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Implied Cost of Equity Capital in Earnings-Based Valuation Model: Evidence from Korea*

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Abstract

We provide empirical evidence regarding the reliability of implied cost of equity capital based on the earnings-based valuation models in Korea. We find that the implied cost of equity capital is more reliable as the estimate of unobservable ex-ante cost of equity capital than the realized stock return in Korea. Furthermore, we find that the implied cost of equity capital from the residual income valuation model (Ohlson, 1995) outperforms that from the abnormal earnings growth valuation model (Ohlson and Juettner-Nauroth, 2005) in the estimation of ex-ante cost of equity capital in Korea. Our study will contribute to Korean academics by suggesting a more reliable way to derive the estimates of ex-ante cost of equity capital.

Keywords: Ex-Ante Cost of Equity Capital; Implied Cost of Equity Capital; Residual Income Valuation Model; Abnormal Earnings Growth Valuation Model; Risk Proxies

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1. Introduction

This study examines two research questions: (1) Is the implied cost of equity capital (hereafter ICOE) based on the earnings-based valuation models reliable in Korea?; (2) Which of the earnings-based valuation models is more reliable for the estimation of the ICOE in Korea?

Over the last decade, it has been a crucial issue in both finance and accounting research to estimate the ex-ante cost of equity capital which is needed as an input for equity valuation or project evaluation. Since the ex-ante cost of equity capital is unobservable, the ex-post realized stock return has often been used as a proxy. However, Fama and French (1997) conclude that the cost of equity capital estimated from the ex-post realized stock return is inevitably imprecise, owing to the uncertainty inherent to the magnitude of risk premia, coupled with the uncertainty inherent to risk loadings. Elton (1999) also finds that the correlation between expected returns and realized returns is weak, calling for an alternative method for the estimation of ex-ante cost of equity capital.

Responding to the call for an alternative approach to the estimation of the ex-ante cost of equity capital, accounting studies have explored the feasibility of ICOE derived from the earnings-based valuation models (Gebhardt, Lee, and Swaminathan, 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005; Easton and Monahan, 2005). The general idea therein is to substitute price and analysts' earnings forecasts with an equity valuation equation and to back out the ICOE as the internal rate of return that equates the current stock price with the expected future sequence of residual income or abnormal earnings growth.

While previous studies using U.S. data have already confirmed the reliability of ICOE as a reasonable estimate of the ex-ante cost of equity capital, whether such an approach can be applicable to Korean firms remains an open question due to the following reasons.

First, given that the quality of analysts' earnings forecasts varies across countries,[1] it is not clear that the results of U.S. studies are applicable to Korean firms. As our approach requires that analysts' earnings forecasts constitute a reasonable proxy for market's earnings expectations, the reliability of ICOE depends on the quality of ana-

1) For example, the different disclosure policies across countries are significantly associated with analysts' earnings forecast accuracy and/or bias (Hope, 2003a, 2003b).

lysts' earnings forecasts. Thus, if analysts' earnings forecasts for Korean firms were noisy proxies for market's earnings expectations, the resulting ICOE would be unreliable.

Second, the assumption of earnings growth beyond the forecast horizon is unavoidable in the implementation of earnings-based valuation models. Since the economic environments in which Korean firms operate are inevitably different from those in which U.S. firms operate, it is an empirical question whether the U.S. based studies' assumptions of earnings growth beyond the forecast horizon are also applicable to Korean firms. If our assumption regarding Korean firms' long-term earnings growth beyond the forecast horizon do not fit the corresponding market's expectations, the ICOE derived from the equity valuation models will also be noisy.[2)]

Third, if capital markets around the world are segmented, investors in different countries are likely to apply different equity valuation models, which could result in different stock prices in the capital market even for the same firm. If Korean investors principally utilize non-earnings-based valuation models, such as free cash flow discount models to derive equity value, the ICOE based on the earnings-based valuation models will not be reliable.

Thus, we investigate whether Korean firms' ICOE based on earnings-based valuation models is a more reliable proxy for the ex-ante cost of equity capital than are realized stock returns by evaluating the association between the ICOE (or realized stock returns) and the frequently-cited risk proxies.

As the second research question, we compare the reliability of alternative earnings-based valuation models in terms of inferring a more reasonable ex-ante cost of equity capital in Korea. This is an important research question since valuation method choice may significantly affect the valuation outcome, which would result in varying reliability of ICOE derived from different valuation methods.[3)]

Although many U.S. based studies use the residual income valuation model (hereafter RIV model; Ohlson, 1995) and/or the abnormal earnings growth model (hereafter OJ model; Ohlson and Juettner-Nauroth, 2005) to drive the ICOE, they have

2) For example, Cheng (2005) suggests that the future residual earnings are determined by various economic determinants, such as industry concentration and industry level barriers to entry, which may vary across countries.

3) Our perspective assumes that equity valuation does not escape from the practical limitations or biases inherent in the equity valuation method, since the valuation method determines both the information input and the information processing (Chen, Yee, and Yoo, 2006).

reported mixed results with regard to which model is more useful to get a more reliable proxy for the ex-ante cost of equity capital. Furthemore, even if U.S. based studies have shown consistent results, such results cannot be applied directly to Korean firms, due to the following reasons.

First, the relative reliability of the equity valuation model in terms of inferring more reasonable cost of equity capital is affected by the extent to which the clean surplus relation (hereafter CSR) holds in a country's financial reporting rules. This is because the RIV model requires the CSR for the model derivation whereas the OJ model does not. If the Korean GAAP allows more (less) deviation from the CSR than does the U.S. GAAP, it is possible that the OJ model may perform better (worse) than the RIV model in Korea by a greater extent than in the U.S.

Second, as indicated above, the empirical implementation of earnings-based valuation models requires the assumption of earnings growth beyond the forecast horizon. Since the RIV and OJ model may adopt different assumptions regarding long-term earnings growth beyond the forecast horizon (Jorgensen, Lee, and Yoo, 2007), it is an open empirical question which growth assumption of a specific equity valuation model is more feasible for Korean firms that may have systematically different earnings growth expectations from those of U.S. firms.

Thus, we investigate which of the earnings-based valuation models yields a more reliable ICOE in terms of the association with frequently-cited risk proxies. More specifically, we examine the individual association between the various ICOE's (or realized stock returns) and each of the risk proxies, and also the overall association between them in terms of the adjusted R^2 of the regressions of ICOE's (or realized stock returns) on the sets of risk proxies.

We find that, while the ICOE shows the predicted associations with the most of risk proxies, the realized stock returns do not. Furthermore, the adjusted R^2 of the regressions of ICOE on risk proxies is significantly higher than that of the realized stock returns. We further find that the ICOE based on the RIV model outperforms that based on the OJ model in terms of the overall association (i.e., the adjusted R^2 of the regressions) with risk proxies. Thus, we conclude that the ICOE is a more reliable proxy for the ex-ante cost of equity capital than are the realized stock returns in Korea, and also that the RIV model provides a more reliable proxy for the ex-ante cost of equity capital for Korean firms than does the OJ model. These results will be helpful for Korean academics (practitioners) to get a more reasonable proxy for the ex-ante cost of equity capital, which can be applied to various studies (works, such as project evaluation) requiring it.

