	-0.032
CGSCORE	-0.049	-0.010	-0.125***	0.019	-0.064	0.043

Notes) ***, **, and * denote the significance at the 0.01, 0.05, and 0.10 levels, respectively. See Table 2 for variable definitions.

19) Large firms must have a board of directors, a half of which have to be outside directors, comprised of at least three outside directors, an audit committee with an outside director as the chairperson, and at least 2/3 outside members, and an outside director nominating committee. In addition, the Financial Supervisory Commission (FSC) requires Korean listed firms to disclose firm-specific information, which may influence investors' decision making.

4.2.3 Univariate test

Table 4 reports the results of the univariate relationship among corporate governance practices, firm characteristics, and the implied costs of equity capital. Specifically, the *CGSCORE* is grouped into ten in accordance with the corporate governance scores and, in turn, the mean of each implied cost of equity capital and firm characteristic is computed in each group. Finally, the *t*-statistic for the difference in the implied cost of equity capital and firm characteristic across two extreme groups, G1 and G10, is exhibited.

Panel A presents the results for each implied cost of equity capital estimate. The results show that four implied costs of equity capital-*R_gmmn*, *R_gmmmd*, *R_pegmd*, and *R_mpegmd* - have a positively significant *t*-value, which indicates that in general, corporate governance may explain the variation in the implied costs of equity capital. However, *R_pegmn* and *R_mpegmn* are not significantly correlated with the corporate governance score. Panel B presents the results of the univariate relationship between corporate governance and firm characteristics which belong to model (1) *R_gmmn*.[20] Firm size (*LNTASSET*), Tobin's Q (*TOBINQ*), and analyst following (*ANALYST*) show negatively significant *t*-values, which suggests that a higher corporate governance score is associated with large firms, growth firms, and firms that are followed by many analysts. However, return volatility (*RETVOL*), earnings variability (*ROAVAR*), and a high book-to-market ratio (*BM*) exhibit positively significant *t*-values, which indicate that a higher corporate governance score is related to firms with lower return volatility, lower earnings variability, and a lower *BM*. All other implied cost of equity capital estimates show similar results with regard to firm size, analyst following, return volatility, and Tobin's Q.

4.3 Multivariate Tests on Corporate Governance Overall Score

4.3.1 Validation of the implied cost of equity capital measures

Many studies investigate the validity of the implied cost of equity capital estimates by linking the measures to traditional risk proxies, such as Beta, firm size, and book-to-market ratio (Gebhardt et al., 2001; Gode and Mohanram, 2003; Guay et al., 2004;

20) To save space, only the results for R_*gmmn* are reported here. The results for the remaining five implied cost estimates are not significantly different from those of R_*gmmn*.

Table 4. Corporate governance score and the implied costs of equity capital

Table 4 reports the results of the univariate relationship among corporate governance scores, firm characteristics, and the implied costs of equity capital. Panel A reports the mean value of each implied cost of equity capital for each corporate governance score decile. Panel B reports the mean value of each firm characteristic for each corporate governance score decile. See Table 2 for variable definitions. ***, **, and * denote the significance at the 0.01, 0.05, and 0.10 levels, respectively.

	Lowest									*Highest*	*Diff*	
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G1-G10	t-Stat
Panel A: The Implied Costs of Equity Capital												
R_gmmn	0.186	0.187	0.193	0.181	0.167	0.189	0.170	0.174	0.169	0.156	0.030	1.80*
R_gmmd	0.202	0.215	0.222	0.204	0.196	0.188	0.186	0.218	0.194	0.165	0.037	2.02**
R_pegmn	0.172	0.172	0.179	0.173	0.151	0.171	0.162	0.172	0.163	0.153	0.019	1.25
R_pegmd	0.199	0.206	0.199	0.192	0.176	0.185	0.166	0.200	0.192	0.160	0.039	2.24**
R_mpegmn	0.152	0.165	0.159	0.155	0.130	0.159	0.140	0.154	0.149	0.128	0.024	1.59
R_mpegmd	0.183	0.185	0.175	0.174	0.158	0.164	0.144	0.190	0.183	0.148	0.035	1.83*
Panel B: Firm Characteristics of R_gmmn												
LNTASSET	26.569	26.359	26.607	26.894	27.200	27.163	27.316	27.398	28.010	28.710	-2.141	-7.79***
ANALYST	3.091	2.970	3.372	3.418	3.868	3.620	4.112	3.887	3.941	4.653	-1.562	-6.13***
BETA	0.829	0.805	0.811	0.872	0.900	0.914	0.912	0.842	0.964	0.919	-0.090	-1.11
RETVOL	0.032	0.030	0.031	0.034	0.030	0.032	0.027	0.029	0.030	0.027	0.005	2.49**
LEV	0.783	0.675	1.060	1.714	1.336	1.615	1.060	0.873	1.123	1.292	-0.509	-1.02
ALTMAN	0.938	1.099	0.911	0.934	0.905	1.137	0.897	0.923	0.909	1.043	-0.105	-0.73
ROAVAR	0.048	0.042	0.036	0.043	0.036	0.038	0.039	0.032	0.034	0.032	0.016	1.74*
DISP	0.328	0.235	0.287	0.315	0.351	0.351	0.272	0.331	0.289	0.281	0.047	0.39
BM	2.185	2.214	2.294	2.652	2.456	2.469	2.068	2.442	2.191	1.701	0.484	1.65*
TOBINQ	0.819	0.838	0.929	0.856	0.882	0.950	0.904	0.841	0.912	1.079	-0.260	-3.43***

Easton, 2004; Botosan and Plumlee, 2005; Easton and Monahan, 2005). Ashbaugh-Skaife et al. (2005) also check their estimates of firms' cost of equity capital by documenting the relation between the implied cost of equity capital and three risk proxies: Beta, firm size, and book-to-market ratio. This study adopts the same approach for the validity check of the implied cost of equity capital measures. As in previous studies, the following regression models provide a benchmark for assessing the incremental effect of corporate governance practices on the implied cost of equity capital. Model (7) is the rank regression model grouped into ten.

