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The Equity Premium Puzzle: An Empirical Investigation of Korean Stock Market

Very Preliminary

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Abstract: The purpose of this study is to examine the expected rates of return for the companies listed in the Korean stock market by investigating, (1) implied costs of capital, (2) equity premia, and (3) firm characteristics affecting the expected rates of return. We compare the implied costs of equity capital in Korea stock market and U.S. stock market. A major research question is whether companies listed in emerging market have disadvantage as they are underpriced through higher implied costs of capital compared to the companies traded in the developed market. The results suggests that the estimated cost of equity capital for the Korean stock market is, on average, much higher than that of the U.S. stock market. However, it seems that the "Korea discount" has been significantly eased in recent years. Lastly, we could find significant association between the measure of the implied cost of capital in relation with variables that affect the risk and profitability perceived by market investors.

Key words: Analysts' forecasts, cost of capital, equity premium, firm characteristics, Korea discount,Korean stock market, required rate of return

JEL classification: G12, G14, G15, M40, M41

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1 Introduction

The purpose of this study is to examine the expected rates of return for the companies listed in the Korean stock market by investigating, (1) implied costs of capital, (2) equity premia, and (3) factors affecting the expected rates of return.[1]

Korea experienced serious economic difficulties in the late 1990s. The collapse of the Thai baht in 1997 triggered a regional economic crises that spread to Korea. Stock prices plummeted devastating Korean markets for several years. Since that time, business ethics and corporate transparency have received a great deal of attention in Korea.

The plethora of Anecdotal evidence has shown the existence of "Korea discount". The valuation phenomenon so-called "Korea discount" refers to the phenomenon that the companies listed in the Korean stock market, *ceteris paribus*, are traded at a discount in comparison with the companies in other countries even though the profitability of companies are not lower. Korean companies are substantially undervalued even compared to many Asian developing countries (Suh and Sim, 2007). [2] Korean government has expressed strong concerns about the "Korea discount", and has taken concrete steps to restructure financial system since the economic turmoil(e.g. improving corporate governance and transparency). [3]

The literature has proposed a plenty of potential explanations for the phenomenon. Financial systems is lacking in sophistication such that: (1) the volatility of Korean stock market due to the investors' characteristics of short-term speculation (Chang, 2005), (2) restrictions on the stock market (e.g. restricted short-selling), and (3) weak financial systems (e.g. shareholder protection, restrictions on hedge funds or pension funds, etc.). Business corporations also have provided serious discount factors such that: (1) poor corporate governance (Baek et al., 2004; Balck et al., 2006; Hail and Leuz, 2006), (2) lacking business

[1]The implied costs of capital or the expected rates of returns are not exactly equivalent to the costs of equity capital unless market prices are efficient and analysts's forecasts of earnings and accounting numbers are not biased. In other worlds, the estimates of cost of capital are implied by market prices, analysts' forecasts of earnings, and accounting numbers. Nevertheless, these terms are commonly used interchangeably.

[2]For example, Guerrera (2006) commented concerning the "Korea discount": "HSBC analysts estimate that over the past 12 years, the Korean stock market had traded, on average, 26 per cent below the valuation of other exchanges in Asia excluding Japan."

[3]Market participants, as a solution for resolving the "Korea discount" have hoped that the FTSE, the stock market index, upgrade Korea from "emerging" market to "developed" status Ramstad (2007) noted: "...Even after South Korea met developed-market income qualifications in 2003, the firms that create indexes expressed concerns from market volatility to weak dividend payouts to the risk of troubled from neighboring North Korea....An upgrade in market status has become a major goal for some government officials and news media in South Korea, where rankings and comparisons with other countries are taken very seriously. After FTSE and MSCI criticized the low level of dividends paid by South Korean companies, the government, which owns the Korean Stock Exchange, in 2004 encouraged companies to change by creating an index of the top 50 companies based on dividends."

ethics including corporate transparency (Baek et al., 2004; Choi and Jung, Forthcoming; Choi and Nakano, Forthcoming), (3) inadequate and less timely disclosure (Botosan, 1997; Botosan and Plumlee, 2002; Poshakwale and Courtis, 2005; Dargenidou et al., 2006; Habib, 2006), and (4) militant union. A close link existing between undervaluation and political risk(i.e. North Korea) has been reported as well.