The paper proceeds as follows. Section 2 reviews the related literature and Section 3 describes the research design. Section 4 provides the descriptive statistics of our sample, and Section 5 presents the main empirical results. Section 6 concludes.

2. Literature Review

Over the last decade, how to estimate a reliable ex-ante cost of equity capital has been a fundamental academic issue. The ex-ante cost of equity capital is the core factor in financial decision making such as equity valuation or project evaluation. As the ex-ante cost of equity capital is not observable, the ex-post realized stock return has been utilized as an indirect measure of the ex-ante cost of equity capital. However, the realized stock return has been proven as a noisy proxy for the ex-ante cost of equity (Fama and French, 1997; Elton, 1999). Thus, academics in accounting have suggested an alternative approach to estimate the ex-ante cost of equity capital by calculating the internal rate of return that equates the stock prices with the equity value estimates based on analysts' earnings forecasts.

The seminal study by Gebhardt et al. (2001) finds that the ICOE based on the RIV model is a reliable proxy for the ex-ante cost of equity capital. Subsequent studies also have achieved consistent results showing that the ICOE is more reliable on average as a proxy for the ex-ante cost of equity capital than the realized stock return.

After establishing the reliability of ICOE, these subsequent studies have attempted to address the issue as to which valuation model is more useful in inferring a more reliable ICOE.

Gode and Mohanram (2003) report that the RIV model reflecting industry-specific information outperforms the OJ model in terms of the correlations with the frequently cited risk proxies. Easton and Monahan (2005) also conclude that the ICOE from the PEG model, a special case of the OJ model, is the worst performer. However, Botosan and Plumlee (2005) argue that the ICOE from the PEG model dominates the alternative valuation model such as the RIV model. Therefore, it remains an open empirical question which of the earnings-based valuation models is more reliable for the estimation of the ICOE, even for U.S. firms.

Despite the popularity of U.S. based studies directly examining the reliability of ICOE, few research has explored directly the reliability of ICOE in non-U.S. countries[4] as well as in Korea.[5] Given that Korean researchers have begun to use the ICOE in various studies (e.g., Kim, 2006; Byun, 2006; Cho and Jo, 2006), it is necessary to directly assess the reliability of ICOE in Korea in order to investigate whether their proxy of ex-ante cost of equity capital is reasonable or not. Our study fills this void in the Korean literature. In addition, there has been no previous empirical test as to which valuation model is more appropriate to get a more reliable proxy for the ex-ante costs of equity capital in Korea. We expect Korean researchers (practitioners) to refer to our empirical results regarding the relative reliability of ICOE from various valuation models, when they need to select a specific valuation model to derive a more reliable ICOE for their studies (works, such as project evaluation).

3. Research Design and Variable Measurement

3.1 The Implied Cost of Equity Capital in Earnings-Based Valuation Model

We compute the ICOE for each firm as the internal rate of return that equates the stock prices to intrinsic value estimates based on the analysts' earnings forecasts. Both the RIV and OJ models are derived from the same underlying model, i.e., the dividend discount model:

$$P_t = \sum_{n=1}^{\infty} \frac{E_t\left[dps_{t+n}\right]}{(1+r_t)^n} \tag{1}$$

where P_t is the stock price per share at period t, dps_t is the dividends per share

4) One of the notable exceptions is Chen, Jorgensen, and Yoo (2004). They report how the predominance of ICOE based on the RIV model or the OJ model differs across seven developed countries, depending on the extent to which the CSR holds in each country's financial reporting.

5) Two working papers by Hwang, Lee, and Lim (2007a, 2007b), which are conducted simultaneously with our paper, also examine the association between the ICOE and the frequently cited risk proxies in Korea, focusing on how to improve the reliability of ICOE in Korea. However, they do not explicitly examine the superior reliability of ICOE to that of realized stock returns, which is the basic evidence supporting the use of ICOE as a proxy for the ex-ante cost of equity capital. Furthermore, they do not compare the relative reliabilities of ICOE's from various valuation models.

during period *t*, and r_t is the firm's cost of equity capital at period t.

The RIV model (Ohlson, 1995) rewrites equity value in terms of the book value of equity and the present value of expected future residual income by imposing the CSR[6] on the dividend discount model.

$$P_t = bv_t + \sum_{s=1}^{\infty}\left(\frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s}\right) \tag{2}$$

where bv_t is the book value of equity per share at period t and eps_t is the earnings per share during period t.

The OJ model (Ohlson and Juettner-Nauroth, 2005) provides an alternative to the RIV model in order to mitigate the potential problems in the RIV model, such as the deviations from the CSR in the current financial reporting rules.

$$P_t = \frac{E_t(eps_{t+1})}{r_t} + \sum_{s=1}^{\infty}\left(\frac{E_t(eps_{t+s} + r_t dps_{t+s} - (1+r_t)eps_{t+s-1})}{r_t(1+r_t)^s}\right) \tag{3}$$

Equation (2) and Equation (3) exhibit the intrinsic value of equity using an infinite series of future residual incomes or abnormal earnings growth. While both the RIV and OJ models yield identical valuation outcomes with an infinite forecast horizon under the CSR condition, both models may generate different valuation outcomes within the finite forecast horizon, which is necessary for the empirical implementation of these models. In the representative studies conducted in this area, the RIV and OJ models employ different assumptions regarding the forecast horizon and future earnings growth after the finite forecast horizon. For example, while the implementation of the OJ model assumes an economy-wide earnings growth rate after the two-year-ahead forecast horizon, the implementation of the RIV model incorporates firm (or industry) specific earnings growth rates after the three-year-ahead forecast horizon. Thus, we expect that the ICOE's derived from either RIV or OJ model may differ from each other owing to the deviations from the CSR and/or different assumptions regarding future earnings growth after forecast horizons.

6) The CSR indicates that the change in book value of equity between two dates is equal to comprehensive income minus dividends.

We implement the RIV model in two different ways, as was the case in the representative prior research. The two implementations differ only in their assumptions about the forecast horizon and the growth of residual income beyond the forecast horizon.

