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Expected stock return, expected investment, and expected profitability in Korea

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이 논문을 경영학석사 학위논문으로 제출함

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Abstract

Fama and French (2006) and Aharoni et al. (2013) use the dividend discount model to develop the role of expected investment and expected profitability to predict stock returns at the per share level and firm level, respectively. The valuation model posits that the expected return is negatively related to expected investment and positively related to expected profitability.

Using Korean, data, this paper shows that the valuation relations do not apply at both the per-share level and firm-level, except for the effect of expected profitability on the stock return, which appears to be positive and significant at the firm-level. In addition, the paper examines measurement error problem in the fitted values from the first-stage regressions, which makes the use of profitability and asset growth variable unreliable with Korean data.

The paper also examines the relation between stock returns and expected profitability and expected investment among chaebols and non-chaebols at different time periods to bring insights into model's predictions and unique characteristics in Korean firms.

Keywords: Book-to-market, Profitability, Investment, Expected return

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I. Introduction

Fama and French (2006) and Aharoni et al. (2013) examine the relations between stock returns and expected investment and expected profitability based on the Miller and Modigliani (1961) as following:

$$V(t) = \sum_{t=1}^{\infty} \frac{E(Y(t+\tau)) - E(\Delta B(t+\tau))}{(1+\rho)^{\tau}} \qquad (1)$$

where V(t) is the market value of the firm's equity at the end of period t, Y(t) is income after interest and taxes assumed to be received at the end of period t, B(t) is the book value of equity at the end of period t, ΔB(t+1), and ρ is the discount rate. Dividing both sides of Eq (1) by the book value of equity at the end of period t gives:

$$\frac{V(t)}{B(t)} = \sum_{t=1}^{\infty} \frac{E(Y(t+\tau)/B(t)) - E(\Delta B(t+\tau)/B(t))}{(1+\rho)^{\tau}} \qquad (2)$$

Eq (2) refers to the Miller Modigliani valuation formula. Expected future net income relative to current book equity is a measure of profitability, and it should be positively related to the stock return. Expected future change in book equity relative to current book equity is a measure of investment, and it should be negatively related to the stock return.

Based on the valuation formula, Aharoni et al. present empirical result that is

consistent with the model's assumption at the firm-level, as the expected investment and expected profitability exhibit negative and positive relations to stock returns, respectively, with statistical significance. Their result differs from that of Fama-French who examine the same relations at per-share basis where both the expected investment and expected profitability have positive and insignificant coefficients on the regression.

Therefore, I conduct firm-level and per-share level analysis to examine relations between stock returns and expected investment and expected profitability using Korean data.[1] Although per-share level analysis fails to produce result consistent to model in United States, I decide to use both approaches on the behalf that the Korean data can match the valuation formula better on one approach than the other. Furthermore, the paper includes analysis based on "business groups" samples to reflect the unique characteristics of the country, and financial crisis such as IMF crisis in 1997 and global financial crisis in 2008 that are both relevant to Korea.

The remainder of the paper is organized as follows. Section 2 examines the data,

[1] Aharoni et al. (2013)

methodology, and summary statistics. Section 3 presents empirical results from multiple regressions based on the Miller Modigliani formula. Section 4 describes goodness of fitness tests and additional sub-sample analysis, and section 5 concludes.

II. Literature Review

This paper tests for the book-to-market, profitability, and investment effects in expected returns predicted by valuation equation (1). Therefore, it can be viewed as providing an overall perspective on other papers that link average stock returns to book-to market equity and proxies for expected profitability and investment.

This paper is primarily based on Fama French (2006) and Aharoni et al. (2013) that examine relations between stock return and expected profitability and investment at the per-share level and firm level, respectively. The concept of valuation formula in Eq (1) is defined in Miller and Modigliani (1961). However, the papers draw their perspectives from other empirical papers. There is evidence that firms with higher book-to-market ratios have higher average stock returns (Fama and French 1992), and controlling for book-to-market equity, average returns are positively related to profitability (Haugen, Baker 1996). Titman, Wei and Xie (2004) show a negative relation between average returns and investment. In Sloan (1996), the paper shows that higher accruals predict lower stock returns. Finally, Lee, Ng, and Swaminathan (2004) combine analyst forecasts of earnings with the assumptions about future

investment to estimate expected stock returns. The general result is that higher expected net cash flows (expected profitability minus expected investment) forecast higher stock returns.