$$R\_gm\ (R\_peg,\ R\_mpeg) = \alpha + \beta_1 BETA + \beta_2 FIRM\_SIZE + \beta_3 BM + \beta_4 Year\ Dummy + \varepsilon \quad (5)$$

$$R\_gm\ (R\_peg,\ R\_mpeg) = \alpha + \beta_1 BETA + \beta_2 LNTASSET + \beta_3 BM + \beta_4 CGSCORE + \beta_5 Year\ Dummy + \beta_6 Industry\ Dummy + \varepsilon \quad (6)$$

$$R\_R\_gm\ (R\_R\_peg,\ R\_R\_mpeg) = \alpha + \beta_1 R\_BETA + \beta_2 R\_LNTASSET + \beta_3 R\_BM + \beta_4 R\_CGSCORE + \beta_5\ Year\ Dummy + \beta_6 Industry\ Dummy + \varepsilon \quad (7)$$

Panel A of Table 5 presents the OLS regression results with three risk proxies, Beta, firm size, and book-to-market ratio, after controlling for fiscal year, following Ashbaugh-Skaife et al. (2005).[21] The statistical significance of the reported coefficients is based on the heteroscedasticity consistent covariance matrix (White, 1980). The benchmark model of the unmerged sample (i.e., before merging with the *CGSCORE*) shows strongly significant coefficients on all three risks, but the sign of the coefficient on Beta is not predicted. However, the results of the merged samples (i.e., after merging with the *CGSCORE*) show a strong positive coefficient on *BM* and a strong negative coefficient on firm size of all six implied cost models, but *BETA* does not have significant coefficients. The explanatory power of the equation with three risk proxies ranges from 7.88% for *R_mpegmd* to 13.41% for *R_pegmn*.

21) Following Ashbaugh-Skaife et al. (2005), we use the market value of equity as a firm size proxy for this benchmark test to compare the result with that of previous studies. According to Ashbaugh-Skaife et al. (2005), their results of benchmark regressions of the implied cost of equity on risk proxies have an adjusted R^2 of 0.15. The result is not significantly different from that of this study.

Table 5. Validation of the implied cost of equity capital measures

See Table 2 for variable definitions. t-statistics are reported in parentheses. ***, **, and * denote the significance of the parameter estimated at the 0.01, 0.05, and 0.10 levels, respectively, based on the heteroscedasticity consistent covariance matrix following White (1980). The models are defined as follows.

$$R\_gm\ (R\_peg, R\_mpeg) = \alpha + \beta_1 BETA + \beta_2 FIRM\_SIZE + \beta_3 BM + \beta_4\ YEAR\ DUMMY + \varepsilon \quad \text{Panel A}$$

$$R\_gm\ (R\_peg, R\_mpeg) = \alpha + \beta_1 BETA + \beta_2 LNTASSET + \beta_3 BM + \beta_4 CGSCORE + \beta_5 YEAR\ DUMMY + \beta_6 INDUSTRY\ DUMMY + \varepsilon \quad \text{Panel B}$$

$$R\_R\_gm\ (R\_R\_peg, R\_R\_mpeg) = \alpha + \beta 1 R\_BETA + \beta_2 R\_LNTASSET + \beta_3 R\_BM + \beta_4 R\_CGSCORE + \beta_5 YEAR\ DUMMY + \beta_6 INDUSTRY\ DUMMY + \varepsilon \quad \text{Panel C}$$

Panel A: OLS Regression for Benchmarks

Variables	Pre. sign	Before merging with the CGSCORE						After merging with the CGSCORE					
		(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
		R_gmmn	R_gmmd	R_pegmn	R_pegmd	R_mpegmn	R_mpegmd	R_gmmn	R_gmmd	R_pegmn	R_pegmd	R_mpegmn	R_mpegmd
INTERCEPT	+/-	0.349 (5.55)***	0.222 (2.67)***	0.371 (6.42)***	0.277 (3.66)***	0.302 (5.02)***	0.224 (2.69)***	0.406 (6.66)***	0.287 (4.20)***	0.330 (6.55)***	0.322 (4.79)***	0.297 (5.48)***	0.307 (4.25)***
BETA	+	-0.001 (-8.94)***	-0.002 (-9.05)***	-0.001 (-10.61)***	-0.002 (-11.61)***	0.020 (2.08)**	0.022 (1.64)	0.006 (0.63)	0.017 (1.32)	0.001 (0.20)	0.008 (0.72)	0.009 (0.91)	0.014 (1.09)
FIRM_SIZE	-	-0.007 (-3.20)***	-0.002 (-0.82)	-0.008 (-4.06)***	-0.005 (-1.85)*	-0.007 (-3.41)***	-0.004 (-1.56)	-0.010 (-4.70)***	-0.006 (-2.58)***	-0.007 (-4.21)***	-0.007 (-3.13)***	-0.007 (-3.78)***	-0.007 (-2.97)***
BM	+	0.013 (4.76)***	0.018 (3.86)***	0.013 (5.32)***	0.018 (4.25)***	0.013 (4.49)***	0.018 (3.24)***	0.010 (3.90)***	0.016 (4.94)***	0.011 (4.92)***	0.014 (4.25)***	0.011 (5.08)***	0.011 (3.32)***
YEAR D.		included	included	included	included	included	included	included	included	included	included	included	included
Adj. R^2		0.1208	0.1137	0.1361	0.1222	0.1168	0.1067	0.1264	0.1326	0.1341	0.1164	0.1155	0.0788
No. of Obs.		604	557	677	618	641	580	439	389	475	437	478	428

(Continued)