The RIVC model, our first RIV model, assumes that the residual income remains constant beyond year $t+3$ (Gebhardt et al., 2001). The RIVC model is as follows.

$$P_t = bv_t + \sum_{s=1}^{3}\left(\frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s}\right) + \frac{E_t(eps_{t+3} - r_t \times bv_{t+2})}{r_t \times (1+r_t)^3} \quad (4)$$

The RIVI model, our second RIV model, assumes that the return on equity (ROE) trends linearly to the industry median ROE by the 12th year, and that thereafter the residual incomes remain constant in perpetuity (Lee, Myers, and Swaminathan, 1999; Gebhardt et al., 2001; Liu, Nissim, and Thomas, 2002).[7] The industry median ROE is calculated by the moving median of the previous five years' ROE of the firms within the same industry.[8] Following Gebhardt et al. (2001), we use only those firms with positive ROE in the calculation. In the RIVI model, current price per share is:

$$P_t = bv_t + \sum_{s=1}^{3}\left(\frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s}\right) + \sum_{s=4}^{11}\frac{\left[E_t(ROE_{t+s} - r_t)\right]\times bv_{t+s-1}}{(1+r_t)^s} + \frac{\left[E_t(ROE_{t+12} - r_t)\right]\times bv_{t+11}}{r_t \times (1+r_t)^{11}} \quad (5)$$

where ROE_t is the return on equity during period t.

Under the assumption of future earnings growth beyond the forecast horizon for the OJ model, we use $(\gamma - 1)$ as the perpetual growth rate of the capitalized abnormal earnings growth after two-year-ahead.[9] Following previous research, we set

7) The RIVI model reflects the industry-specific information into the terminal value calculation, whereas the RIVC model does not. Therefore, if industry profitability is consistent with the market's expectation for long-term profitability, the ICOE derived from the RIVI model will be superior to the ICOE derived from the RIVC model.

8) We calculate the industry median of ROE using the two-digit Korean SIC codes.

9) The short term earnings growth $[(eps_{t+2} + r_t dps_{t+1} - (1+r_t)eps_{t+1})/eps_{t+1}]$ is assumed to decay asymptotically to the perpetual growth rate of the capitalized abnormal earnings $(\gamma$-1). The decay rate is also determined by $(\gamma$-1).

$(\gamma - 1)$ as equal to the risk-free interest rate minus the long-term inflation rate.[10)] The long-term inflation rate is calculated as the previous ten-years' moving average of annual inflation rates at each forecasting date. We use the core inflation rate provided by the Bank of Korea. Under this assumption, the two-period OJ model (hereafter OJ2 model) expresses current stock price per share as follows:

$$P_t = \frac{eps_{t+1}}{r_t} + \frac{aeg_{t+2}}{r_t(r_t - \gamma + 1)} \tag{6}$$

where $aeg_{t+2} \equiv eps_{t+2} + r_t dps_{t+1} - (1 + r_t) eps_{t+1}$.

Consequently the formula for the ICOE is as follows:

$$r_t = A + \sqrt{A^2 + \frac{eps_{t+1}}{P_t}\left(\frac{(eps_{t+2} - eps_{t+1})}{eps_{t+1}} - (\gamma - 1)\right)} \tag{7}$$

where $A \equiv \frac{1}{2}\left(\gamma - 1 + \frac{dps_{t+1}}{P_t}\right)$. When $eps_{t+1} > eps_{t+2}$, we set the short-term earnings growth $(eps_{t+2} - eps_{t+1})$ to zero. When the value inside the root is negative, we assume that the ICOE is A.

The PEG model, a special case of the OJ2 model, is derived as described in Easton (2004). Specifically, if we assume that both $\gamma = 1$ and $dps_{t+1} = 0$ in the OJ2 model, i.e., no changes in abnormal earnings growth beyond the forecast horizon and no dividend payments, we can derive the PEG model as follows:

$$P_t = \frac{eps_{t+2} - eps_{t+1}}{r_t^2} \tag{8}$$

where $eps_{t+1} > eps_{t+2}$, the ICOE is set as the ICOE derived from the OJ2 model.

The ICOE, r_t, can be obtained as the solution to the quadratic equation above. Therefore, we classify the PEG model as a specific form of the OJ2 model when we

10) Analogous to Claus and Thomas (2001), we set $(\gamma - 1)$ to zero when negative.

compare the validity of the OJ model with that of the RIV model.[11)]

In the empirical implementation of all four models, we adopt the same assumptions, as follows. Analysts' earnings forecasts are employed as a proxy for the market's earnings expectations. We also make the same assumptions regarding the dividend payout ratio to both models, as follows. First, we estimate the future dividend by scaling the dividends in the most recent year with the earnings over the same year.[12)] We, then, solve for r_t by searching over a range of 0 to 100% for a value of r_t that minimizes the difference (or makes the difference as zero) between the stock prices and the intrinsic value estimates based on analysts' earnings forecasts.

3.2 Measurement of the Reliability of Proxy for Ex-Ante Cost of Equity Capital

Since the true ex-ante cost of equity capital is unobservable, a direct assessment of the reliability of ICOE (or realized stock returns) as its proxy is impossible. Following previous research, such as Gebhardt et al. (2001) and Gode and Mohanram (2003), we assess the reliability of ICOE (or realized stock returns) by examining the association between ICOE (or realized stock returns) and frequently cited risk proxies within following equation.

$$IRP_t(RET_{t+1}) = \beta_0 + \sum_{j=1}^{k} \beta_{jt} RISKPROXY_{jt} + IndustryIndicators + \varepsilon_t \tag{9}$$

where IRP_t is the implied risk premium, which is defined as the ICOE minus risk free rate at period t, RET_{t+1} is the realized stock returns during period t+1, and $RISKPROXY_{jt}$ is the jth risk proxy at period t.

If the ICOE or realized stock returns are reliable as a proxy for the ex-ante cost of

11) In this paper, the term of the "RIV model" includes both the RIVC and RIVI model. Also, the term of the "OJ model" includes both the OJ2 and PEG model.

12) Following Chen et al. (2004), for the firms with negative earnings, we divide dividends in the most recent year by one-year-ahead or two-year-ahead (three-year-ahead) analysts' earnings forecast to derive an estimated payout ratio. If all of the earnings forecasts are still negative, we assume the future dividend payout ratio to be zero. If the estimated dividend payout ratio is larger than 0.5, we assume the payout ratio to be 0.5.

equity capital, it should exhibit an expected individual association (a high overall association) with each of the risk proxies (full set of risk proxies), which is captured by the coefficient estimates of each risk proxy (adjusted R^2) from the regressions on the basis of equation (9). Thus, we use both the individual and overall association of ICOE and realized stock returns with the risk proxies within equation (9) as the metric of its reliability as the proxy for the ex-ante cost of equity capital. More specifically, we compare the sign of the coefficient estimates of each risk proxy and the magnitude of adjusted R^2 from the regressions on the basis of equation (9) across varying ICOE's and the realized stock returns. Finally, we include the indicator variables for industry affiliation (two-digit Korean SIC codes) in order to account for possible industry-to-industry variations in cost of equity capital.

3.3 Measurement of Risk Proxies

We choose the following seven risk proxies used in prior research as the regressors in equation (9).