In addition, the paper tests relationship between the stock return and expected investment and profitability on *chaebols*, which refer to corporate groupings in Korea. Indeed, several literatures provide the explanation on the ownership structure of groups. For example, there is evidence that chaebols have tunneling incentives for pyramidal ownership structures (Bae, Kang, and Kim 2002). Lemmon and Lins (2003) report evidence that the separation of ownership and control is detrimental to performance during East Asian financial crisis.

III. Data, methodology, and summary statistics

The data are drawn from the Data Guide Pro annual database, which consist of 1,717 public companies listed on KOSPI and KOSDAQ index for the sample period of 1981 through 2012. Following Fama-French and Aharoni et al., financial firms and very small firms with total assets of less than $25 million or book equity of less than $12.5 million are excluded from the regressions used to predict investment and profitability. In addition, the firms that miss accounting and market information for every fiscal year are excluded, which are used to calculate the explanatory variables for first-stage regression. To alleviate statistical biases, any firm-year observation that lies outside of 1^{st} to 99^{th} quartile is winsorized, and thus size of the sample not reduced in the process. Consequently, the final sample involve of 14,313 firm-years, where the result is reproduced in Table 1.

Table 1

Descriptive Statistics for Korean Data

The sample consists of 14,313 firm-year observations during December 1981 – December 2012 on non-financial firms on the DataGuide Pro annual databases with assets of at least KRW 3 billion, book equity of at least KRW 1.5 billion, and all accounting and market information necessary to calculate the explanatory variables used in the first-stage regressions. Observations are winsorized from regressions if the value of explanatory variables lies outside the 1st to 99th quartile.

firm-year observations from 1981-2012	**58,378**
Missing accounting or market information	**40,405**
negative x values for Ln(x)	**297**
asset < KRW 3 billion or equity < KRW 1.5 billion	**3,363**
Final Sample	**14,313**
Panel A: Sample divided by corporate groups	
chaebol	**2,729**
non-chaebol	**11,584**
Panel B: Sample divided by IMF crisis period and global financial crisis period	
1981 - 1996	**2,475**
1997 - 1999	**1,284**
2000 - 2007	**6,389**
2008 - 2010	**3,755**

In particular, for further analysis based on group structure of firms, the final sample is divided for *chaebols* and stand-alone firms. The criterion for defining *chaebol* firm is defined by Online Provision of Enterprise Information (OPNI), which provides a list of firms that form corporate groups in Korea. In addition, the final sample is divided for the period of 1981-1996 to 1997-1999, and 2000-2008 to 2008-2010 for sub-sample analysis to account for IMF crisis in 1997 and global financial crisis in 2008.

The paper follows both Fama and French (2006) and Aharoni et al. (2013) to estimate the expected investment and expected profitability used in the second-stage regression, using a group of accounting and market variables. The first-stage regression is as following:

$$\begin{aligned}\Delta A(t+1)/A(t) = {} & \lambda_0 + \lambda_1 \ln BM(t) + \lambda_2 \ln MV(t) \\ & + \lambda_3 [\text{Neg } Y(t)] + \lambda_4 Y(t)/B(t-1) \\ & + \lambda_5 [-AC(t+1)/B(t)] + \lambda_6 [+AC(t+1)/B(t)] + \lambda_7 \Delta A(t)/A(t-1) \\ & + \lambda_8 [\text{No } D(t)] + \lambda_9 D(t)/(B(t-1) + \omega(t+1)\end{aligned} \tag{3}$$

$$Y(t+1)/B(t) = \lambda_0 + \lambda_1 \ln BM(t) + \lambda_2 \ln MV(t) + \lambda_3 [\text{Neg } Y(t)] + \lambda_4 Y(t)/B(t-1) + \lambda_5 [-AC(t+1)/B(t)] + \lambda_6 [+AC(t+1)/B(t)] + \lambda_7 \Delta A(t)/A(t-1) + \lambda_8 [\text{No } D(t)] + \lambda_9 D(t)/(B(t-1) + \omega(t+1) \quad (4)$$

In the paper, the time index t is equivalent to the calendar year t. Y(t+1)/B(t) is income before extraordinary items scaled by book equity. ΔA(t+1)/A(t) is the growth in total assets over a year. lnBM(t) is the natural log of the book-to-market ratio at the end of year t. lnMV(t) is the natural log of the book-to-market ratio at the end of year t. lnMV(t) is the natural log of the market value of equity at the end of year t. [+AC(t+1)/B(t)] is year t+1 accruals. [-AC(t+1)/B(t)] is defined in a same way with opposite sign; D(t+1)/(B(t) is the dividend yield during year t+1. Neg (Y) is a dummy variable that equals one if the profitability at the end of calendar year t is negative and zero otherwise. [No D(t)] is a dummy variable that equals one if the firm paid out dividend during the fiscal year t, and zero otherwise.