	Panel B: OLS Regression						Panel C: Rank Regression					
Variables	(1) R_gmmn	(2) R_gmmd	(3) R_pegmn	(4) R_pegmd	(5) R_mpegmn	(6) R_mpegmd	(1) R_gmmn	(2) R_gmmd	(3) R_pegmn	(4) R_pegmd	(5) R_mpegmn	(6) R_mpegmd
INTERCEPT	0.133 (1.82)*	0.034 (0.41)	0.112 (1.91)*	0.073 (0.01)	0.061 (0.99)	0.059 (0.68)	0.815 (0.94)	0.379 (0.40)	0.401 (0.58)	1.715 (2.12)**	-0.049 (-0.09)	-0.049 (-1.94)*
BETA	-0.004 (-0.34)	0.007 (0.55)	-0.005 (-0.57)	0.002 (0.20)	-0.004 (-0.38)	0.002 (0.16)	0.026 (0.52)	0.076 (1.51)	0.0001 (0.00)	0.054 (1.12)	0.006 (0.14)	0.006 (0.35)
LNTASSET	-0.000 (-0.13)	0.003 (0.91)	-0.001 (-0.25)	0.002 (0.80)	0.000 (0.23)	0.002 (0.56)	0.004 (0.07)	0.069 (1.21)	0.031 (0.61)	0.039 (0.75)	0.037 (0.74)	0.037 (1.16)
BM	0.012 (4.74)***	0.016 (5.06)***	0.012 (5.64)***	0.014 (4.52)***	0.012 (5.67)***	0.012 (3.62)***	0.349 (7.64)***	0.312 (6.38)***	0.351 (8.20)***	0.318 (6.79)***	0.317 (7.31)***	0.317 (5.32)***
CGSCORE	-0.125 (-2.61)***	-0.119 (-2.02)**	-0.066 (-1.59)	-0.128 (-2.25)**	-0.083 (-1.99)**	-0.101 (-1.55)	-0.118 (-2.24)**	-0.099 (-1.69)*	-0.091 (-1.80)*	-0.095 (-1.77)*	-0.066 (-1.31)	-0.066 (-1.81)*
YEAR D.	included	included	included	included	included	included	included	included	included	included	included	included
IND. D.	included	included	included	included	included	included	included	included	included	included	included	included
Adj. R^2	0.1134	0.1287	0.1285	0.1124	0.1112	0.0670	0.1471	0.1202	0.1523	0.1231	0.1217	0.0760
No. of Obs.	439	389	475	437	478	428	439	389	475	437	478	428

Panel B of Table 5 presents the OLS regression results with four risk proxies: Beta, firm size, book-to-market ratio, and the overall corporate governance score. The results show that the coefficient of the overall corporate governance overall score is significant at the 5% level in four of implied equity capital costs models: *R_gmmn*, *R_gmmd*, *R_pegmd*, and *R_mpegmn*. The *R_pegmn* model and the *R_mpegmd* model also have negative coefficients on the corporate governance score, but they are not significant.

To check the robustness of the impact of corporate governance practices on the implied costs of equity capital, rank regression is conducted by ranking the independent variables for each fiscal year. Panel C of Table 5 shows the rank regression results grouped into ten. With the exception of the R_*mpegmn* model, five models still have negatively significant coefficients on the corporate governance overall score.

4.3.2 Regression results on corporate governance overall scores

Table 6 presents six regression results of the implied costs of equity capital against the corporate governance overall score (*CGSCORE*) with relevant control variables. As in the preceding analyses, the statistical significance of the reported coefficients is based on the heteroscedasticity consistent covariance matrix (White 1980). The *CGSCORE* is negatively significant in the first model (1) (coefficient = -0.103, t = -2.09), the second model (2) (coefficient = -0.108, t = -1.86), and the fourth model (4) (coefficient = -0.113, t = -2.08), but is not significant in the third model (3) (coefficient = -0.053, t = -1.25), the fifth model (5) (coefficient = -0.060, t = -1.34), or the sixth model (6) (coefficient = -0.081, t = -1.27). In the case of the *R_gm* estimates, there is a moderately negative association between the corporate governance overall score and the implied cost of equity capital in accordance with the hypothesis. However, the *R_peg* estimates show mixed results; only the *R_pegmd* estimate shows a significant association between the corporate governance practices and the implied cost of equity capital. In the case of *R_mpeg*, neither of the estimates shows significant results against the corporate governance overall score. Because *R_peg* and *R_mpeg* are special cases of *R_gm*, which assume that the subsequent periods' abnormal growth in earnings is zero, the unexpected regression results of *R_peg* and *R_mpeg* may reflect the important role of earnings growth assumptions. Furthermore, these unexpected weak results of cost of equity capital may be induced by the endogeneity problem of corporate governance practices, which has been addressed in many prior studies. Therefore, the

endogeneity problem of corporate governance practices is discussed in the following section.

The signs of control variables are almost as predicted. Through all six regressions, the book-to-market ratio (*BM*) has a significantly positive coefficient, which indicates that firms with a high *BM* usually have a higher cost of equity capital. Leverage, a proxy for firms' financial risk, also shows a positive coefficient in four implied cost of equity capital estimates. In both the *R_gmmn* and *R_pegmn* regressions, the analyst following *(ANALYST)* variable has a negative sign, which confirms the theory that firms followed by many analysts have a lower cost of equity capital. Return volatility shows a positive coefficient against those two implied cost models, *R_pegmn* and *R_mpegmd*. The R&D variable (*RD*) has a positive coefficient in two *R_mpeg* estimates, which supports the evidence that intangible assets correlate positively with the cost of equity capital because of the impounding higher proportion of private information of analysts.

Of the three models, *R_gm*, which is based on the perpetual growth rate assumption, produces the most significant results on the *CGSCORE*. In contrast, the magnitude of the R^2 would suggest that the *R_peg* estimate may be generally better than the *R_gm* estimate.[22] In addition, the median versions of the implied cost of capital estimates show more significant results on the *CGSCORE* than do the mean versions of the implied cost of equity capital estimates.[23] However, more caution is needed in interpreting the results regarding the choice of the best implied cost of equity capital measure. Further, choosing the best measure is not the scope of this study. In summary, the OLS regression results in Table 6 show a moderate negative relation between the *CGSCORE* and the implied costs of equity capital.

4.3.3 Discussion of endogeneity problems

As shown in Table 6, the coefficients on the *CGSCORE* are weakly significant or not significant at all in the OLS regressions. Therefore, investigation of possible endogeneity problems is necessary for corporate governance variables. Black et al. (2006a) extensively discuss the endogeneity issue in their study. Following their suggestion, this study implements simultaneous equations estimation using the two-stage least

22) Botosan and Plumlee (2005) find that R_peg and R_gm have higher R^2 than other proxies. However, they do not insist that high R^2 means more reliability because the assumption, placed on terminal value (e.g., growth) can yield induced high R^2.

23) Refer to Gu and Wu (2003).