Market Beta (*BETA*): The Capital Asset Pricing Model predicts a positive association between a firm's beta and its cost of equity capital (Fama and French, 1992; Malkiel and Xu, 1997; Gordon and Gordon, 1997). We predict a positive association between the ICOE and *BETA*. The systematic risk, *BETA*, is estimated by regressing at least 30 prior monthly stock returns up to 60 prior monthly returns against the corresponding market indices, such as KOSPI and KOSDAQ.

Market Value of Equity (*SIZE*): Large firms with more liquid and more information have lower ICOE (Gebhardt et al., 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005). Amihud and Mendelson (1986) and Amihud (2002) suggest firm size proxies for liquidity since a larger stock issue tends to have a smaller price impact for a given order flow and a smaller bid-ask spread. Botosan (1997) shows higher levels of disclosure associates with the lower risk premiums. Following Fama and French (1992) and Penman (2004), we predict a negative association between the ICOE and *SIZE*. *SIZE* is estimated as the market value of equity.

Book-to-Market Ratio (*B/M*): Fama and French (1992) argue that high book-to-market stocks yield superior returns as they are fundamentally riskier. *B/M* may proxy for a distress risk factor since financially distressed firms are likely to have high *B/M* (Fama and French, 1992, 1993, 1995). Gode and Mohanram (2003) also point out that higher *B/M* reflects higher perceived risk. Therefore, we predict a positive association between the ICOE and *B/M*. *B/M* is estimated as the ratio of the book value of equity to the market value of equity.

Debt-to-Market Ratio (*D/M*): Modigliani and Miller (1958) show that the cost of equity capital should be an increasing function of the financial leverage. Since increasing debt in the capital structure entails increasing financial risk, prior research has identified *D/M* as a risk proxy (Fama and French, 1992; Gebhardt et al., 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005). We expect a positive association between ICOE and *D/M*. The financial leverage, *D/M*, is defined as the book value of debt divided by the market value of equity.[13]

Idiosyncratic Risk (*IDRISK*): While *BETA* indicates a systematic risk, an idiosyncratic risk represents an unsystematic risk (Lehmann, 1990; Malkiel and Xu, 1997). Lehmann (1990) revisits the residual risk as a risk factor which partially reflects exposure to the omitted sources of systematic risk. Thus, prior research (e.g., Gode and Mohanram, 2003; Chen et al., 2004) considers an idiosyncratic risk as a component of the entire set of risk proxies. We expect a positive association between ICOE and *IDRISK*. The idiosyncratic risk, *IDRISK*, is measured by the variance of residuals from the regressions of *BETA* estimation.[14]

Operating Income Volatility (*OIVOL*): In the finance literature, the variability of reported earnings has been frequently regarded as a source of risk (Madden, 1998; Barth, Elliott, and Finn, 1999; Gode and Mohanram, 2003). These studies suggest that firms with more unstable earnings have higher risk premium. We predict a positive association between the ICOE and *OIVOL*. *OIVOL* is measured by the standard deviation of operating income in at least past two up to five years scaled by average total assets.

Dispersion of Analysts' Earnings Forecasts (*EPSDISP*): The dispersion in analysts' earnings forecasts may capture the information risks (Chen et al., 2004; Botosan and Plumlee, 2005) and/or earnings variability (Gebhardt et al., 2001). That is, *EPSDISP* may display the uncertainty regarding future firm performance due either to the

13) Following prior research, we use *lnSIZE*, *lnB/M*, and *lnD/M*, the natural logarithmic value of *SIZE*, *B/M*, and *D/M*, in regression analysis to address the non-normal distributions of these variables. Whether or not taking logs of all these variables has no effect on our inferences.

14) No inferences are affected by excluding either *BETA* or *IDRISK* from the set of risk proxies.

vague information environment or to the fundamental cash flow risk. We expect a positive association between ICOE and *EPSDISP*. *EPSDISP* is measured by the standard deviation of the one-year-ahead analysts' earnings forecasts scaled by the absolute mean of these forecasts.

4. Sample and Descriptive Statistics

4.1 Sample Selection

Our empirical analysis is based on a sample of Korean firms from 2001 to 2006. We extract accounting and stock return data from the Korea Information Service Value (hereafter KisValue) database and analysts' earnings forecasts data from the Fn-Guide database.[15] In addition, we use the three-year government bond rate as a proxy for the risk-free rate, and the core inflation rate from the Economic Statistics System of the Bank of Korea.

As of April of each year, we select firm-years that satisfy the following criteria: (1) financial statement data, which is required for the computation of the main variables, industry identification codes and stock return data are available from KisValue; (2) stock price, mean of one-year-ahead, two-year-ahead, and three-year-ahead analysts' earnings forecasts are available from Fn-Guide; (3) all of the risk proxies are available; (4) non-financial firm; (5) fiscal year-end is December; (6) one-year-ahead and two-year-ahead analysts' earnings forecasts are positive;[16] (7) the book value of equity is positive.

This process yields a final sample of 1,167 firm-year observations from 415 KSE/KOSDAQ listing firms between 2001 and 2006.[17] It is this final sample that is used for the descriptive statistics shown in Table 1.[18]

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15) Fn-Guide was founded in July, 2000. It gathers and compiles different estimates made by stock analysts, who are engaged in 37 domestic/foreign security companies in Korea, regarding the future earnings, sales, revenues, and so forth of Korean firms. It provides the consensus of analysts' earnings forecasts, which is the mean of the future earnings estimates of the analysts covering a firm.

16) This criterion is necessary for the implementation of the OJ2 and PEG model, as shown in Gode and Mohanram (2003).

17) This is because the Fn-Guide provides the data of analysts' earnings forecasts only from 2001.

18) To mitigate the effect of outliers, regressors are winsorized at 1% and 99% of the pooled distributions.

Table 1. Descriptive Statistics

This table presents the distributions of main variables used in this study. $OJ2_{ICOE}$ and PEG_{ICOE} are the implied cost of equity capital from the OJ2 and PEG model respectively. $RIVC_{ICOE}$ and $RIVI_{ICOE}$ are the implied cost of equity capital from the RIVC and RIVI model respectively. See the main text for the details of the implementation of each valuation model. *AICOE* is the average of four implied costs of equity capital. *RF* is the 3-year government bond rate as the proxy for risk free rates. *RET12* is the one-year-ahead annual stock returns. *BETA* is the systematic risk estimated by regressing at least 30 prior monthly stock returns up to 60 prior monthly returns against the corresponding market index. *SIZE* is market value of equity as of April of each year (Billion Korean Won). *B/M* is the book value of equity divided by market value of equity. *D/M* is the book value of debt divided by market value of equity. Although we use the logarithmic values of *SIZE*, *B/M*, and *D/M* in subsequent main analyses, we present the distributions of the raw values of these variables for a descriptive purpose. *IDRISK* is the idiosyncratic risk, which is measured as the variance of residuals from the regressions of *BETA* estimation. *OIVOL* is the standard deviation of operating income during at least past two years up to five years, scaled by average total asset. *EPSDISP* is the dispersion of analysts' earnings forecasts, which is measured as the standard deviation of the one-year-ahead analysts' earnings forecasts scaled by the absolute mean of these forecasts. *AEPS/P* is the actual earnings per share scaled by stock price. *EPS1/P* is the one-year-ahead analysts' earnings forecasts scaled by stock price. *EPS2/P (EPS3/P)* is the two-year-ahead (three-year-ahead) analysts' earnings forecasts scaled by stock price. *NUMEST* is the number of analysts' earnings forecasts.