Despite the plethora of studies documenting the phenomenon of "Korea Discount", and the studies that have speculated causes of the discount, the link between the equity cost of capital and its effects on corporate valuation has rarely been investigated. Hence, the major research question is whether companies listed in an emerging market(e.g. Korean stock market) have disadvantage as they are underpriced through higher implied costs of capital compared to the companies traded in the developed market. One important issue addressed in this study regards the exact nature of the relationship between the cost of equity capital and the undervaluation of Koran corporations.

Estimating the cost of equity capital is crucial in valuation since it directly affects on the present value of future economic benefits. On average, higher(lower) firm value is derived from lower(higher) cost of capital if the long-term growth rate is assumed to be the same for all companies. Hence, the valuation level of stock market may be examined by estimating the implied costs of capital implicitly required by the market participants. We are particularly interested in whether "Korea discount" exists by a investigation of the expected rates of returns for the Korean stock market. In doing so, we will compare the implied costs of equity capital in Korea stock market and U.S. stock market.

The method of estimating the expected rates of return in this study is the method that Easton et al. (2002) reverse-engineered the residual earnings model to estimate the equity premium in U.S. market.

It has only been in the last decade that literature paid much heed to the reverse-engineered valuation models to determine the implied cost of equity capital. The extant and expanding body of studies have investigated the issues pertaining to the cost of equity capital. The extant literature has reverse-engineered the residual earnings model or abnormal earnings growth model for estimating the expected rate of return on equity investment (O'Hanlon and Steele, 2000; Gebhardt et al., 2001; Claus and Thomas, 2001; Easton et al., 2002; Baginski and Wahlen, 2003; Gode and Mohanram, 2003; Easton, 2004; Easton and Monahan, 2005; Easton and Sommers, 2007). The reverse-engineered valuation methods have been developed to estimate the required rates of return regarding levels of aggregation, namely: (1) firm-specific estimates (Gebhardt et al., 2001; Claus and Thomas, 2001;

Baginski and Wahlen, 2003; Gode and Mohanram, 2003), and (2) estimates for a group or portfolio (O'Hanlon and Steele, 2000; Claus and Thomas, 2001; Easton et al., 2002; Easton, 2004). The disadvantage of the first approach is that they need to assume long-term growth rate, such as (1) fading ROE to the industry median ROE (Gebhardt et al., 2001), or (2) the long-term growth of abnormal earnings grow at the same rate for all companies (expected inflation rate: risk free rate minus 3%) (Claus and Thomas, 2001; Gode and Mohanram, 2003). Recent studies, in fact, have challenged the validity of *firm-specific* estimation procedures (Botosan and Plumlee, 2005; Guay et al., 2005; Easton, 2006). Hence, this study simultaneously estimates growth rate and the required rates of return using Easton et al. (2002) (henceforth ETSS).

In the meantime, a large body of studies have used the required rates of return developed from the reverse-engineered models to test hypotheses pertaining to the link between the required rates of return and relevant factors that may affect the required rates of return (**?**Daske, 2006; Easton and Sommers, 2007). An expanding body of literature has documented the international differences in the cost of equity capital, and have investigated the link between the required rate of return and potential factors (Agmon and Findlay, 1982; Damodaran, 2003; Chen et al., 2004; Koedijk and van Dijk, 2004; Sabal, 2004; Daske, 2006; Dargenidou et al., 2006; Hail and Leuz, 2006; He and Kryzanowski, 2007).

Results suggest that a substantial country risk premium exists in Korean stock market; however, the implied costs of capital have decreased over last 6 years. The result is in line with the argument that the phenomenon of "Korea discount" has been eased. In addition, we could find significant association between the measure of the implied cost of capital in relation with variables that affect the risk and profitability perceived by market investors.