Table 6. Regression results of the implied costs of equity capital on the corporate governance overall score

See Table 2 for variable definitions. t-statistics are reported on the right-hand side of the coefficient. ***, **, and * denote the significance of the parameter estimated at the 0.01, 0.05, and 0.10 levels, respectively, based on the heteroscedasticity consistent covariance matrix following White (1980). The models are defined as follows.

$$\begin{aligned} R\_gm\ (R\_peg,\ R\_mpeg) = {} & \alpha + \beta_1 CGSCORE + \beta_2 LNTASSET + \beta_3 BETA + \beta_4 BM + \beta_5 ANALYST + \beta_6 DISP + \beta_7 LEV \\ & + \beta_8 ROAVAR + \beta_9 ALTMAN + \beta_{10} RETVOL + \beta_{11} RD + \beta_{12}\ ADV + \beta_{13}\ PPE + \beta_{14} YEAR\ DUMMY \\ & + \beta_{15} INDUSTRY\ DUMMY + \varepsilon \end{aligned} \quad (1)\text{-}(6)$$

	(1) R_gmmn		(2) R_gmmd		(3) R_pegmn		(4) R_pegmd		(5) R_mpegmn		(6) R_mpegmd	
	Param. Estim.	t-stat.	Param. Estim.	t-stat.	Param. Estim.	t-stat.	Param. Estim.	t-stat.	Param. Estim.	t-stat.	Param. Estim.	t-stat.
Intercept	0.049	0.55	0.058	0.59	0.011	0.15	0.014	0.16	-0.063	-0.82	-0.016	-0.17
CGSCORE	-0.103	-2.09**	-0.108	-1.86*	-0.052	-1.25	-0.113	-2.08**	-0.060	-1.34	-0.081	-1.27
LNTASSET	0.002	0.76	0.001	0.43	0.002	0.64	0.004	1.09	0.003	1.09	0.004	1.04
BETA	-0.010	-0.83	-0.001	-0.05	-0.010	-1.06	-0.005	-0.41	-0.013	-1.19	-0.012	-0.89
BM	0.008	2.30**	0.012	3.01***	0.010	3.55***	0.009	2.48**	0.010	3.33***	0.006	1.67*
ANALYST	-0.007	-2.05**	0.001	0.26	-0.005	-1.67*	-0.003	-1.04	-0.004	-146	-0.004	-1.11
DISP	0.007	0.62	0.009	0.82	-0.005	-0.50	0.008	0.77	0.006	0.62	0.031	1.90*
LEV	0.005	1.53	0.009	2.18*	0.003	1.30	0.011	3.06***	0.004	1.68*	0.010	3.17***
ROAVAR	-0.007	-0.09	-0.055	-0.61	-0.040	-0.67	-0.093	-1.64	-0.033	-0.64	-0.076	-1.30
ALTMAN	0.002	0.31	0.010	1.18	0.013	2.14**	0.017	1.87*	0.005	0.77	0.010	0.88
RETVOL	0.788	1.61	0.311	0.60	0.886	2.31**	0.547	1.14	1.434	3.26***	0.828	1.56
RD	0.602	1.10	1.003	1.50	0.715	1.63	0.977	1.57	0.951	1.89*	1.437	2.28**
ADV	-0.083	-0.40	0.103	0.43	0.124	0.72	0.097	0.42	0.109	0.57	0.101	0.42
PPE	-0.003	-0.36	-0.009	-0.74	0.006	0.65	-0.008	-0.76	-0.002	-0.23	-0.011	-0.83
YEAR D.	Included		Included		Included		Included		Included		Included	
IND. D.	Included		Included		Included		Included		Included		Included	
Adj. R^2	0.1350		0.1473		0.1457		0.1513		0.1490		0.1208	
No. of Obs.	439		389		475		437		478		428	

squares estimation (2SLS). A 2 trillion *won* asset dummy variable (*ADUMMY*) is used as an instrumental variable.[24] Furthermore, this study refers to another study by Black et al. (2006b) regarding the determinants of Korean corporate governance systems. According to their study, corporate governance systems can be influenced by firm size, long term profitability, firm risks, and industry factors. The first-stage regression model of 2SLS is as follows:

$$\begin{aligned} CGSCORE = \alpha &+ \beta_1 ADUMMY + \beta_2 LNTASSET + \beta_3 ALTMAN + \beta_4 TOBINQ \\ &+ \beta_5 PERFORM + \beta_6 BM + \beta_7 ROAVAR + \beta_8 RETVOL \\ &+ \beta_9 R\_gm + \beta_{10} Year\ Dummy + \beta_{11} Industry\ Dummy + \varepsilon \end{aligned} \quad (8)$$

As shown in Table 7, 2SLS is accomplished for all six regressions, although models (3), (5), and (6) do not achieve significant coefficients on the *CGSCORE* in OLS regression. In Table 7, models (1) through (6) show significant coefficients on the *CGSCORE*; the magnitude of the coefficients on the *CGSCORE* becomes larger, and *t*-values become stronger. This means that the costs of equity capital are more responsive to corporate governance practices with less variance in 2SLS estimation. To test the endogeneity of each model, the Hausman test is performed. All of the test results are significant at a 1% significance level ($p < 0.0001$). In addition, the adjusted R^2 of the first stage of *R_gmmn* is 56.95%, which indicates that the explanatory power of the first-stage model is generally appropriate.[25]

4.4 Multivariate Tests on Corporate Governance Categories

4.4.1 OLS Regression results by year

As noted, because the survey construction for 2001-2002 is somewhat different from the survey construction for 2003-2004, for this study, the former is reconstructed into five categories in accordance with the latter.[26] The OLS regression of

24) According to Black et al. (2006a), since Korean government reformed the corporate governance systems of large firms with assets of more than 2 trillion won, the asset size dummy can be an ideally exogenous variable under Korean law. For a more detailed explanation, see Black, Jang, and Kim (2006a, 2006b). Another motive for using an asset size dummy is that prior study already provides evidence of the meaningful differences between small firms and large firms classified by a 2 trillion won assets dummy.

25) The adjusted R^2 of the first stage of the other models is almost the same.

26) For the 2001 period, the data set is classified into four categories, as FAC3 and FAC5 are not separable. Thus, only a yearly regression is run for 2001.

Table 7. Endogeneity tests by 2SLS for model (1) through model (6)

Table 7 shows the first-stage and the second-stage regression results of 2SLS for models (1) through (6). This table uses the following model as the first-stage equation.

$$\begin{aligned} CGSCORE = \alpha &+ \beta_1 ADUMMY + \beta_2 LNTASSET + \beta_3 ALTMAN + \beta_4 TOBINQ + \\ &\beta_5 PERFORM + \beta_6 BM + \beta_7 ROAVAR + \beta_8 RETVOL + \\ &\beta_9 R\_gm\ (R\_peg,\ R\_mpeg) + \beta_{10} Year\ Dummy + \beta_{11} Industry\ Dummy + \varepsilon \end{aligned}$$

See Table 2 for variable definitions. t-statistics for the t-test are reported in parentheses. ††† The Hausman test is performed to test the simultaneity. ***, **, and * denote the significance of the parameter estimated at the 0.01, 0.05, and 0.10 levels, respectively.

