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The Equity Capital Cost of Thai listed Companies Across Industries

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Abstract— **This paper aims to determine whether the level of equity capital cost varies across industries, and examine the financial ratios affecting the equity capital cost. The sample consists of listed companies in the Stock Exchange of Thailand during the years 2005-2011 and the data is collected from financial reports. The results show that overall cost of equity capital is rather identical among six industries. However, the averaged equity capital cost of Agro and Food Industry, and Industrials are highest compared to other industries. Furthermore, the companies with higher ratios of financial leverage and book-to-market encounter huge capital costs. While larger sized companies have competitive advantage to persuade new investment projects due to lower cost of equity capital.**

Keywords— **costs of equity capital, industry, financial ratios**

I. Introduction

A company's costs of equity capital are the expected rate of return that capital providers, i.e. investors, require to attract funds to a particular investment. In stock valuation that is a function of short-term earnings and future cash flows, the equity capital costs play a part in the creation of firm value as a discount rate of the future cash flows. In business, a company also needs to minimize the costs of equity capital as they affect various corporate decisions. For example, these costs determine the harder rate of investment projects, influence the composition of capital structures, and result in the company's operations and subsequent profitability [1]. Since the cost of equity capital cannot be directly observed, the expected return rates are commonly used as a proxy for them.

The study of the equity capital costs in Thai capital market is appealed as this public capital market is relatively young and not as developed as those in the U.S. [2]. Industry and sector classifications of the emerging market are not various compared to those of developed markets. Stock prices of Thai emerging market are undervalued so there are more opportunities for investors to invest in a firm/industry with future growth or high expected returns. In particular, unsophisticated investors need fundamental information to estimate the equity costs and the firm value. However, the equity capital costs generally vary depending on both industry and firm characteristics [3]. The study of variations in the equity costs and the effects of financial fundamentals thus provides benefits for the investors to make a decision on stock investment.

The objectives of this research are to examine whether the industry groups' the equity costs are different, and how financial ratios relate to the costs of equity capital in Thai security market. The firms' the financial fundamentals investigated consist of size, leverage, and book-to-markets and the industries are classified into seven groups (excluding financial industry) following the Stock Exchange of Thailand (SET). This paper uses the implied rate of return by the Easton method that is developed from the Price-Earnings-Growth model instead of the realized rate of return (e.g. CAPM) that is a noise proxy of the equity capital costs [4]. The remainder of the paper is organized by prior empirical research and hypotheses, data and methodology, results, and conclusions and discussions, respectively.

II. Prior Empirical Research and Hypotheses

A. Prior Research

Business models and operating environments of each industry result in its particular business risk and hence different costs of capital. Gebhardt, Lee [3] document the cross-sectional association between the implied costs of capital, and both firm and industry characteristics by using the sample of the U.S. stocks. The results show a significant industry effect in the implied risk premium and a higher rate of return that is charged by the market to certain industries, i.e. sports and leisure, tobacco, commercial lending, electronic technology, and automotive. While the authors find the evidence on the lower costs of capital to real estate, precious metal, financial services, and metal equipment industries.

He, Lepone [5] using the sample of S&P/ASX 200 Index provide further evidence that the costs of equity capital are positively related to information asymmetry in the sampled company. Importantly, the positive association between the asymmetric information and the equity costs is strengthened for the company in sectors of financials, health care, oil and gas, and utilities. Therefore, both studies imply that industry characteristics reflect certain business environment and influence the way of the rate of returns.

In firm level, there are fast-growing literatures that provide the evidence of unique factors affecting the company's the equity capital costs. More recent study of Dhaliwal, Judd [6] find that the capital costs have the positive association with customer concentration risk and conclude that both composition and concentration of the U.S. firm's customer base can influence equity financing costs. Boubakri, Guedhami [7] add another evidence on the effect of asymmetrical information reflected by firms' geographic location. The authors investigate the privatized

firms across 47 countries and report that investors require a higher rate of returns to the sampled firm that distances from domestic financial centres.