2 Research Design

2.1 Simultaneous Estimation of Implied Cost of Capital and Growth

Our primary analysis is a comparison of the expected rate of return. We first estimate implied costs of capital using residual earnings model. The no arbitrate assumption is sufficient to derive the dividend discount model.[4] The price can be equated to the sum of discounted future stream of dividends. That is,

[4]See Rubinstein Rubinstein (1976).

$$P_0 \equiv \sum_{t=1}^{\infty} \frac{dps_t}{(1+r)^t}. \tag{1}$$

Where:

$$P_q = \text{price per share at time 0;}$$

$$dps_t = \text{expected dividends per share at time } t;$$

$$r = \text{implied cost of capital.}$$

The residual income model equates the price and book value and the present value of expected future abnormal earnings. Ohlson and Juettner-Nauroth Ohlson and Juettner-Nauroth (2005) show the following identity.

$$\begin{aligned} 0 &\equiv y_0 + \frac{y_1 - (1+r)y_0}{(1+r)} + \frac{y_2 - (1+r)y_1}{(1+r)^2} + \dots \\ &\equiv y_0 + \sum_{t=1}^{\infty} \frac{y_t - (1+r)y_{t-1}}{(1+r)^t} \quad \forall \ y_t \ \text{ s.t. } \ \frac{y_t}{(1+r)^t} \underset{t\to\infty}{\longrightarrow} 0 \end{aligned} \tag{2}$$

y_t can be any sequence of numbers as long as discounted value ($\frac{y_t}{(1+r)^t}$) converges to zero in the long run.

Adding equations (1) and (2) yields:

$$Pr_0 = y_0 + \sum_{t=1}^{\infty} \frac{y_t + dps_t - (1+r)y_{t-1}}{(1+r)^t} \tag{3}$$

Without loss of generality, We can assume the discounted book value per share would converge to zero quickly. Let y_t replace book value per share at t,

$$y_t = bv_t \qquad \text{Since } \ \frac{bv_t}{(1+r)^t} \underset{t\to\infty}{\longrightarrow} 0,$$

Where:

$$bv_t = \text{book value per share at } t.$$

equation (3) leads to the residual income model by the Clean Surplus Condition. [5]

[5]Clean surplus condition requires that book value of common equity at time t is equal to book value of common equity at time $t-1$ plus net income available to common shareholders at time t minus net dividends to shareholders at time t.

$$
\begin{aligned}
Pr_0 &= bv_0 + \sum_{t=1}^{\infty} \frac{bv_t + dps_t - (1+r)bv_{t-1}}{(1+r)^t} \\
&= bv_0 + \sum_{t=1}^{\infty} \frac{eps_t - r \cdot bv_{t-1}}{(1+r)^t} \qquad (4)
\end{aligned}
$$

The residual income model (4) can be rearranged as follows:

$$
P_0 = bv_0 + \sum_{t=1}^{2} \frac{E_0[eps_t - r] \cdot bv_{t-1}}{(1+r)^t} + \sum_{t=3}^{\infty} \frac{E_0[eps_t - r] \cdot bv_{t-1}}{(1+r)^t} \qquad (5)
$$

Where:

$$
E_0 = \text{Expectation operator at time 0.}
$$

Following Easton et al. (2002), the first summation of the equation (5) may be re-written as follows [6] :

$$
\begin{aligned}
&\frac{1}{(1+r)^2} \cdot \left(\sum_{t=1}^{2} E_0[eps_t] + r \cdot E_0[dps_1] - ((1+r)^2 - 1) \cdot bv_0 \right) \\
&= \frac{1}{R} \cdot (Z_T - (R-1) \cdot bv_0) \qquad (6)
\end{aligned}
$$

R is defined as one plus the two-year compounded expected return on equity. [7] Z_T is expected aggregate two-year cum-dividend earnings. [8] In order to operationalize the residual model (4), we rearranged the equation (6) as a perpetuity at a permanent growth rate of $\mathbf{g}$.[9] G is defined as one plus the two-year compounded expected rate of growth in residual earnings.[10]

$$
P_0 = bv_0 + \frac{Z_T - (R-1) \cdot bv_0}{R - G} \qquad (7)
$$

The equation (7) is re-written as follows:

---

[6] While the original ETSS model uses four-year periods, we use two-year model since the analysts' forecasts for two-year horizon are readily available in Korean financial market. (Easton et al., 2002) reports that the estimates of the expected rate of return are not sensitive to the length of the analysts' forecast horizon from one to four years.