	First stage	*Second Stage*					
		(1)	(2)	(3)	(4)	(5)	(6)
Variables	CGSCORE	R_gmmn	R_gmmd	R_pegmn	R_pegmd	R_mpegmn	R_mpegmd
INTERCEPT	-0.061 (-0.56)	-0.278 (-1.76)*	-0.261 (-1.49)	-0.165 (-1.44)	-0.314 (-1.91)*	-0.314 (-2.48)**	-0.271 (-1.72)*
CGSCORE		-0.965 (-4.17)***	-0.963 (-3.99)***	-0.520 (-3.14)***	-0.940 (-4.36)***	-0.650 (-3.70)***	-0.707 (-3.48)***
ADUMMY	0.063 (5.18)***						
LNTASSET	0.018 (5.01)***	0.030 (3.40)***	0.030 (3.03)***	0.017 (2.60)***	0.031 (3.58)***	0.024 (3.37)***	0.025 (3.05)***
ROAVAR	-0.155 (-2.29)**	-0.171 (-1.55)	-0.236 (-1.90)*	-0.082 (-1.22)	-0.174 (-2.28)**	-0.053 (-0.93)	-0.136 (-1.84)*
ANALYST		-0.007 (-1.49)	0.0006 (0.12)	-0.004 (-1.31)	-0.003 (-0.74)	-0.005 (-1.39)	-0.005 (-1.11)
DISP		0.004 (0.40)	0.002 (0.21)	-0.006 (-0.83)	0.002 (0.21)	0.006 (0.75)	0.025 (1.74)**
TOBINQ	0.023 (1.66)*						

ALTMAN	0.004 (0.75)	0.002 (0.24)	0.006 (0.49)	0.012 (1.49)	0.012 (0.90)	0.000 (0.00)	0.007 (0.54)
ROA	0.109 (2.63)***						
BM	-0.003 (-1.33)	0.001 (0.27)	0.004 (0.90)	0.007 (2.13)**	0.004 (1.01)	0.009 (3.02)***	0.002 (0.73)
RETVOL	-0.739 (-1.80)*	0.199 (0.32)	-0.213 (-0.30)	0.545 (1.14)	0.237 (0.37)	1.190 (2.61)***	0.529 (0.85)
BETA		-0.012 (-0.79)	0.002 (0.17)	-0.014 (-1.30)	-0.003 (-0.23)	-0.015 (-1.20)	-0.012 (-0.79)
LEV		0.006 (1.92)*	0.010 (2.78)***	0.004 (1.54)	0.011 (3.40)***	0.005 (1.88)*	0.011 (3.43)***
RD		0.847 (1.22)	1.407 (1.82)*	0.889 (1.64)	1.274 (1.73)*	1.120 (1.95)*	1.586 (2.24)**
ADV		-0.026 (-0.11)	0.161 (0.60)	0.124 (0.67)	0.140 (0.56)	0.128 (0.65)	0.142 (0.58)
PPE		-0.008 (-0.63)	-0.015 (-0.94)	0.003 (0.30)	-0.019 (-1.30)	-0.008 (-0.73)	-0.021 (-1.44)
R_gmmn	-0.040 (-0.91)						
YEAR D.	Included	Included	Included	Included	Included	Included	Included
IND. D.	Included	Included	Included	Included	Included	Included	Included
Hausman test†††	137.91***	29.06***	25.17***	81.95***	21.90***	17.69***	14.77***
Adj. R^2 (%)	0.5695	0.1308	0.1316	0.1340	0.1300	0.1334	0.1160
No. of Obs.	425	425	377	457	421	471	422

the six implied cost of equity capital models is performed for one year, two years, and three years.

In untabulated yearly regressions, shareholder rights protection (*FAC1*) is the most frequently significant category across the six models of implied cost of equity capital from 2001 to 2004. The second most frequent category is corporate disclosure (*FAC3*), which is significant only for the year 2004. The board of director category (*FAC2*) is the third most frequent category and is primarily shown in 2001. The F-test and Wald-test are conducted on the corporate governance elements to examine whether corporate governance categories have a significant incremental explanatory power for the implied cost of equity capital.[27] The F-tests and Wald-tests show significant results only for 2003 and 2004, which indicates that the survey questions for 2003 and 2004 include more detailed and specific information about the five corporate governance categories.

Table 8 reports the regression results of the five corporate governance categories for two years and three years. In the two-year and three-year regressions, *FAC1* is still the most significant category among the five corporate governance practices, followed by *FAC3* and *FAC2*. [28] The economic significance of these results is approximately estimated.[29] In the two-year regression of *R_gmmn*, for the average firm, one standard deviation increase in the corporate disclosure category induces a 1.32% decrease in the implied cost of equity capital. Similarly, in the three-year regression of *R_gmmn*, a one standard deviation increase in the shareholder rights protection and the board of directors categories induces a 1.07% and 1.25% decrease in the implied cost of equity capital, respectively.

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27) The F-test examines the significance of the additional explanatory power of corporate governance categories. This is determined by F-test statistics for the test FAC1 = FAC2 = FAC3 = FAC4 = FAC5 = 0. The Wald-test (W = (RRSS-URSS)/(URSS/n)) examines whether the regression on the overall score and the regression on the five categories differ in explanatory power, that is, adj_R^2. See C. S. Maddala, Econometrics (3rd ed.).

28) Two unexpected, puzzling results are shown in Table 8. FAC5 is positively associated with the R_gmmn estimate and similarly, FAC4 is positively associated with R_mpegmd for the two-year and three-year regressions. These positive coefficients are puzzling because the results do not fit the hypothesis that corporate governance practices are negatively related to the implied cost of equity capital.

29) The computation of the 1.32% decrease in R_gmmn for the average firm in our sample is as follows: 0.01919 (one standard deviation of FAC3 for 2003-2004)* -0.690 (FAC3 coefficient for 2003-2004)* 0.017312 (mean R_gmmn for 2003-2004). The computation of the impact of other governance practices is similar.