Then, based on Fama-MacBeth (1973) regression along with the expected investment and expected profitability from the first-stage regression in Eq (3) and Eq (4), it examines their relationship to the stock returns at the firm-level and per-share

level as following:

$$r(i, t+1) = \gamma_0 + \gamma_1 \ln BM(t) + \gamma_2 \ln MV(t+1) + \gamma_3 \hat{E}(\Delta A(t+1)/A(t)) + \gamma_4 \hat{E}(Y(t+1)/B(t)) + \varepsilon(i, t+1) \quad (5)$$

Table 2 presents the descriptive statistics on selected firm level variables used in the first-stage regression such as interquartile break points and the spread between 10^{th} and 90^{th} percentiles. This spread is used to demonstrate the importance of particular variables to determine the expected investment and expected profitability estimates for first-stage regressions. The first two-rows of Table 1 present the distributions of the dependent variables of the first-stage regressions and the remaining rows present that of independent variables.

Table 2

Summary Statistics for explanatory variables for first-regression

The table reports distributional information for the following variables that are used in the first-stage regressions: Y(t+1)/B(t) is income before extraordinary items scaled by book equity; ΔA(t+1)/A(t) is the growth in total assets over a year; lnBM(t) is the natural log of the book-to-market ratio at the end of year t; lnMV(t) is the natural log of the book-to-market ratio at the end of year t; lnMV(t) is the natural log of the market value of equity at the end of year t; [+AC(t+1)/B(t)] is year t+1 accruals; [-AC(t+1)/B(t)] is similarly defined; D(t+1)/(B(t) is the dividend yield during year t+1; and ln(n(t+1)/n(t)) is the natural log of the ratio of the split-adjusted shares outstanding at the end of year t+1 to the split-adjusted shares outstanding at the end of year t.

	25%	Median	75%	10% to 90% spread	10%	90%
Y(t+1)/B(t)	**0.005**	**0.064**	**0.136**	**0.435**	**-0.208**	**0.227**
ΔA(t+1)/A(t)	**-0.013**	**0.081**	**0.209**	**0.524**	**-0.112**	**0.412**
lnBM(t)	**-0.318**	**0.209**	**0.733**	**2.044**	**-0.832**	**1.212**
lnMV(t)	**16.716**	**17.486**	**18.448**	**3.593**	**16.059**	**19.652**
[+AC(t+1)/B(t)]	**0**	**0.005**	**0.141**	**0.354**	**0**	**0.354**
[-AC(t+1)/B(t)]	**-0.139**	**0**	**0**	**0.366**	**-0.366**	**0**
D(t+1)/B(t)	**0.011**	**0.019**	**0.032**	**0.043**	**0.006**	**0.049**

IV. First-stage regressions

To investigate the valuation relation in Eq (1), the expected investment and profitability must be estimated at the firm level following Aharoni et al. (2013). Yet, although the valuation model favors the firm-level analysis, per-share level analysis based on Fama and French (2006) was conducted in addition, because the empirical result might not adhere correctly as specified in the model. Therefore, the relation between stock returns, BM, and expected investment and profitability is examined using both approaches.

Result of per-share level and firm-level first-stage regressions are presented in Table 3. Panel A and B report prediction models for investment and profitability in the coming fiscal year. Results for the first-stage firm-level and per-share level regressions have similarities that there is a significant negative relation between BM and expected investment, and also BM and expected profitability. In particular, BM, current profitability, and current investment are important variables to proxy expected investment and expected profitability as they have significant coefficients at 1% and 5% level. However, it should be noted that these variables lose statistical significance

when examined at the per share level, except for current profitability.

Controlling for the other explanatory variables, the size measure lnMV is negatively correlated with future investment but is not correlated with future profitability. The economic effect of size on investment is much less than of BM. This small effect of size might be due to excluding very small firms in the data collection process. Both the binary variables [Neg Y] and [NoD] are not significantly related to both future profitability and future investment. The accruals variables [-AC/B] and [+AC/B] are also not significant predictors of both future investment and future profitability with a small economic significance. All these results from other explanatory variables raise concern about measurement problem in proxies for expected investment and expected profitability in Korea, because these variables appeared significant when they were examined using United States data. The dividend yield variable has a relatively large economic effect both on expected investment and expected profitability, but it is not statically significant.