Variables	MEAN	Std. Dev.	1%	5%	10%	25%	MEDIAN	75%	90%	95%	99%	*No. of Observations*
$OJ2_{ICOE}$	0.171	0.086	0.009	0.021	0.071	0.124	0.164	0.215	0.277	0.320	0.418	1167
PEG_{ICOE}	0.157	0.083	0.008	0.022	0.063	0.110	0.149	0.198	0.257	0.300	0.383	1167
$RIVC_{ICOE}$	0.160	0.084	0.033	0.066	0.081	0.109	0.146	0.195	0.248	0.302	0.397	1167
$RIVI_{ICOE}$	0.114	0.037	0.046	0.061	0.071	0.088	0.110	0.135	0.163	0.181	0.232	1167
AICOE	0.151	0.060	0.044	0.071	0.086	0.110	0.142	0.180	0.225	0.258	0.337	1167
RF	0.051	0.010	0.039	0.039	0.039	0.045	0.050	0.065	0.066	0.066	0.066	1167
RET12	0.259	0.673	-0.635	-0.475	-0.372	-0.184	0.082	0.505	1.048	1.514	3.253	1167
BETA	1.032	0.432	0.180	0.420	0.523	0.739	0.994	1.259	1.583	1.757	2.705	1167
SIZE	1,070	2,776	16	27	38	73	185	659	2,246	5,286	18,224	1167
B/M	1.497	1.398	0.147	0.270	0.366	0.588	1.056	1.896	3.212	4.162	8.417	1167
D/M	1.797	2.607	0.032	0.105	0.160	0.365	0.856	1.990	4.306	7.093	15.266	1167
IDRISK	0.033	0.034	0.005	0.008	0.011	0.016	0.023	0.036	0.061	0.087	0.232	1167
OIVOL	0.041	0.032	0.005	0.009	0.012	0.019	0.031	0.052	0.081	0.100	0.192	1167
EPSDISP	0.205	0.268	0.000	0.000	0.000	0.069	0.133	0.224	0.429	0.700	1.758	1167
AEPS/P	0.084	0.229	-1.204	-0.187	-0.026	0.047	0.097	0.173	0.270	0.339	0.564	1167
EPS1/P	0.157	0.098	0.012	0.040	0.058	0.092	0.133	0.199	0.283	0.353	0.547	1167
EPS2/P	0.185	0.105	0.037	0.063	0.080	0.113	0.160	0.231	0.314	0.396	0.619	1167
EPS3/P	0.209	0.120	0.023	0.070	0.091	0.127	0.182	0.261	0.359	0.458	0.700	1167
NUMEST	8.268	5.683	1	1	2	3	7	12	17	19	22	1167

4.2 Descriptive Statistics

Descriptive statistics are reported in Table 1.

The means (medians) of the implied costs of equity capital range from 11.4% (11.0%) to 17.1% (16.4%). This result indicates that the means (medians) of the implied equity risk premium (implied cost of equity capital minus risk free rates) are in the range of 6.3% (6.0%) and 12.0% (11.4%).[19] This level of equity risk premium is relatively higher than that of U.S firms.[20] Meanwhile, the mean (median) of realized annual stock returns is 25.9% (8.2%). The distributions of risk proxies are generally consistent with those reported in prior Korea-based studies.

In addition, the mean (median) of current earnings, scaled by stock price, is 0.084 (0.097). The mean (median) of one-year-ahead analysts' earnings forecast scaled by stock price is 0.157 (0.133). An increasing pattern of analysts' earnings forecasts, scaled by stock price, is found in each earnings forecast thereafter. On average, eight analysts follow each firm in our sample.

5. Empirical Results

5.1 Univariate Analysis

Table 2 provides Pearson correlation coefficients between the key variables.

As expected, the implied equity risk premia (hereafter IRP)[21] derived from the OJ2 and PEG models are highly correlated with one another (0.985; p-value < 0.01). Also, those from RIVC and RIVI are also highly correlated (0.682; p-value < 0.01). However, the relatively lower correlations between the IRP based on the OJ and RIV models (0.379~0.431) indicate that the alternative implied costs of equity capital may have different degrees of reliability. In addition, the realized annual stock returns have much lower correlations with the IRP based on the OJ and RIV models (0.137~0.296),

19) The ICOE presented in Table 1 are the values before extracting risk free rates, whereas those used in Tables 2 through 4 are the values after deducting the risk-free rates, which are the implied equity risk premia.

20) Claus and Thomas (2001) report that the implied equity risk premium is approximately three percent or less in the U.S., and five percent in the other five developed countries.

21) Following previous research, we use the implied equity risk premium, which is the implied cost of equity capital minus risk free rate, as the main variable in the analysis of association with risk proxies. Thus, we use ICOE and IRP interchangeably in this study.

Table 2. Pair−wise Correlations between Key Variables

This table presents Pearson correlations between key variables for the pooled sample. Please see note of Table 1 for the explanations of variables except for the followings. OJ_{IRP} (PEG_{IRP}, $RIVC_{IRP}$, $RIVI_{IRP}$) is the implied equity risk premium from OJ2 (PEG, RIVC, RIVI) model, defined by OJ_{ICOE} (PEG_{ICOE}, $RIVC_{ICOE}$, $RIVI_{ICOE}$) minus risk free rate (3-year government bond rate), respectively. *AIRP* is the average of four implied equity risk premia. *lnSIZE* is the natural log of the market value of equity. *lnB/M* is the natural log of book value of equity divided by market value of equity. *lnD/M* is the natural log of book value of debt divided by market value of equity. ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better.