Table 8. Results of Regression on Corporate Governance Categories for Model (1) through Model (6)

Table 8 shows the summary results of regression on corporate governance categories for model (1) through model (6). See Table 2 for variable definitions. t-statistics are reported in parentheses. ***, **, and * denote the significance of the parameter estimated at the 0.01, 0.05, and 0.10 levels, respectively, based on the heteroscedasticity consistent covariance matrix following White (1980). † F-statistics for the F-test (FAC1 = FAC2 = FAC3 = FAC4 = FAC5 = 0) are reported in the fourth column from the right. The F-test examines the significance of any additional explanatory power that corporate governance categories collectively add to the model. †† F-statistics for the Wald-test between the regression on the corporate governance overall score and the regression on the five elements are reported in the third column from the right. The Wald-test examines whether the two regressions differ in R^2.

Variables	YEAR	CGSCORE	FAC1	FAC2	FAC3	FAC4	FAC5	F-test†	Wald-test††	Sample	Adj_R^2
(1) *R_gmmn*	2003-2004	-0.091 (-1.40)	-0.138 (-0.63)	-0.165 (-1.09)	-0.690 (-1.82)*	0.251 (1.07)	0.910 (2.31)**	2.73**	11.853**	211	0.2047/ 0.2311
	2002-2004	-0.100 (-2.03)**	-0.298 (-1.67)*	-0.208 (-1.88)*	-0.244 (-1.44)	0.181 (0.84)	0.442 (1.96)*	2.43**	9.738**	346	0.1514/ 0.1643
(2) *R_gmmd*	2003-2004	-0.091 (-0.41)	-0.692 (-2.60)***	0.199 (1.18)	-0.405 (-0.93)	0.109 (0.33)	0.435 (0.85)	1.86	10.824**	182	0.2534/ 0.2777
	2002-2004	-0.137 (-2.10)**	-0.610 (-2.94)***	-0.039 (-0.30)	-0.290 (-1.33)	-0.016 (-0.06)	0.166 (0.59)	2.39*	8.411*	306	0.1411/ 0.1522
(3) *R_pegmn*	2003-2004	-0.085 (-1.50)	-0.225 (-1.27)	-0.080 (-0.60)	-0.735 (-2.36)**	0.296 (1.42)	0.443 (1.36)	2.60**	10.809**	227	0.1889/ 0.2106
	2002-2004	-0.047 (-1.07)	-0.254 (-1.76)*	-0.092 (-0.91)	-0.151 (-1.00)	0.191 (1.01)	0.220 (1.18)	1.22	5.539	375	0.1409/ 0.1437
(4) *R_pegmd*	2003-2004	-0.087 (-1.11)	-0.225 (-2.20)**	-0.080 (-0.61)	-0.735 (-0.66)	0.296 (1.51)	0.443 (0.07)	1.64	7.558	206	0.2726/ 0.2830
	2002-2004	-0.143 (-2.42)**	-0.644 (-3.45)***	-0.191 (-1.55)	-0.176 (-0.89)	0.238 (0.96)	0.163 (0.64)	3.08***	10.882**	343	0.1892/ 0.2042
(5) *R_mpegmn*	2003-2004	-0.088 (-1.61)	-0.345 (-1.81)*	-0.001 (-0.01)	-0.539 (-1.59)	0.297 (1.40)	-0.049 (-0.13)	1.89*	7.541	232	0.1996/ 0.2099
	2002-2004	-0.060 (-1.29)	-0.452 (-2.92)***	-0.041 (-0.37)	-0.128 (-0.85)	0.233 (1.17)	0.117 (0.57)	2.05*	9.638**	378	0.1471/ 0.1589
(6) *R_mpegmd*	2003-2004	-0.100 (-1.27)	-0.629 (-2.23)**	-0.264 (-1.30)	-0.039 (-0.08)	0.695 (2.32)**	0.029 (0.05)	2.55**	12.455**	210	0.2034/ 0.2326
	2002-2004	-0.144 (-2.36)**	-0.653 (-3.04)***	-0.245 (-1.72)*	-0.151 (-0.71)	0.486 (1.80)*	-0.008 (-0.02)	3.23***	12.438**	341	0.1424/ 0.1623

4.4.2 Factor analysis results

This study uses factor analysis for the 2003-2004 period to identify the most representative factors of corporate governance elements.[30] Panel A and B of Table 9 report the results of the factor analysis of five corporate governance practices for *R_gmmn* for 2004.[31] Panel A shows that there are two large eigenvalues, 2.495 and 1.136, which together account for 72.6% of the standardized variances. This means that these two principal components having eigenvalues that exceed one provide an adequate summary of the data for most purposes. Panel B reports the factor loading for these two factors after rotating the component matrix using varimax rotation. *FAC2*, *FAC3*, and *FAC4* load heavily on FACTOR 1 and *FAC1* and *FAC5* load heavily on FACTOR 2. The final communality estimates indicate that the five corporate governance practices are well accounted for by two components, ranging from 0.503 for *FAC5* to 0.865 for *FAC2*. Both FACTOR1 and FACTOR2 are expected to lower information asymmetry and agency problem.

Because FACTOR 1 is related to the transparency of management (i.e., board of directors, corporate disclosure, and audit committee), FACTOR 1 is labeled *M_ TRANS* (i.e., management transparency), which is negatively associated with the cost of equity capital. FACTOR 2 is labeled *M_ EFFIC* (i.e., management efficiency) because it is related to the efficiency of management, which results in an increase of shareholders' rights and wealth. FACTOR 2 is expected to be negatively associated with the cost of equity capital.

Panel C of Table 9 presents the summary of regression results of the six implied costs of equity capital on corporate governance factors by factor analysis for the 2003-2004 period. *M_ EFFIC* is negatively significant in four regression models, such as *R_ gmmd*, *R_ pegmd*, *R_ mpegmn*, and *R_ mpegmd*, but *M_TRANS* is not significant in any regression model. This means that the corporate governance practices of Korean listed firms primarily depend on the investment efficiency or the operating efficiency of management, which results in an increase of shareholders' rights and wealth. The results of some control variables are as predicted. The *BM, DISP,* and *LEV* have a significantly positive coefficient. The *ANALYST* and *PPE* have a negatively signifi-

30) As both the F-test and the Wald-test are significant only for the 2003-2004 period in the previous section (4.4.1), factor analysis results for the period should be less noisy. In addition, factor analysis is also used to address the potential multicollinearity problem of the five corporate governance practices.