Table 3
Firm-level and per-share level first-stage regression predictors of investment and profitability

Panel A reports the average coefficients an associated t-statistics of sets of Fama-Macbeth (1973) regressions used to predict investment according to Eq (3). The dependent variable in the first two rows of Panel A is investment during the fiscal year that ends in calendar year t+1, $\Delta A(t+1)/A(t)$, where A(t) is the book value of assets at the end of fiscal year that ends in calendar year t. The explanatory variables in the Panel A are as described in Table 2. The two variables not described in Table 2 are dummy variables: [Neg Y(t]] which equals one if the firm experiences negative earnings in the fiscal year that ends in calendar year t, and [No D(t)] which equals one if the firm does not pay a dividend that year. The first row of Panel B reports the average coefficients and associated t-statistics of sets of Fama-Macbeth regressions used to predict profitability according to Eq (4).
The ** and * denote that an average coefficient is significant at 1% and 5% levels, respectively.

	lnBM(t)	lnMV(t)	negY(t)	Y(t)/B(t-1)	[-AC(t+1)/B(t)]	[+AC(t+1)/B(t)]	ΔA(t)/A(t-1)	NoD(t)	D(t+1)/B(t)
Panel A: Firm-level first-stage regression to predict investment									
Firm Level	0.05***	0.01	0.06	0.19***	0.03	0.01	0.12***	0.02	-0.38
Per Share Level	0.03	-0.02	0.12	0.22***	0.01	-0.09	0.01	0.05	0.25
Panel B: Firm-level first-stage regression to predict profitability									
Firm Level	-0.04***	0.00	-0.01	0.35***	-0.01	-0.02	-0.02	-0.01	0.41***
Per Share Level	-0.01	0.03	0.09	0.29***	-0.01	-0.05	-0.06	-0.03	0.26

Although not presented in Table 3, the first-stage regressions were performed for sub-sample analysis that consider the 1981 – 1997 pre-IMF financial crisis period in Korea.[2] The result was not different in terms of both economic and statistical significance compared to those estimated over the full 1981 – 2013 period. Therefore, the inclusion of the IMF financial crisis does not materially alter the prediction models. In addition, the first-regressions that add change in number of outstanding shares as explanatory variable produced similar results with the regression without it.

After obtaining first-stage estimates of per-share level and firm-level expected profitability and expected investment, the relation between future stock returns and expected profitability, investment, and current book-to-market ratio are examined.

[2] Based on the assumption that IMF crisis materially affected the coefficient for expected investment and profitability

V. Second-Stage regression

In the second-stage regressions, the average coefficients from the first-stage regressions are used in conjunction with the first-stage explanatory variables to obtain estimates of expected profitability and expected investment, and estimate the second-stage regression for each month from December 1981 to December 2012.[3] The average coefficients and associated t-statistics are presented in Table 4. Three sets of results for the second-stage regressions are presented in Table 4 that include sub-sample analysis for those before IMF crisis in 1997, and expected investment measured by growth in book equity rather than asset growth.

The different results correspond to the three different estimates of expected investment and expected profitability conducted at the firm-level and per-share level. All the coefficients of the per-share level second-stage regressions are consistent with their expected signs. For example, the coefficient for expected investment is -0.05 and that for expected profitability is 0.074. Yet the statistical significance for expected investment and profitability are -1.43 and 2.89, which means that they are not

[3] Aharoni et al. (2013)

significant at the 5% and 1% level. This result differs to that of Fama-French (2006) analysis where they found both coefficients to be positive and insignificant. Since the signs of the coefficients adhere to the valuation model in Eq (1), the per-share level analysis can be considered to work better in Korea than in United States; however, the statistical significance of coefficients is weak which make the result unreliable to assess the model correctly.

On the other hand, the second-stage regressions at the firm-level shows positive, significant coefficient for expected profitability, and positive insignificant for expected investment. In Table 4, the coefficient for expected investment is 0.031 and that for expected profitability is 0.111. The expected profitability has positive sign with statistical significance at the 5% and 1% level with the value of 4.91, which is greater than 2.01 in United States. Yet, its economic significance is much smaller as it has a value of 0.111 compared to 1.54 in United States.