[7] $R = (1+r)^2$

[8] $Z_T = E_0[eps_t] + r \cdot E_0[dps_1]$

[9] Refer to Easton et al. (2002) for the detailed proof.

[10] $G = (1+g)^2$

$$\frac{Z_T}{bv_0} = G - 1 + R - G \cdot \frac{P_0}{bv_0} \tag{8}$$

In order to simultaneously estimate g and r, the equation (8) is re-written as following linear regression model for each firm i.

$$\frac{Z_{iT}}{bv_{i0}} = \gamma_{0i} + \gamma_{1i} \cdot \frac{P_{i0}}{bv_{i0}} + \varepsilon_{0i} \tag{9}$$

γ_0 and γ_1 can be estimated for any portfolio of firms from the linear regression of $\frac{Z_{iT}}{bv_{i0}}$ on $\frac{P_{i0}}{bv_{i0}}$. Following the regression analysis, r and g can be derived from the estimates of coefficients γ_0 and γ_1 such that:

$$\gamma_0 = G - 1 = (1+g)^2 - 1,$$
$$\gamma_1 = R - G = (1+r)^2 - (1+g)^2.$$

3 Data and Sample Selection

The financial data for this study were collected from companies listed in the Korean stock market. The sample consists of annual data from the years 2000 to 2006. [11] The companies with non-December fiscal year-end were excluded from the sample. The sample consists of the companies traded either on the KSE(Korea Stock Exchange) or on the KOSDAQ(Korea Securities Dealers Automated Quotation). [12]

Measures for the financial variables were taken from financial statements and the stock market at the end of the fiscal year. All per share variables are adjusted for stock splits and stock dividends. Accounting data, including earnings per share, book value, sales, long-term debt, total assets, and number of shares were culled from the TS2000 annual research files.[13] Stock prices and market beta are from the KSRI Stock Database.[14] The analysts' forecasts

[11] The archival database for earnings forecasts for Korean companies was available from 2000.

[12] As of 3 December 2007, 745 companies are listed on Korea Stock Exchange while 1,026 companies are listed on the KOSDAQ.

[13] TS2000 providing companies' financial data is prepared and maintained by the Korea Listed Companies Association.

[14] KSRI Stock Database is made available by the Korea Securities Research Institute.

and T-bond rates are obtained from FnGuide database. Earnings forecasts are derived from the last available consensus forecasts in December.

The sample selection rule requires earnings forecasts for two years. For example, to be included in 2006, the sample firms should have the last available consensus forecasts in December 2006 for each of the fiscal years ending December 31, 2006 and 2007. The top one percentile of observations based on $\frac{Z_T}{bv_0}$ and $\frac{P_0}{bv_0}$ are simultaneously eliminated to exclude the observations with extremely small book value of equity. The number of observations monotonically increases from 150 in 2000 to 320 in 2006. Altogether, this paper employs a sample of 1,779 firm years.

4 Empirical Results

4.1 Descriptive Statistics

A variety of studies demonstrate that firm specific risks affect the implied costs of capital (Gebhardt et al., 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005). Table 1 presents variable descriptions and descriptive statistics used to measure the implied costs of capital and firm characteristics. Median values of P/B (1.006) and P/E (9.200) are slightly lower than the historic average of the U.S. stock market. Median value of beta (0.915) is slightly lower than market beta. Median values for ROA and ROE are 6.5% and 11.6% respectively.

4.2 Implied Costs of Capital

4.2.1 Time Trend

Table 2 shows temporal changes of the implied costs of capital. Consistent with anecdotal evidence, the implied costs of capital are higher in the early 2000's (i.e. years proceeding IMF bailout) compared to the implied costs of capital in recent years. As would be expected, the implied costs of capital capital for Korean companies are higher than those for U.S. companies. The r varies from a high of 21.9% in 2002 to a low of 13.0% in 2006. The growth rate g is relatively stable over the sample period. Not surprisingly, the implied market premium is significantly higher than that of U.S. market. The estimated equity premium over risk-free rate for Korean stock market averages 10.9% over the years 2000 to 2006. The equity premium varies from a high of 16.8% in 2002 to a low of 8.1% in 2006. This estimate is much higher than equity premium for U.S. stock market reported in prior