31) Factor analysis of all models is performed on the five categories by year. The results for the other models are similar to the Panel A abd B of Table 9.

cant coefficient. These OLS regression results together with the new corporate governance factor by factor analyses provide additional evidence that corporate governance factors can reduce the implied cost of equity capital.

Table 9. Factor analysis of corporate governance variables and summary regressions results

Panel A and B of Table 9 shows the results of the factor analysis of the five corporate governance categories for R_gmmn. Panel C shows the results of the implied cost of equity capital regression on corporate governance factors by factor analysis for the 2003-2004 period. See Table 2 for variable definitions. t-statistics for the t-tests are reported on the right-hand side of the coefficient. ***, **, and * denote the significance of the parameter estimated at the 0.01, 0.05, and 0.10 levels, respectively, based on the heteroscedasticity consistent covariance matrix following White (1980).

Panel A: Correlation Matrix and Eigenvalues of the Correlation Matrix for 2003-2004

Partial Correlation Matrix					Total Variance Explained				
	FAC1	FAC2	FAC3	FAC4	Component	Eigenvalue	Difference	Proportion	Cumulative
FAC1					1	2.495	1.358	0.499	0.499
FAC2	0.048				2	1.136	0.355	0.227	0.726
FAC3	0.201	0.514			3	0.780	0.396	0.156	0.882
FAC4	-0.176	0.600	0.076		4	0.383	0.181	0.076	0.959
FAC5	0.154	-0.015	0.174	0.030	5	0.202		0.040	1.000

Panel B:Rotated Component Matrix /Factor Loading for 2003-2004

Component	FACTOR 1 (= M_TRANS)	FACTOR 2 (= M_EFFIC)	Final Communality Estimates: Total = 3.632
FAC1	-0.018	0.837	0.702
FAC2	0.922	0.118	0.865
FAC3	0.798	0.340	0.753
FAC4	0.896	-0.059	0.807
FAC5	-0.047	0.682	0.503
Variance Explained	2.330	1.301	

Panel C: Summary Regression Results on Corproate Governance Factors by Factor Analysis

	(1) *R_ gmmn*		(2) *R_ gmmd*		(3) *R_ pegmn*		(4) *R_ pegmd*		(5) *R_ mpegmn*		(6) *R_ mpegmd*	
	Par.am Estim.	t-stat.	Param. Estim.	t-stat.	Par.am Estim.	t-stat.	Par.am Estim.	t-stat.	Param. Estim.	t-stat.	Par.am Estim.	t-stat.
M_TRANS	-0.011	-1.64	0.006	0.75	-0.007	-1.29	0.002	0.25	-0.001	-0.22	0.006	0.78
M_EFFIC	0.002	0.39	-0.012	-1.71*	-0.004	-0.85	-0.012	-1.96**	-0.010	-1.93*	-0.016	-2.00**
Adj. R^2	0.2051		0.2681		0.1860		0.2819		0.2053		0.2221	
No. of Obs.	211		182		227		206		232		206	

5. Summary and Conclusions

The purpose of this study is to examine the relation between corporate governance practices and the implied cost of equity capital. The limited transparency or opacity of firms' operations to outside investors has been a subject of serious concern; consequently, demands have been placed on corporate governance systems to mitigate agency problems. This study provides direct evidence of the effect of corporate governance practices on the implied cost of equity capital using a corporate governance score constructed by the KCGS for the 2001 to 2004 periods.

The results indicate that in general firms with good corporate governance practices have a lower implied cost of equity capital. In particular, shareholder rights protection is the most important practice for the reduction of the implied cost of equity capital. Board of directors and corporate disclosure are also important in lowering the implied cost of equity capital. This negative relation between corporate governance practices and the implied cost of equity capital becomes stronger even after controlling for endogeneity problems. Overall, our study shows that, consistent with agency theory, corporate governance practices can reduce the implied cost of equity capital through a reduction in agency problems and information asymmetry.

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Appendix

Survey Questions on Corporate Governance Practice of Listed Korean Firms

1. The construction of corporate governance score(*CGSCORE*)

The corporate governance score (*CGSCORE*) is based on a detailed survey of all companies listed on the Korea Stock Exchange (KSE), conducted by the KSE in Spring 2001. The purpose of the survey is to determine the extent to which corporate governance principles are practiced by the KSE traded companies and the KSE member firms. The conduction of the survey by KSE for the year 2001-2002 is at an early stage, but KSE sponsorship ensures a high response rate. For ease of assessing the questionnaire forms, questions related to the corporate governance principles were gathered under four or five categories and the responses to the questions were evaluated under two choices denoted as "Yes/No" or short answer. Since 2003, the survey is being executed under the control of the Korea Corporate Governance Service (KCGS). As mentioned before, KSE (or KCGS) has been changing its survey questions of each category each year, which makes it impossible to keep the same elements in the index throughout the year. Thus, this paper focuses on the sub category score of corporate governance practices. Questions are designed in five different weighted categories: Shareholder Rights Protection (FAC1), Board of Directors (FAC2), Corporate Disclosure (FAC3), Audit Committee Activities (FAC4), and Dividend Policies (FAC5).

2. The survey items of corporate governance score(CGSCORE)

The survey items below briefly describe individual survey questions for listed Korean firms given by KCGS. For example, the survey question for 2003 by KCGS is composed of 86 items and total score is 300. Each item has a multi-choice answer with a different score of 1-10 given. Overall score is the sum of the score of each item.