Table 4

Firm-level and per share-level relation between stock returns, BM, expected profitability, and expected investment

r(i, t+1) denotes the return on a stock in the ith month of the 12 months subsequent to December of calendar year t+1. The coefficients obtained from the fir-stage regressions are used in the estimation of expected profitability $\hat{E}(Y(t+1)/B(t))$, in the fiscal year ending in calendar year t+1, and expected investment, $\hat{E}(\Delta A(t+1)/A(t))$, in the fiscal year ending in calendar ear t. MV(t+1) is the market value of equity at the end of December of calendar year t+1.

Intercept	lnBM(t)	lnMV(t)	$\hat{E}(\Delta A(t+1)/A(t))$	$\hat{E}(Y(t+1)/B(t))$
Panel A: Firm-level regression				
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions				
0.009	-0.007	0.001	0.031	0.111
(0.43)	(3.72)	(4.27)	(1.17)	(3.14)
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions that include % change in shares outstanding				
-2.42	0.17	0.16	0.095	0.76
(-4.06)	(3.59)	(4.28)	(1.01)	(3.58)
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions that include % change in shares outstanding with investment proxied by $\Delta B(t)/B(t-1)$				
-2.31	0.14	0.16	-0.029	1.14
(-4.19)	(2.18)	(4.26)	(-0.52)	(4.23)
Panel B: Per-Share regression				
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions				
0.040	-0.014	0.005	-0.050	0.074
(3.59)	(3.91)	(3.17)	(-1.43)	(2.89)
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions that include % change in shares outstanding				
0.044	-0.012	0.004	-0.037	0.082
(3.45)	(-3.99)	(3.26)	(-1.56)	(2.97)
Dec 1981- Dec 2012: Predicted profitability and investment from first-stage regressions that include % change in shares outstanding with investment proxied by $\Delta B(t)/B(t-1)$				
0.038	-0.008	0.001	-0.028	0.104
(3.55)	(-2.92)	(2.87)	(-1.02)	(3.24)

It should be noted that the Miller Modigliani valuation formula[4] relates future stock returns to the expected growth in book equity. Fama French (2006) argue that asset growth, rather than equity growth, provides a better predictor of total investment, as it is a less noisy measure of total investment. Therefore, the fourth row of Table 4 reports the result when growth in total assets is replaced by growth in book equity for second-stage regressions. However, a comparison of first and third rows of Table 4 shows that the coefficient for both expected profitability and expected investment actually have higher statistical significance when investment is measured using book equity rather than asset. For instance, the t-statistics value for expected profitability is 5.65 when measured with book equity growth, compared to the 4.91 with asset growth. Therefore, it can be considered that book equity growth is a less noisy proxy for expected investment than asset growth in Korea.

In the result, it shows that the valuation model does not apply according to its implication for both the per-share level and firm-level analysis in Korea. The problem might be that the data in Korea are nosier than the one in United States. Therefore, it is

[4] Miller and Modigliani (1961)

suggested to examine the measurement error in proxies for expected investment and expected profitability at the first-stage regression.

VI. Goodness of fit test

Referring to first-stage regression, proxies for the expected investment and expected profitability were developed using various market and accounting explanatory variables. However, there is a potential measurement error problem in the way that the variables of profitability and investment from first-stage regressions are used in the second-stage regressions, because these fitted variables can be affected by noise in their measurement. Therefore, a goodness of fit test is conducted to confirm to what extent the accounting and market variables in the first-stage regressions can proxy for expected investment and profitability. It should be noted that the test is based on both firm-level and per-share level, because although Aharoni et al. (2013) claim that firm-level analysis provides better predictors of expected investment and profitability, inconsistent result from Table 4 indicates that the same prediction does not apply to Korean data.

Results of goodness of fit tests on first-stage regressions are presented in Table 5. The first and second rows refer to coefficients of r^2 based on Korean data and United States, respectively. It uses the same nine explanatory variables as FF and Aharoni et

al., and each column measures the r^2 for expected investment and profitability at the firm-level and per-share level. First, the r^2 in United States are much higher than those in Korea both for expected investment and profitability. For instance, the r^2 for expected investment on firm-level is only 0.17 in Korea whereas it is 0.47 in United States. This result indicates that the first-stage regression performs poorly to measure expected investment and profitability, which can lead to their relationship with stock returns that are not consistent with the model.