	OJ_{IRP}	PEG_{IRP}	$RIVC_{IRP}$	$RIVI_{IRP}$	*AIRP*	*RET12*	*BETA*	*lnSIZE*	*lnB/M*	*lnD/M*	*IDRISK*	*OIVOL*	*EPSDISP*
PEG_{IRP}	0.985***												
$RIVC_{IRP}$	0.431***	0.407***											
$RIVI_{IRP}$	0.429***	0.379***	0.682***										
AIRP	0.908***	0.889***	0.739***	0.644***									
RET12	0.141***	0.137***	0.233***	0.296***	0.205***								
BETA	0.040	0.071**	-0.117***	-0.195***	-0.042	-0.104***							
lnSIZE	-0.243***	-0.230***	-0.305***	-0.308***	-0.347***	0.009	0.057*						
lnB/M	0.220***	0.176***	0.442***	0.667***	0.439***	0.218***	-0.273***	-0.356***					
lnD/M	0.301***	0.277***	0.431***	0.556***	0.477***	0.266***	-0.144***	-0.156***	0.727***				
IDRISK	-0.009	0.021	-0.060**	-0.176***	-0.024	-0.127***	0.454***	-0.210***	-0.175***	-0.102***			
OIVOL	0.010	0.048*	-0.041	-0.145***	-0.037	-0.065**	0.256***	-0.033	-0.383***	-0.371***	0.253***		
EPSDISP	0.141***	0.165***	-0.008	-0.004	0.125***	0.037	0.216***	-0.036	0.165***	0.233***	0.171***	-0.036	
No. of Observations	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167

which suggests that the ICOE may reduce the noises in the ex-post stock returns as a proxy for the ex-ante cost of equity capital.

Table 2 also reports the correlations among risk proxies. While they are correlated significantly with one another, most of the pair-wise correlation coefficients do not exceed 0.4. This result indicates that each of the risk proxies may capture some incremental risk factors, which are not captured by the other risk proxies.

Most importantly, Table 2 reports the univariate correlations between the IRP and each of the risk proxies. First, *lnSIZE, lnB/M* and *lnD/M* are associated significantly with the IRP from all valuation models, as expected. Second, *BETA, OIVOL* and *EPSDISP* have expected significant correlations only with the IRP from the OJ model, whereas they do not show the expected correlations with them from the RIV model. Third, *IDRISK* does not show the expected correlations with any of the IRP from the earnings-based valuation models. On the other hand, the average IRP, as the benchmark of IRP based on earnings-based models, is correlated significantly with *lnSIZE*, *lnB/M*, *lnD/M*, and *EPSDISP*. Although some of the univariate correlations between the IRP and risk proxies are not consistent with our expectations, the univariate correlations between the realized annual stock returns and the risk proxies are not consistent with our expectations to a greater extent. The realized annual stock returns are correlated significantly only with *lnB/M* and *lnD/M* in the expected direction. However, the univariate correlation results should be interpreted with caution, as they do not reflect the incremental or overall associations between the proxies of the ex-ante costs of equity capital and the entire set of risk proxies. Consequently, we now turn to the multivariate regression results which present the incremental or overall association between them.

5.2 Multivariate Analysis

In this section, we report the results of our multivariate regression tests.[22] To examine whether the ICOE is a better proxy for the ex-ante cost of equity capital than

22) To remove the effects of the cross-sectional correlation in error terms inherent to panel data, we adopt the "Fama-MacBeth" approach (Fama and MacBeth, 1973) to calculate the t-statistics for coefficient estimates. The "Fama-MacBeth" t-statistics are calculated from the time-series standard errors of the annually estimated coefficients. In addition, we report the average of adjusted R^2 of the year-by-year regressions. These approaches are applied to all subsequent regression analyses.

the realized stock returns, we regress the average of ICOE (or realized stock returns), calculated from each of four valuation models, on the alternative sets of frequently cited risk proxies. Table 3 presents the results of these regressions.

Panel A of Table 3 shows the association between the average IRP (or realized annual stock returns) and Fama-French three factors (*BETA*, *lnSIZE* and *lnB/M*; Fama and French, 1993). While the average IRP is associated significantly with all three risk proxies in the expected directions, the realized annual stock returns show a predicted association only with *lnB/M*. Furthermore, whereas the adjusted R^2 of the regression of average IRP on the Fama-French three factors is 28.4%, that of the realized annual stock returns is only 11.7%.[23),24)]

Panel B of Table 3 reports the regression results when all risk proxies, described in Section 3, are included as regressors. While the average IRP has predicted associations with *BETA*, *lnSIZE*, *lnD/M*, and *OIVOL*, the realized annual stock returns show the predicted association only with *lnD/M* and *OIVOL*. In addition, although the adjusted R^2 of IRP increases from 28.4% to 37.1% in this model with the full set of risk proxies, that of the realized annual stock returns remains at 15.0%.[25)]

One of the concerns regarding the higher R^2 for the IRP in the model with the full set of risk proxies is that *lnB/M* could mechanically generate a higher R^2 for the IRP. This is because the RIV model explains *B/M* itself. To address this potential problem, we rerun the regressions in Panel B of Table 3, after excluding *lnB/M* from the set of risk proxies. As indicated in Panel C of Table 3, our main result remains qualitatively similar.

In summary, Table 3 shows that the ICOE derived from the earnings-based valuation models is a superior proxy for the ex-ante cost of equity capital to the realized annual stock returns with regard to the association with the frequently cited risk proxies.[26)]

23) To test the statistical significance of the differences of adjusted R^2, we try the bootstrap-type analysis following Liu et al. (2002). The bootstrap-type analysis results in 1,167 firm-years by drawing observations randomly from the constructed sample with replacement. For each trial, we compute the difference of adjusted R^2 across the models. This process is repeated 100 times and a distribution for the difference of adjusted R^2 is obtained. A t-statistic is computed as the mean divided by the standard deviation of this distribution.

24) The t-statistic based on bootstrap-type analysis for the difference of adjusted R^2 is 4.71.

25) The t-statistic based on bootstrap-type analysis for the difference of adjusted R^2 is 6.58.

26) We rerun the tests using annualized monthly stock returns, rather than realized annual stock returns, but the results are qualitatively similar to those reported in Table 3.

Table 3. Regressions of Implied Equity Risk Premium and Realized Annual Stock Returns on Risk Proxies

Panel A, Panel B, and Panel C of this table present the cross-sectional year-by-year regressions of the average implied equity risk premium and realized annual stock returns on the sets of risk proxies. The regression equations are as follows.

<MODEL 1: Panel A> $AIRP$ or $RET12 = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnB/M + \varepsilon$

<MODEL 2: Panel B> $AIRP$ or $RET12 = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnB/M + \beta_4 lnD/M + \beta_5 IDRISK + \beta_6 OIVOL + \beta_7 EPSDISP + \varepsilon$

<MODEL 3: Panel C> $AIRP$ or $RET12 = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnD/M + \beta_4 IDRISK + \beta_5 OIVOL + \beta_6 EPSDISP + \varepsilon$

See the notes of Table 1 and Table 2 for the definitions of the variables. Industry indicators are included but not reported. The coefficients presented are the means from annual regressions. The number below each coefficient is the Fama-McBeth t-statistic (Fama and McBeth, 1973). Adj. R^2 is the average adjusted R^2 for the annual regressions. ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better.