U.S. studies; 2.5% over the years 1981 to 1995 (Gebhardt et al., 2001), 3.4% over the years 1985 to 1998 (Claus and Thomas, 2001), or 5.3% over the years 1981 to 1998 Easton et al. (2002). The result may imply that there is a significant discount in Korean stock market. Although it is not apparent that the implied cost of capital has monotonically decreased over the years from 2000 to 2006, it is clear that the equity premium is much higher in early 2000s (just after Asian economic crisis). It make sense because investors' required rates were much higher during the economic turmoil since many companies had financial difficulties if not went default. A likely explanation for this pattern is that the "Korea discount" has been eased in recent years although the implied cost of capital is still much higher than that of U.S. stock market. In sum, although there is obvious difference in estimation periods, we can draw the same conclusion since the implied cost of capital less varies period by period in U.S. stock market.čiteetss2002.

4.2.2 Industry

Table 3 presents the estimates of r, g, and equity premium for the portfolios partitioned by industry groups. Consistent with prior studies, energy and utility industries have a lower equity premium than most of other industries (Fama and French, 1997; Gebhardt et al., 2001; Easton et al., 2002). Telecommunication service shows lower equity premium. The result may reflect the monopolic power of Telecommunication companies since just few companies dominate highly profitable market. The result is not surprising in a sense that prior literature has shown the negative association between the market power and the implied costs of capital (Cressy, 1995). Health care industry has the highest equity premium.

4.2.3 Firm Characteristics

Table 5 presents the estimates of r and g for the portfolios partitioned by financial factors representing firm characterizes. The relationship between firm characteristics and the implied costs of capital is backed up by anecdotal evidence. Prior studies demonstrate that firm specific risks affect the implied costs of capital (Gebhardt et al., 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005). In this section, we compare the estimates of implied costs of capital and various firm characteristics to measure how well the implied costs of capital are associated with firm characteristics.

The market price, the numerator of the P/B and P/E ratios, is based on the expected future earnings that market participants pay for (Ohlson, 1995). If market participants expect a higher future economic benefits relative to book value (Earnings), the P/B (P/E)

will show a higher value by incorporating the market's expectation in the numerator. Prior literature has reported that low P/B firms earn higher ex post returns that high P/B firms or face higher systematic risk (**?**Berk et al., 1999). [15] In this case, these stock should earn higher risk premium. Supporting prior arguments, the level of P/B and P/E is negatively associated with the implied costs of capital. Estimated implied costs of capital for the lowest quintile (Portfolio 1) of P/B and P/E are 33.3% and 29.7% and while those for the highest quintile (Portfolio 5) are 19.2$ and 9.6% respectively. No significant association between P/B or P/E and estimated growth rates.

Total assets (TA) representing size effect of a firm proxies risk. [16] Prior studies document that investors' required rate of return for larger companies lower since they have dominant market power (Cressy, 1995) and/or lower default risk. In addition, disclosure literature argues that investors can lower information asymmetry for larger firms since the size proxies the availability of information. Hence, a negative association exists between the level of disclosure and cost of capital (Botosan, 1997; Poshakwale and Courtis, 2005; Habib, 2006). On the other hand, it is known that small firms are more optimistically biased (Bhushan, 1989; Brown, 1999; Richardson et al., 2000; Easton and Sommers, 2007). Hence, these firms may show upward biased costs of capital (Easton and Sommers, 2007). It is extremely difficult if not impossible to empirically disentangle those effects. There is significant negative association between firm size and the implied costs of capital. Nonetheless, the evidence provides that the estimates of r monotonically decreases from 23.2% for portfolio 1 to 12.2% for portfolio 5.

Also well documented is that firm risk is negatively correlated with cost of capital and firm value. Measures used to assess firm risk were market beta (beta), debt-to-market (D/A), and debt-to-assets (D/M). The capital asset pricing model beta is used to capture firm specific risk related to market volatility (Sharpe, 1964; Lintner, 1965; Mossin, 1966). Given that beta captures firm specific risk, a positive association would be expected between beta and implied costs of capital (Gordon and Gordon, 1997; Harris et al., 2003; Gode and Mohanram, 2003). Contrary to expectations, beta is not significantly associated with the implied costs of capital. There is no significant difference between r for portfolio 1 (17.3%) and portfolio 5 (17.1%).