Table 5

Goodness of fitness test for expected profitability and expected investment

$\hat{E}(\Delta A(t+1)/A(t))$ denotes the estimated expected profitability, in the fiscal year ending in calendar year t+1, and $\hat{E}(Y(t+1)/B(t))$ denotes the estimated expected investment, in the fiscal year ending in calendar year t+1. The first and second rows show the r2 measures for expected investment and expected profitability in Korea and United States, at the per-share level and firm-level, respectively.

	$\hat{E}(\Delta A(t+1)/A(t))$		$\hat{E}(Y(t+1)/B(t))$	
	Per-Share Basis	**Firm-Level Basis**	**Per-Share Basis**	**Firm-Level Basis**
Korea	**0.06**	**0.09**	**0.18**	**0.17**
United States	**0.16**	**0.19**	**0.39**	**0.47**

Second, the result shows that the explanatory variables perform better in measuring expected profitability than expected investment. In Korea, the r^2 coefficients for expected investment are 0.06 and 0.09 at the per-share level and firm level, whereas those for expected profitability are 0.18 and 0.17. The results in United States show similar patterns as the r^2 are higher by two-fold. Therefore, the higher r^2 for expected profitability may explain why its coefficient is positive and significant measured at the firm-level analysis.[5]

Third, although Eq (1) posits that the explanatory variables measure the expected investment and profitability correctly at the firm-level, the result in Table 5 does not exhibit such a pattern. The r^2 for expected investment and expected profitability increase from 0.16 to 0.19 and 0.39 to 0.47 in United States, whereas those in Korea increase from 0.06 to 0.09 and decrease from 0.18 to 0.17, respectively. As such, the r^2 for expected investment and profitability do not improve significantly when measured at the firm-level than per-share level.

Thus, the goodness of fit test reveals that there is much information about expected

[5] This result is identical to Aharoni et al. (2013)

investment and profitability beyond that in the nine explanatory variables used in the first-regression. Better proxies for expected investment and profitability should do a better job identifying the profitability and investment effects in average returns predicted by Eq (1).

VII. Sub-sample analysis based on *chaebols*

Apart from noise in data, Korea has a large number of firms that form corporate groups, namely *chaebols* that differs from United States where the majority of firms are stand-alone firms. Therefore, it is suggested to examine the difference of expected investment and expected profitability effects between chaebols and non-chaebols with the respect to stock returns.

Table 6 shows the results for firm-level and per-share level regressions that are based on sub-sample of chaebols and non-chaebols. It should be noted that this result is primarily driven by non-chaebols as the number of firm-year observations for non-chaebols are 11,584 whereas that of chaebols are 2,729 which means that 81% of the result is based on non-chaebols.

Table 6
The relation between stock returns, BM, expected profitability, and expected investment for chaebol and non-chaebol firms

The coefficients obtained from the first-stage regressions are used in the estimation of expected profitability $\hat{E}(Y(t+1)/B(t))$, in the fiscal year ending in calendar year t+1, and expected investment, $\hat{E}(\Delta A(t+1)/A(t))$, in the fiscal year ending in calendar ear t. lnBM(t) is the book-to-market ratio at the end of December of calendar year t. lnMV(t+1) is the natural log of market value of equity at the end of December of calendar year t. N refers to number of annual firm-year observations for each criterion.

	N	Intercept	lnBM(t)	lnMV(t)	$\hat{E}(\Delta A(t+1)/A(t))$	$\hat{E}(Y(t+1)/B(t))$
Panel A: Firm-level regression						
chaebol	2,729	-0.007	-0.009	0.000	0.057	-0.070
		(-0.24)	(-2.29)	(-0.05)	(1.26)	(-1.95)
non-*chaebol*	11,584	0.001	-0.013	0.002	-0.003	0.093***
		(0.05)	(-4.62)	(1.79)	(-0.12)	(4.33)
Panel B: Per Share-level regression						
chaebol	2,729	0.059	-0.002	0.007	-0.002	0.024
		(0.82)	(-0.39)	(2.82)	(-0.05)	(0.60)
non-*chaebol*	11,584	0.012	-0.018	0.006	-0.061	0.065***
		(0.91)	(-4.56)	(3.41)	(-1.76)	(4.20)

First, the coefficient of expected profitability for non-chaebols is 0.093 and 0.065 at the firm-level and per-share level, respectively, that are significant at the 10% and 5% level. The coefficient of expected profitability for chaebol firms is -0.070 and 0.024 at the firm-level and per-share level with no statistical significance. The result indicates that the positive effect of expected profitability on stock returns can be only found in the non-chaebols to extent that they include stand-alone firms in Korea, which are similar to those in United States. Therefore, it suggests that in addition to noise in data, the unique chaebol/non-chaebol corporate group structures make the positive effect of expected profitability not directly observable in Korea.