Items	Question	Score	%
FAC1. Protection of Shareholder Rights		90	30.0
1	Adoption/incidence of corporate governance principles	5	1.67
2	Adoption of the codes of ethics for executives and employees	3	1.00

3	Level of ownership by directors, except for the largest shareholder and his/her affiliated shareholders	3	1.00
4	Level of ownership by independent directors	3	1.00
5	Level of ownership by affiliated companies including subsidiaries	6	2.00
6	Level of ownership by the largest shareholder and his/her relatives, except for affiliated companies	3	1.00
7	Level of ownership by shareholders who have more than 1% of ownership, except for the largest shareholder and his/her affiliated shareholders	3	1.00
8	Level of ownership by institutional investors	3	1.00
9	Level of ownership by foreigners	3	1.00
10	Percentage of transactions, relative to owners' equity, with the largest shareholder and his/her affiliated shareholders excluding subsidiaries	5	1.67
11	Percentage of loans, relative to owners' equity, made to the largest shareholder and his/her affiliated shareholders excluding subsidiaries	5	1.67
12	Percentage of investments, relative to owners' equity, in affiliated companies	3	1.00
13	Percentage of loan guarantees and collaterals, relative to owners' equity, made to affiliated companies	3	1.00
14	Percentage of transactions, relative to total assets, with affiliated companies	4	1.33
15	Percentage of sales, relative to total sales, with affiliated companies	4	1.33
16	Incidence of cumulative voting in corporate charters	4	1.33
17	Incidence of voting by mail	4	1.33
18	Incidence of the upper limit on the new issuances of convertible bonds	2	0.67
19	Incidence on the upper limit on the new issuances of bonds with stock warrants in corporate charters	2	0.67
20	Incidence in corporate charters of the mechanisms to protect management (e.g., increased restrictions on dismissal of executives, increased restrictions on a change in the number of executives, increased approval requirements for changes in control in special shareholders' meetings, or staggered term limits for executives)	4	1.33
21	Incidence of explanations on shareholders' suggestions including director nominations in the materials for general shareholders' meetings	3	1.00
22	Incidence of explanations on proxy voting	4	1.33
23	Timeliness in announcing the general shareholders' meeting venues and agenda on the company wet site	3	1.00
24	The number of general shareholders' meetings held on the same date	3	1.00
25	Attendance rate of minority shareholders in general shareholders' meetings	4	1.33
FAC2. Board of Directors		100	33.3
Board composition and independent directors		40	13.3
1	The number of independent directors in excess of the minimum required by the law	4	1.33
2	Attendance rate of independent directors	5	1.67
3	The number of board meetings attended by independent directors only	4	1.33

4	Incidence of cases where independent directors either objected or suggested a modification to the meeting agenda	4	1.33
5	Incidence of cases where the opinions modified by independent directors' were adopted	4	1.33
6	Incidence of stipulations that allow independent directors to obtain external expert assistance	3	1.00
7	Incidence of cases where independent directors did ask for and obtained external expert assistance	3	1.00
8	Number of independent directors who were recommended by either controlling shareholders (or their affiliated shareholders) or the management?	4	1.33
9	Separation of board chair from CEO? If not, is there a lead independent director?	4	1.33
10	Percentage of directors with foreign citizenship	3	1.00
11	Incidence of stipulations that require the management to provide relevant information to independent directors	2	0.67
Board activities and board compensation		60	20.0
12	The number of board meetings in prior year	4	1.33
13	Average attendance rate of the board	4	1.33
14	Incidence of board minutes that record individual directors' opinions	5	1.67
15	Incidence of voting records for individual directors on the specific agenda	5	1.67
16	Timeliness in provision of information to directors via either by direct contact or by mail	4	1.33
17	Incidence of stipulations on regular board meetings in corporate charters	3	1.00
18	Incidence of company-provided liability insurance policies for directors	3	1.00
19	Incidence of cases where a claim was made to directors either for allegedly violating rules and regulations stipulated in corporate charters or wrongdoings	3	1.00
20	Incentives for directors to hold shares in the company	3	1.00
21	Average value of shareholdings per director, except for controlling shareholders	3	1.00
22	Granting performance-based stock options to board of directors	3	1.00
23	Incidence of nomination committee or compensation committee	4	1.33
24	Percentage of independent directors in the nomination committee, if any	1	0.33
25	Percentage of independent directors in the compensation committee, if any	1	0.33
26	Independent director as the chair of the nomination committee	2	0.67
27	Independent director as the chair of the compensation committee	2	0.67
28	Provision of annual reports by the nomination and compensation committees	2	0.67
29	Incidence of manuals that stipulate the authority, responsibilities, and operations of the board	4	1.33
30	External education programs for directors to facilitate board's effectiveness	4	1.33

FAC3. Corporate Disclosure		50	16.7
1	The number of investor relations (IR) meetings during the year of the survey	3	1.00
2	The number of voluntary disclosures during the year of the survey	3	1.00
3	The number of confirmatory disclosures during the year of the survey	3	1.00
4	The number of disclosures that corrected previous disclosures	3	1.00
5	Provision of operating performance measures on a monthly basis	3	1.00
6	Provision of management forecasts	3	1.00
7	Disclosure in annual reports of major activities of the audit committee or the internal auditor	2	0.67
8	Disclosure of gross income of individual directors in annual reports	5	1.67
9	Disclosure of directors' background information on the company wet site	2	0.67
10	Disclosure of board attendance rate of individual board members	2	0.67
11	Disclosure of individual board members' voting records on material agenda	2	0.67
12	Disclosure in annual reports of board activities	3	1.00
13	Percentage of disclosures that are made one day earlier than scheduled	3	1.00
14	Incidence of violating fair disclosure rules	2	0.67
15	Provision of independent auditors' audit opinion and other material information in English	2	0.67
16	Disclosure of annual reports, semi-annual reports and other items on the company web site	3	1.00
17	Company web site in English	2	0.67
18	Incidence of cases where executives or employees were sanctioned due to insider trading activities	4	1.33
FAC4. Audit Committee Activities		30	10.0
1	Incidence of the audit committee	3	1.00
2	Percentage of independent directors in the audit committee, if any	2	0.67
3	Incidence of stipulations on the authority, responsibilities, and operations of the audit committee	4	1.33
4	Provision of the authority to the audit committee or the internal auditor to approve the selection of an individual who is in charge of internal audits	4	1.33
5	Incidence of cases where audit committee members or the internal auditor have obtained audit-related education	3	1.00
6	Incidence of independent internal audit department that supports the audit committee	4	1.33
7	The number of the audit committee meetings	3	1.00
8	Provision of annual reports to the board on the audit committee's activities	3	1.00
9	Incidence of non-audit consulting services performed by the independent external audit firm	3	1.00
FAC5. Dividend Policies		30	10.0
1	Dividend yield	10	3.33
2	Dividend payout ratio averaged over past three years	5	1.67
3	Incidence of interim dividends	5	1.67
4	Incidence of stock repurchases	10	3.33
CGSCORE		300	100