D/M and D/A measure the risk associated with financial leverage of the firm. As the

[15] **?**) reports that P/B is the most important variable in explaining the variation in implied costs of capital.

[16] Alternative financial measures were tested as proxy variables including the market capitalization.

amount of debt in a firm's capital structure increases, so too does the risk the firm takes on. This provides an incentive for market participants to require higher rates of returns for the firms with higher ratios. Although one of the conjectures of this study is a positive association between the implied cost of capital and financial leverage, the finding is unclear.

ROA and ROE proxy the profitability of companies. ROA and ROE show monotonically positive association with implied costs of capital. r for the portfolio 1 of ROA and ROE are 8.6% and 8.2% and while those for the portfolio 5 are 25.7$ and 29.1%. We can postulate that analysts' forecast for highly profitable companies are more likely optimistic. Optimistically inflated forecast may lead to upward bias in the implied costs of capital.

4.3 International Perspective

To be continued.

5 Concluding Remarks

A variety of evidence has shown the existence of "Korea discount" refereing to the phenomenon that the companies listed in the Korean stock market, *ceteris paribus*, are traded at a discount in comparison with the companies in other countries.

The results of this study have several important implications for the study of equity premium. First, this paper provides compelling evidence that Korean stock market is traded at a discount. The estimated equity premium over risk-free rate for Korean stock market averages 10.9% over the years 2000 to 2006. What is clear is that the estimate is much higher than equity premium for U.S. stock market reported in prior studies. Second, the equity premium has decreased over the last 6 years. We postulate that the economic turmoil of 1997 had negatively (in a valuation sense) affected Korean stock market over several years, and investors' required rates were much higher after the crisis since many companies had financial difficulties if not went default. However, it seems that the "Korea discount" has been eased in recent years. Lastly, as well documented in prior studies, we could find a significant association between the firm characteristics and the implied costs of capital (Gebhardt et al., 2001; Gode and Mohanram, 2003; Botosan and Plumlee, 2005). By doing so, we could examine the measure of the implied cost of capital in relation with variables that affect the risk and profitability perceived by market investors.

However, the results of this study should be interpreted with caution. One issue to be wary of is the potential upward bias in estimates of costs of capital implied by market prices

and analysts' forecasts. The high costs of capital may reflect that earnings forecasts are optimistically biased. In this case, the cost of capital implied by inflated analysts' forecasts of earnings will be upward biased. Easton and Sommers (2007). Another related issue would be one that earnings forecasts prepared under different accounting regimes (e.g. GAAP or Korean GAAP) may lead to differences in cost of capital Easton (2006).

In this regard, it would be worthwhile if future research extends the conclusions of this study in several directions. First, a further analysis regarding analysts' optimism and implied cost of capital with a data set covering a longer window of time would be a valuable area for future study. Another caution must be exercised when we interprets the positive association between ROA/ROE the implied cost of capital. Further research is required to investigate whether analysts' forecast for highly profitable companies are more likely optimistic. Second, yet another worthwhile study would be one that looks into the cross sectional and longitudinal analysis of analysts' forecast errors for Korean companies and, in particular, investigates the degree to which forecasts errors are attributable the implied costs of capital.

Overall, this study is among the first to examine the implied equity premium for Korean stock market; consequently, we believe this study sheds light on the research of equity premium by revealing links between the implied cost of capital and firm characteristics. The findings of this study provide another potent interpretation of "Korea discount" based on the equity premium.

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Table 1: Descriptive Statistics: Variables[1]

Descriptive Statistics	N	Min	Max	Median	Std.
P/B	1,931	0.141	6.579	1.006	1.017
P/E	1,868	0.505	95.170	9.200	10.825
TA	1,912	11.1	195,206	273.7	11,640.6
Beta	1,694	0.000	7.050	0.915	0.509
D/M	1,826	0.000	13.203	0.156	0.899
D/A	1,826	0.000	0.740	0.090	0.105
ROA	1,836	-0.106	0.349	0.065	0.055
ROE	1,836	-0.306	0.613	0.116	0.083

Notes to Table 1:

[1] The descriptive statistics are computed after considering missing values.