Second, the coefficient for expected investment for non-chaebols is -0.003 and -0.061 at the firm-level and per-share level, respectively, despite that they are not statistically significant. The coefficient of expected investment for chaebol firms is 0.057 and -0.002 at the firm-level and per-share level. The only non-chaebols show the negative sign for the expected investment, which is consistent to Eq (1). It should be noted that the sign for expected investment is negative even at the per-share level,

because it is different from that of Fama-French (2006) who obtained positive and insignificant coefficient.

Consequently, one can argue that the expected profitability and expected investment are better predictors of the stock returns for non-chaebols than chaebols. The expected profitability shows positive and statistically significant sign, and the expected investment shows negative sign, which are predicted by the Miller-Modigliani valuation formula.

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VIII. Sub-sample analysis based on crisis periods

In Table 6, the result indicates that the effect of expected investment and expected profitability for *chaebols* is inconsistent to the prediction in Eq (1). For instance, the firm-level regression based on 2,729 chaebols shows that the expected investment is positively related to stock return whereas the expected profitability is negatively related to stock return, which is exactly opposite to what the model predicts.[6] In principle, the inconsistent result might indicate that the unique corporate characteristics in Korea cause the relationship in Eq (1) to disappear among chaebols. For instance, Bae, Kang, and Kim (2002) argue that intra-chaebol acquisitions transfer wealth among the firms in the business groups, and this effect is more likely to place during financial crisis when the financing cost is expensive. Those problems that are unique to corporate group structure can distort the effect of expected investment and expected profitability in financial crisis, which leads to further analysis based on different time periods.

[6] According to Aharoni et al. (2013), expected investment is negatively related to stock return whereas expected profitability is positively related.

Table 7

The relation between stock returns, BM, expected profitability, and expected investment for chaebol/non-chaebols during financial crisis

The coefficients obtained from the first-stage regressions are used in the estimation of expected profitability $\hat{E}(Y(t+1)/B(t))$, in the fiscal year ending in calendar year t+1, and expected investment, $\hat{E}(\Delta A(t+1)/A(t))$, in the fiscal year ending in calendar ear t. lnBM(t) is the book-to-market ratio at the end of December of calendar year t. lnMV(t+1) is the natural log of market value of equity at the end of December of calendar year t. N refers to number of annual firm-year observations for each criterion. The samples are divided in the ways that are in accordance with IMF crisis period in 1997, and global financial crisis period in 2008.

	N	Intercept	lnBM(t)	lnMV(t)	$\hat{E}(\Delta A(t+1)/A(t))$	$\hat{E}(Y(t+1)/B(t))$
Panel A: Multiple regression based on *chaebol* firms						
1991 - 1996 :	638	-0.016	-0.017	0.000	0.026	-0.111
		(-0.24)	(-2.29)	(-0.05)	(1.26)	(-1.95)
1997 - 1999 :	214	-0.099	-0.002	0.008	-0.007	0.101
		(-1.25)	(-0.5)	(2.13)	(-0.26)	(1.45)
2000 - 2007 :	803	0.027	0.005	-0.002	0.106	-0.073
		(0.61)	(0.54)	(-0.9)	(2.10)	(-1.33)
2008 - 2010 :	386	0.008	-0.013	-0.002	0.122	-0.105
		(0.15)	(-5.13)	(-1.34)	(4.04)	(-2.12)

Panel B: Multiple regression based on non-*chaebol* firms						
1991 - 1996 :	1972	-0.002	-0.009	0.003	-0.046	0.138
		(0.05)	(-4.62)	(1.79)	(-0.12)	(4.33)
1997 - 1999 :	1070	0.072	-0.017	-0.001	0.018	0.096
		(0.57)	(-1.72)	(-0.09)	(0.11)	(3.88)
2000 - 2007 :	5586	-0.035	-0.018	0.004	0.031	0.010
		(-0.56)	(-4.26)	(1.06)	(1.74)	(0.47)
2008 - 2010 :	3369	0.028	-0.010	0.001	0.074	0.109
		(0.62)	(-1.76)	(0.57)	(20.48)	(4.68)

Table 7 shows the result for chaebol and non-chaebol firms that are divided into pre- and after- IMF crisis period in 1997, and global financial crisis period in 2008. However, the results are hard to interpret because none of them produce figures consistent to the model[7]. Yet, there are some recurring patterns that are noticeable in the table.