In Thai emerging economy, an evidence involving with the level of the implied costs of equity capital to industry groups is absent. Few studies investigate informational mechanism that affects the firms' costs of capital. For example, Priebjrivat [8] employs the sample of the SET50 index and reports the evidence that the disclosure quality in management discussion and analysis (MD&A) decreases the costs of equity capital. Anuchitworawong [9] reports that Thai listed firms enjoy lower weighted average costs of capital when the firms' the financial information is transparently disclosed. However, this current paper is different from those two studies based on the sample of Thai companies in four aspects. First, the research will provide the evidence on whether Thai equity capital costs vary across the industry groups. Second, all listed companies with available data are used as the sample, and thus extending the sample scope of Priebjrivat work. Next, this study employs the ex-ante (implied) rate of return instead of a noise proxy of ex-post (realized) return rate used by Anuchitworawong to measure the equity capital costs. Last, the paper focuses on financial fundamentals that are necessary for investors to estimate the security's the equity capital costs.

B. Hypotheses

There are variations in systematic risks across industries that affect risks and returns of the capital market. Ramiah, Cam [10] summarizes that certain Australian sectors, e.g. water sector, increase in the systematic risks as it is sensitive to the political event, i.e. the terrorist attacks. Each industry environment is also related to different litigation risk (i.e. the risk of securities class action lawsuits) [11], therefore they affect the managerial decisions by the firm and the rate of returns by the investors. Corresponding to the empirical evidence of Lowry and Shu [12], the IPO pricing is low when the firm/industry has higher legal exposure. Therefore, this current study expects the different cost of equity capital across industry groups as each industrial type face different business and litigation risks, and hypothesizes that:

H1: The equity capital costs of Thai industry groups are different.

According to moral-hazard problem of agency conflicts, when more equity is sold to outside investors, the utility-maximizing agent has an incentive to consume private perquisite rather than invest in positive net present value projects [13]. However, larger firms that the complexity of the firm contracting nexus expands will attract more external monitoring by stakeholders [14]. Agency problems are expected to decline as the firm size is large and hence lower costs of equity capital. On the other hands, agency costs are borne by the firm due to increased costs of borrowing and book-to-market values. Higher debt levels increase the moral-hazard problems of the managers, e.g. incentives to take risks, and limit future investment projects of the firms [15]. Meanwhile, higher book-to-market ratios reflect less growth, undervalued stock price, and/or information asymmetry. Based on principal-agent conflicts, required rates of returns will be more charged to the firm with higher external borrowing and underpricing. Therefore, this current study anticipates the negative effect of firm size and the positive effects of leverages and book-to-market ratios on the costs of equity capital and hypothesizes that:

H2: Firm size is negatively related to the equity capital costs.

H3: Leverage is positively related to the equity capital costs.

H4: Book-to-market is positively related to the equity capital costs.

III. Data and Methodology

A. Sample Selection and Data

The initial sample is listed companies in the SET for seven years ending 2011. The sample consists of seven industry groups. *First*, Agro and Food Industry contribute to (1) agribusiness, and (2) food and beverage sectors. *Second*, Consumer Products include (1) home and office products, (2) jewelry and ornaments, (3) personal products and pharmaceuticals, and (4) fashion sectors. *Third*, Industrials comprise (1) petrochemicals and chemicals, (2) machinery and equipment, (3) packaging, (4) paper and printing materials, (5) automotive, (6) industrial materials and machinery, and (7) steel sectors. *Fourth*, Property and Construction consist of (1) construction materials, (2) property development, and (3) property fund sectors. *Fifth*, Resources include (1) energy and utilities, and (2) mining sectors. *Sixth*, Services contains (1) commerce, (2) media and publishing, (3) health care services, (4) tourism and leisure, (5) printing and publishing, (6) professional services, (7) transportation and logistics, and (8) warehouse and silo sectors. *Last*, Technology constitutes (1) information and communication technology, (2) electrical products and computer, and (3) electronic components sectors.

However, companies in the financial industry group are excluded from the sample as its financial information is prepared under different requirements of either the Bank of Thailand or the Department of Insurance. Furthermore, the sample with incomplete data of two-year-ahead earnings forecast to calculate the costs of equity capital is excluded. Those restrictions result in the final sample of 387 firm-year observations in six industry groups. All firms in Consumer Product industry have unavailable data, and thus excluding from the sample. Financial data is retrieved from the SET Market Analysis and Reporting Tool (SETSMART).