Panel A: Regressions of Implied Equity Risk Premium and Realized Annual Stock Returns on Fama-French Three Factors

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnB/M*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected signs	?	+	-	+				
AIRP	Coefficient Estimates	0.250***	0.012***	-0.008***	0.024***	Included	0.284	6	1167
	F/M t-stat.	(5.280)	(3.658)	(-3.327)	(5.334)				
RET12	Coefficient Estimates	-0.010	-0.066	0.047**	0.144***	Included	0.117	6	1167
	F/M t-stat.	(-0.020)	(-0.681)	(2.493)	(4.902)				

Panel B: Regressions of Implied Equity Risk Premium and Realized Annual Stock Returns on Full Set of Risk Proxies

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnB/M*	*lnD/M*	*IDRISK*	*OIVOL*	*EPSDISP*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected signs	?	+	-	+	+	+	+	+				
AIRP	Coefficient Estimates	0.290***	0.012*	-0.010***	0.004	0.020***	-0.121	0.260***	0.002	Included	0.371	6	1167
	F/M t-stat.	(7.038)	(1.817)	(-5.620)	(0.812)	(5.313)	(-1.555)	(3.686)	(0.131)				
RET12	Coefficient Estimates	0.294	-0.073	0.032*	0.021	0.121***	-0.982***	1.241*	0.086	Included	0.150	6	1167
	F/M t-stat.	(0.541)	(-1.185)	(1.943)	(0.850)	(3.910)	(-2.761)	(1.873)	(0.481)				

Panel C: Regressions of Implied Equity Risk Premium and Realized Annual Stock Return on Full Set of Risk Proxies Except *lnB/M*

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnD/M*	*IDRISK*	*OIVOL*	*EPSDISP*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected signs	?	+	-	+	+	+	+				
AIRP	Coefficient Estimates	0.305***	0.013*	-0.011***	0.021***	-0.148*	0.245***	0.002	Included	0.363	6	1167
	F/M t-stat.	(9.267)	(1.794)	(-6.871)	(7.308)	(-1.783)	(3.546)	(0.134)				
RET12	Coefficient Estimates	0.356	-0.074	0.029*	0.128***	-1.111***	1.168*	0.094	Included	0.153	6	1167
	F/M t-stat.	(0.585)	(-1.138)	(1.670)	(4.878)	(-2.898)	(1.712)	(0.534)				

Table 4. Regressions of Alternative Implied Equity Risk Premium on Risk Proxies

Panel A, Panel C, and Panel E of this table present the cross-sectional year-by-year regressions of alternative implied equity risk premium on the sets of risk proxies. The regression equation is as follows.

<MODEL 1: Panel A> $IRP = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnB/M + \varepsilon$

<MODEL 2: Panel C> $IRP = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnB/M + \beta_4 lnD/M + \beta_5 IDRISK + \beta_6 OIVOL + \beta_7 EPSDISP + \varepsilon$

<MODEL 3: Panel E> $IRP = \beta_0 + \beta_1 BETA + \beta_2 lnSIZE + \beta_3 lnD/M + \beta_4 IDRISK + \beta_5 OIVOL + \beta_6 EPSDISP + \varepsilon$

Please see notes of Table 1 and Table 2 for the definitions of variables. *IRP* indicates OJ_{IRP}, PEG_{IRP}, $RIVC_{IRP}$, $RIVI_{IRP}$, and *AIRP*. Industry indicators are included but not reported. The coefficients presented are the means from annual regressions. The number below each coefficient is the Fama-McBeth t-statistic (Fama and McBeth, 1973). Adj. R^2 is the average adjusted R^2 for the annual regressions. Panels B, D, and F of this table show the bootstrap-type t-statistics for the differences of adjusted R^2s across alternative *IRPs* as described in Footnote 23. A positive (negative) t-statistic indicates that the *IRP* in the row (column) presents a higher adjusted R^2 than the *IRP* in the column (row). ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better.

Panel A: Regressions of Alternative Implied Equity Risk Premium on Fama-French Three Factors

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnB/M*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected Signs	?	+	-	+				
OJ_{IRP}	Coefficient Estimates	0.279***	0.020**	-0.008**	0.016*	Included	0.164	6	1167
	F/M t-stat.	(3.631)	(2.473)	(-2.293)	(1.955)				
PEG_{IRP}	Coefficient Estimates	0.257***	0.022***	-0.008**	0.012	Included	0.160	6	1167
	F/M t-stat.	(3.377)	(2.760)	(-2.300)	(1.585)				
$RIVC_{IRP}$	Coefficient Estimates	0.303***	0.003	-0.010***	0.034***	Included	0.281	6	1167
	F/M t-stat.	(11.289)	(0.617)	(-6.552)	(8.634)				
$RIVI_{IRP}$	Coefficient Estimates	0.162***	0.003	-0.003***	0.033***	Included	0.660	6	1167
	F/M t-stat.	(7.732)	(1.496)	(-3.892)	(8.991)				
AIRP	Coefficient Estimates	0.250***	0.012***	-0.008***	0.024***	Included	0.284	6	1167
	F/M t-stat.	(5.280)	(3.658)	(-3.327)	(5.334)				

Panel B: t-statistics for the Differences of Adjusted R^2 in Panel A

	OJ_{IRP}	PEG_{IRP}	$RIVC_{IRP}$	$RIVI_{IRP}$
PEG_{IRP}	-0.33			
$RIVC_{IRP}$	3.65	3.66		
$RIVI_{IRP}$	16.91	16.06	11.23	
AIRP	8.32	7.06	-0.54	-14.70

Panel C: Regressions of Alternative Implied Equity Risk Premium on Full Set of Risk Proxies

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnB/M*	*lnD/M*	*IDRISK*	*OIVOL*	*EPSDISP*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected Signs	?	+	-	+	+	+	+	+				
OJ_{IRP}	Coefficient Estimates	0.345***	0.022**	-0.012***	-0.012	0.025***	-0.208***	0.190**	0.021	Included	0.238	6	1167
	F/M t-stat.	(4.574)	(2.028)	(-3.604)	(-1.239)	(3.953)	(-2.968)	(2.289)	(0.912)				
PEG_{IRP}	Coefficient Estimates	0.310***	0.019**	-0.011***	-0.016	0.025***	-0.148**	0.233***	0.030	Included	0.246	6	1167
	F/M t-stat.	(4.036)	(2.073)	(-3.306)	(-1.566)	(4.297)	(-2.139)	(3.145)	(1.353)				
$RIVC_{IRP}$	Coefficient Estimates	0.337***	0.004	-0.012***	0.016***	0.022***	-0.113	0.451***	-0.031**	Included	0.349	6	1167
	F/M t-stat.	(8.746)	(0.694)	(-6.324)	(2.674)	(6.651)	(-0.833)	(3.635)	(-2.000)				
$RIVI_{IRP}$	Coefficient Estimates	0.168***	0.004	-0.004***	0.029***	0.007***	-0.015	0.167***	-0.014***	Included	0.702	6	1167
	F/M t-stat.	(12.092)	(1.153)	(-6.202)	(8.420)	(11.421)	(-0.320)	(4.875)	(-5.015)				
AIRP	Coefficient Estimates	0.290***	0.012*	-0.010***	0.004	0.020***	-0.121	0.260***	0.002	Included	0.371	6	1167
	F/M t-stat.	(7.038)	(1.817)	(-5.620)	(0.812)	(5.313)	(-1.555)	(3.686)	(0.131)				