First, the coefficient of expected investment for both chaebol and non-chaebols become positive and significant after the global financial crisis in 2008. The same pattern does not occur in the period following IMF crisis in 1997. The table shows that the chaebols and non-chaebols exhibit positive value of 0.122 and 0.074, respectively, and they are statistically significant at 5% and 1% level. Despite the result, it should be noted that the effect of expected investment is difficult to interpret due to the low r^2 in its proxies.

Second, the coefficient of expected investment for chaebols is 0.122 with t-statistics vale of 4.04 in the following three years of 2008 financial crisis. This result can be evidence that the corporate business groups in Korea increase capital budgeting in

[7] Fama-French (2006)

favor of top-tier firms in the ownership structure during crisis period. However, the similar pattern does not appear in 1997 crisis. The coefficient of expected investment has negative sign that is not statistically significant.

Due to the inconsistent result, it is difficult to find supporting evidence that the relation between stock return and expected investment and expected profitability is distorted by tunneling or other activities that are related to agency-problem within chaebols in Korea.[8] However, further research that also include chaebol firms that are not publicly listed might reveal certain facts that support such posits.

[8] Bae, Kang, Kim (2002)

IX. Conclusion

According to the Miller and Modigliani valuation formula, Aharoni et al. (2013) finds empirical evidence that stock returns are negatively related to expected investment and positively related to expected profitability at the firm-level, whereas Fama and French (2006) fail to find the result consistent to the predictions at the per-share level. Using Korean data, this paper shows that neither per-share level nor firm-level analysis produce the result that are implied by the Miller and Modigliani model, except for positive and significant effect of expected profitability, which appear at the firm-level analysis.

To address the issue, this paper examines the measurement error in proxies for expected investment and expected profitability in the first-stage regression. With goodness of fit tests, it turns out that the r^2 coefficient for both expected profitability and investment are much lower in Korea than those in United States, which raises concern that the proxies contain high level of noise for accounting and market data with respect to the nine explanatory variables used in the first-stage regression.

In addition, the sub-sample analysis based on chaebol and non-chaebol firms indicate that the positive relation between stock return and expected profitability and negative relation between stock return and expected investment that are in accordance with the Miller and Modigliani model are more consistent in the non-chaebol firms. The chaebol firms produce anomalous results that are hard to interpret both at the firm-level and per-share level analysis. Therefore, this empirical work shows that for non-chaebol firms, the expected investment and profitability are better predictors of stock returns.

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초록

기대이익, 기대투자, 기대수익성에 관한 고찰

본 논문은 파마와 프렌치 (2006) 그리고 아하로니, 그룬디, 젱 (2013)이 밀러-모디글리아니 (1961)의 배당할인모형을 이용해 기대이익, 기대투자, 그리고 기대수익성의 관계를 한국 기업들을 대상으로 알아본 것이다. 배당할인모형에 의거하면 기대투자는 기대이익과 음의 관계를 가지고, 기대수익성은 기대이익과 양의 관계를 가지게 된다.

본 논문의 실증연구의 결과에 의하자면, 한국에서 배당할인모형이 주장하는 관계성은 기업수준분석과 주당분석에서 나타나지 않았으며, 유일하게 기대수익성이 기업수준에서 분석해보았을 때 유의적인 값을 가지게 되는 것으로 결과가 나왔다. 이와 같이 결과가 비유의적인 값을 가지게 되는 점을 설명하기 위해, 본 논문은 첫 단계 회귀분석에서 기대투자와 기대수익성을 측정하는 데 결정계수가 미국보다 한국이 턱없이 모자라는 점을 지적하고 있다. 또한, 본 연구는 기대투자와 기대수익성이 기대이익과 가지는 관계성을 재벌과 비재벌의 두 표본으로 나누어서 구분하고, 이를 더 나아가 한국과 국제금융위기 전후로 기간을 나누어 한국 주식시장에서 본 모형이 설명력을 가지게 되는지 실증분석하게 된다.

주요어 : 시가 장부가 비율, 수익성, 투자, 기대이익

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