Where:

Z_T : Aggregate expected cum-dividend earnings for the two-year period;

P/B : Price to Book Value of Equity;

P/E : Price to Earning Ratio;

TA : Total Asset (in millions of Korean Won);

Beta : Capital Asset Pricing Model Beta;

D/M : Debt to Market Capitalization;

D/A : Debt to Total Asset;

ROA : Return on Total Asset;

ROE : Return on Common Equity.

Table 2: Annual Estimates of the Expected Rate of Return(r) and the Expected Long-Term Growth in Residual Income (g)

Year	n	γ_0	γ_1	R^2	r	g	T-Bond	Equity Premium
2000	**150**	**0.25**	**0.15**	**0.04**	**18.4 %**	**11.8 %**	**6.7 %**	**11.7 %**
2001	**245**	**0.33**	**0.08**	**0.02**	**18.7 %**	**15.2 %**	**5.9 %**	**12.8 %**
2002	**230**	**0.28**	**0.21**	**0.06**	**21.9 %**	**13.0 %**	**5.1 %**	**16.8 %**
2003	**252**	**0.29**	**0.10**	**0.06**	**18.0 %**	**13.7 %**	**4.8 %**	**13.2 %**
2004	**267**	**0.24**	**0.19**	**0.11**	**19.8 %**	**11.5 %**	**3.3 %**	**16.5 %**
2005	**303**	**0.21**	**0.11**	**0.13**	**14.9 %**	**10.0 %**	**5.1 %**	**9.9 %**
2006	**320**	**0.20**	**0.07**	**0.15**	**13.0 %**	**9.7 %**	**4.9 %**	**8.1 %**
All	**1779**	**0.29**	**0.10**	**0.05**	**17.6 %**	**13.7 %**	**6.7 %**	**10.9 %**

Notes to Table 2:

$$\frac{Z_{iT}}{bv_{i0}} = \gamma_{0i} + \gamma_{1i} \cdot \frac{P_{i0}}{bv_{i0}} + \varepsilon_{0i} \quad (9)$$

γ_0 and γ_1 are the estimates of the coefficients in the linear regression of the ratio of aggregate earnings-to-book value on the ratio of price-to-book value where P_0 is the fiscal year fiscal year end price at time 0. bv_0 is the book value of equity per share at time 0. Z_T is the aggregate expected cum-dividend earnings for the two-year period. n is the number of observations. R^2 is adjusted R^2. r and g are derived from the estimates of coefficients γ_0 and γ_1 where $g = \sqrt{\gamma_0 + 1} - 1$ and $r = \sqrt{\gamma_1 + (1+g)^2} - 1$.

Table 3: Annual Estimates of the Expected Rate of Return(r) and the Expected Long-Term Growth in Residual Income (g) for Various Industry

Year	n	r	g	Equity Premium
Basic Materials	**224**	**15.6 %**	**9.8 %**	**8.9 %**
Consumer Discretionary	**394**	**18.3 %**	**16.1 %**	**11.6 %**
Consumer Staples	**124**	**12.9 %**	**7.4 %**	**6.2 %**
Energy	**14**	**12.7 %**	**5.7 %**	**6.0 %**
Financial	**44**	**19.5 %**	**18.7 %**	**12.8 %**
Health Care	**87**	**26.1 %**	**29.7 %**	**19.4 %**
Industrials	**308**	**16.8 %**	**11.6 %**	**10.1 %**
Information Technology	**483**	**19.7 %**	**15.1 %**	**13.0 %**
Telecommunication Services	**18**	**10.0 %**	**3.0 %**	**3.3 %**
Utility	**65**	**7.8 %**	**14.7 %**	**1.1 %**

Notes to Table 3:

$$\frac{Z_{iT}}{bv_{i0}} = \gamma_{0i} + \gamma_{1i} \cdot \frac{P_{i0}}{bv_{i0}} + \varepsilon_{0i} \quad (9)$$

γ_0 and γ_1 are the estimates of the coefficients in the linear regression of the ratio of aggregate earnings-to-book value on the ratio of price-to-book value where P_0 is the fiscal year fiscal year end price at time 0. bv_0 is the book value of equity per share at time 0. Z_T is the aggregate expected cum-dividend earnings for the two-year period. n is the number of observations. R^2 is adjusted R^2. r and g are derived from the estimates of coefficients γ_0 and γ_1 where $g = \sqrt{\gamma_0 + 1} - 1$ and $r = \sqrt{\gamma_1 + (1+g)^2} - 1$.