Panel D: t-statistics for the Differences of Adjusted R^2 in Panel C

	OJ_{IRP}	PEG_{IRP}	$RIVC_{IRP}$	$RIVI_{IRP}$
PEG_{IRP}	1.22			
$RIVC_{IRP}$	2.51	2.31		
$RIVI_{IRP}$	10.67	10.11	8.72	
AIRP	6.57	5.69	-0.05	-10.13

Panel E: Regressions of Alternative Implied Equity Risk Premium on Full Set of Risk Proxies Except *lnB/M*

Dependent Variable		*Intercept*	*BETA*	*lnSIZE*	*lnD/M*	*IDRISK*	*OIVOL*	*EPSDISP*	*Industry Indicators*	Adj. R^2	No. of years	No. of Observations
	Expected Signs	?	+	-	+	+	+	+				
OJ_{IRP}	Coefficient Estimates	0.321***	0.024**	-0.011***	0.020***	-0.190**	0.223***	0.019	Included	0.223	6	1167
	F/M t-stat.	(5.104)	(2.174)	(-3.740)	(4.274)	(-2.459)	(3.075)	(0.778)				
PEG_{IRP}	Coefficient Estimates	0.275***	0.022**	-0.010***	0.019***	-0.117*	0.276***	0.027	Included	0.228	6	1167
	F/M t-stat.	(4.092)	(2.252)	(-3.116)	(4.944)	(-1.740)	(4.286)	(1.154)				
$RIVC_{IRP}$	Coefficient Estimates	0.377***	0.004	-0.014***	0.027***	-0.167	0.399***	-0.030**	Included	0.329	6	1167
	F/M t-stat.	(12.839)	(0.550)	(-8.303)	(9.230)	(-1.270)	(2.912)	(-2.069)				
$RIVI_{IRP}$	Coefficient Estimates	0.249***	0.001	-0.008***	0.017***	-0.119*	0.083**	-0.009***	Included	0.567	6	1167
	F/M t-stat.	(24.856)	(0.386)	(-17.997)	(9.314)	(-1.811)	(2.496)	(-3.781)				
AIRP	Coefficient Estimates	0.305***	0.013*	-0.011***	0.021***	-0.148*	0.245***	0.002	Included	0.363	6	1167
	F/M t-stat.	(9.267)	(1.794)	(-6.871)	(7.308)	(-1.783)	(3.546)	(0.134)				

Panel F: t-statistics for the Differences of Adjusted R^2 in Panel E

	OJ_{IRP}	PEG_{IRP}	$RIVC_{IRP}$	$RIVI_{IRP}$
PEG_{IRP}	0.85			
$RIVC_{IRP}$	2.76	2.63		
$RIVI_{IRP}$	8.71	8.47	6.14	
AIRP	8.98	8.02	0.26	-6.43

Next, we examine which valuation model could generate more reliable ICOE in Korea. For this purpose, we regress the alternative IRP based on different valuation models on alternative sets of risk proxies, comparing the extents of associations between the alternative IRP and risk proxies. Table 4 reports the regression results.

Panel A of Table 4 shows the results of the regressions of alternative IRP (including the average IRP as a benchmark) on the Fama-French three risk factors. While the IRP based on the OJ model have predicted associations with *BETA* and *lnSIZE*, those from the RIV model show predicted associations only with *lnSIZE* and *lnB/M*.

Panel C of Table 4 presents the regression results for the full set of risk proxies. The IRP derived from the OJ model have the expected associations with *BETA*, *lnSIZE*, *lnD/M*, and *OIVOL*, whereas those from the RIV model have the expected associations with *lnSIZE*, *lnB/M*, *lnD/M*, and *OIVOL*. In Panel E of Table 4, we rerun our analyses after dropping *lnB/M* from the set of risk proxies. The results are quite similar to those shown in Panel C of Table 4.

Since most of the IRP are significantly correlated with most of the risk proxies in the expected directions, it is difficult to assess the relative reliability of the IRP exclusively on the basis of the coefficients of the individual risk proxies. Thus, we assess the performance of the valuation models to derive more reliable ICOE on the basis of the magnitude of the adjusted R^2 of the regressions, which is the indicator of the overall association between IRP and the sets of risk proxies.

For all sets of risk proxies, the RIVI model generates the highest adjusted R^2 (56.7%~70.2%), and the RIVC model yields a relatively high adjusted R^2 (28.1%~34.9%). In contrast, the OJ2 and PEG models generate relatively lower adjusted R^2 (16.0%~24.6%). As indicated in Panels B, D, and F of Table 4, the differences in the adjusted R^2 between the two RIV models and the two OJ models are statistically significant. Moreover, the adjusted R^2 of the RIVI model (56.7%~70.2%) is greater than that of the average IRP as a benchmark (28.4%~37.1%) in all cases. This result may indicate the superiority of the RIV model for the generation of a reliable ICOE, which is beyond the benefit of reduction of measurement error by averaging various ICOE's.

In sum, the evidence shown in Table 4 indicates that the ICOE from the RIV model clearly outperforms the ICOE from the OJ model in terms of the overall association with frequently cited risk proxies. In other words, the results of Table 4 suggest that the RIV model generates more reliable ICOE than the OJ model does in Korea.

6. Conclusion

In this study, we examine whether the implied cost of equity capital (ICOE) based on the earnings-based valuation models is reliable in Korea. We conclude that the ICOE is superior to the ex-post realized stock returns as a proxy for the unobservable ex-ante cost of equity capital. We also find that the ICOE derived from the residual income valuation model (RIV model; Ohlson, 1995) is more reliable than that based on the abnormal earnings growth model (OJ model; Ohlson and Juettner-Nauroth, 2005) in Korea.

Our study makes several important contributions to the Korean literature. We provide empirical evidence strengthening the validity of using the ICOE based on earnings-based valuation models as a proxy for the ex-ante cost of equity capital in Korea. This evidence will be helpful for Korean researchers or practitioners to obtain a more reliable proxy for the ex-ante cost of equity capital for various purposes. In addition, our results regarding the relative usefullness of the RIV and OJ model will provide some guidance to Korean researchers or practitioners who must select a specific valuation model to derive the ICOE.

Our findings invariably suffer from certain limitations. First, we cannot rule out the possibility that the risk proxies we use in this study may not represent all true risk factors. Then, any omitted risk factors may have affected our conclusions. Second, we examine only the representative empircial implementations of theoretical valuation models following the U.S. based studies. Thus, we do not claim that our results can be generalized to alternative Korea-specific implementations of valuation models. Nonetheless, we believe that our study provides new insights into the derivation of a more reliable proxy for the true ex-ante cost of equity capital for Korean firms.

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