Table 4: Correlations of Firm Characteristics

	P/B	P/E	TA	Beta	D/M	D/A	ROA
P/E	0.552						
	(<.0001)						
TA	-0.221	-0.086					
	(<.0001)	(0.0002)					
Beta	0.139	0.125	-0.130				
	(<.0001)	(<.0001)	(<.0001)				
D/M	-0.608	-0.330	0.513	-0.093			
	(<.0001)	(<.0001)	(<.0001)	(0.0002)			
D/A	-0.205	-0.091	0.484	-0.040	0.870		
	(<.0001)	(0.0001)	(<.0001)	(0.107)	(<.0001)		
ROA	0.519	-0.255	-0.317	0.028	-0.580	-0.384	
	(<.0001)	(<.0001)	(<.0001)	(0.2617)	(<.0001)	(<.0001)	
ROE	0.515	-0.343	-0.150	0.028	-0.341	-0.141	0.894
	(<.0001)	(<.0001)	(<.0001)	(0.255)	(<.0001)	(<.0001)	(<.0001)

Notes to Table 4:

This table shows Spearman correlations for firm characteristics: price-to-book ratio(P/B); price-to-earnings ratio(P/E); total assets(TA); beta(Beta); long-term debt-to-market ratio; long-term debt-to-asset ratio; return on assets(ROA); return on equity(ROE). Accounting data, including earnings per share, book value, sales, long-term debt, total assets, and number of shares were culled from the TS2000 annual research files. Stock prices and market beta come from the KSRI Stock Database.

Table 5: Annual Estimates of the Expected Rate of Return(r) and the Expected Long-Term Growth in Residual Income (g) for Various Financial Factors

		Quintile of Firm Characteristics				
Financial Factor	Estimates	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}
P/B	r	33.3 %	23.7 %	17.6 %	20.1 %	19.2 %
	g	3.6 %	-0.3 %	6.7 %	19.8 %	15.6 %
P/E	r	29.7 %	20.5 %	14.0 %	12.0 %	9.6 %
	g	13.6 %	7.0 %	-0.3 %	5.5 %	4.9 %
TA	r	23.2 %	22.0 %	17.7 %	15.4 %	12.2 %
	g	20.3 %	20.3 %	11.9 %	12.2 %	6.6 %
Beta	r	17.3 %	18.7 %	17.1 %	15.6 %	17.1 %
	g	13.8 %	15.5 %	12.7 %	9.6 %	13.6 %
D/M	r	16.8 %	18.0 %	20.0 %	18.3 %	14.1 %
	g	12.0 %	13.7 %	18.3 %	14.8 %	9.1 %
D/A	r	17.1 %	21.2 %	16.9 %	16.5 %	15.4 %
	g	12.4 %	18.2 %	13.3 %	11.6 %	9.6 %
ROA	r	8.6 %	14.1 %	16.2 %	20.0 %	25.7 %
	g	3.3 %	9.4 %	14.9 %	19.8 %	23.3 %
ROE	r	8.2 %	12.3 %	16.4 %	19.7 %	29.1 %
	g	2.7 %	8.3 %	16.6 %	18.9 %	28.0 %

Notes to Table 5:

The partitions are formed by sorting the data into quintiles on the basis of the financial factors. For example, portfolio 1 includes bottom 10% of observations based on the size of each financial factor.

Where:

P/B : Price to Book Value of Equity;

P/E : Price to Earning Ratio;

TA : Total Asset;

Beta : Capital Asset Pricing Model Beta;

D/M : Debt to Market Capitalization;

D/A : Debt to Total Asset;

ROA : Return on Total Asset;

ROE : Return on Common Equity.

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