B. Variable Measurement

1) Equity Capital Cost: While several studies apply realized returns to measure the cost of equity (e.g. CAPM model), this research uses Price-Earnings-Growth (PEG) method by Easton instead. The former assumes that the unexpected return has a mean of zero; therefore, the realized returns are a noisy proxy of the costs of equity capital [16]. On the other hands, the latter uses price and analysts' earnings forecasts to calculate the internal rate of

return to estimate the equity capital cost. This implied cost of equity is more applicable to this research since they should be reflected by market expectation, rather than realization. The rate of return of the Easton method (rPEG) is calculated as follow:

$$rPEG = \sqrt{(feps_2 - feps_1)/P_0}$$

where rPEG is the implied costs of equity capital of firm i in year t, $feps_2$ is the two-year-ahead consensus forecast of annual earnings per share of firm i in year t, $feps_1$ is the one-year-ahead consensus forecast of annual earnings per share of firm i in year t, and p_0 is the closing price of firm i at year 0. A consensus forecast earnings is normally an average or median earnings of all the forecasts from individual analysts tracking a particular stock.

2) Firm Size: Size of firm reflects business risk and efficiency of equity, technology, and management; therefore, firm size directly determines the rate of returns in the companies [17]. Firm size (SIZE) is measured by a natural logarithm of market value of equity at the end of a fiscal year as follows:

SIZE = Ln (Market Value of Equity)

3) Financial Leverage: The firms' costs of equity are an increasing function of the amounts of debts in the capital structure [3]. The capital structure with debts reflects the existence of covenant restrictions on future investments and common risks about cash liquidity. Financial leverage (LEV) is a ratio of long-term debts to total assets at the end of a fiscal year as follows:

LEV = Long-term Debt/Total Assets

4) Book-to-Market: Book-to-market ratio explains the book value of equity relative to the expectations of the markets. Stock price with lower ratio suggests that the company's stock is overvalued or overpriced to future invest. Book-to-market value of equity (BTM) is a ratio of book value to market value of equity at the end of a fiscal year as follows:

BTM = Book Value of Equity / Market Value of Equity

IV. Results

Table I below presents the average cost of equity capital across six industry groups, i.e. Agro and Food Industry, Industrials, Property and Construction, Resources, Services, and Technology, during the study period. Among these industries, their cost of capital or the implied rate of returns is rather uniform and ranges between 0.1224-0.1658. Groups of Industrial and Agro and Food Industry have highest cost of equity capital, while groups of Resource and Service have lowest equity cost. However, there is a large variation in the equity capital costs of the Industrials during the study years because of the fluctuation of forecast earnings used for calculation of the capital cost.

TABLE I
AVERAGE COST OF EQUITY CAPITAL ACROSS INDUSTRIES

Industry [a]	N [b]	Mean	Std.Dev.
Agro and Food Industry	40	0.1636	0.0825
Industrials	43	0.1658	0.1310
Property and Construction	110	0.1445	0.0833
Resources	31	0.1289	0.0728
Services	102	0.1224	0.0964
Technology	61	0.1404	0.0964

Note:
[a] Two industry groups excluded from this research are (1) Consumer Products as all companies of this group have incomplete data to calculate costs of equity capital, and (2) financials as their financial information is prepared under different requirements and accounting rules.
[b] N represents the number of firm-year observations during the years 2005-2011.

Table II below reports the ANOVA to test the mean difference of the equity capital cost between six industry groups (H1). The F-test shows the statistical significance of p-value at the 0.1 level; therefore, rejection of the null hypothesis states that those means across industries are all equal. However, the significant level is quite low, the multiple comparison test is performed in the next table.

TABLE II
ANOVA OF THE H1 TEST: MEAN DIFFERENCE BETWEEN INDUSTRY GROUPS (N=387)

Source	Partial SS	df	MS	F	P-value
Model	0.0881	5	0.0176	1.98	0.0814*
Industry Groups	0.0881	5	0.0176	1.98	0.0814*
Residual	3.3979	381	0.0089		
Total	3.4860	386	0.0090		

Note:
*, **, and *** represent the statistical significance at the 0.1, 0.05, and 0.01 level, respectively.

Table III below reports the Bonferroni test for multiple comparisons by each industry group. In this Table, the upper line values are the different mean in each pair of the industry and the lower line values in a bracket show the statistical significance of that mean difference. The results reveal that the mean differences of all pairs are insignificant; therefore, the costs of equity capital among six industry group are identical, not supporting the H1.

TABLE III
BONFERRONI TEST: MULTIPLE COMPARISONS AMONG INDUSTRY GROUPS (N=387)

Dif. Mean [a] (Bonferroni Sig.)	Agro and Food	Industrials	Property and Construction	Resources	Services

	Industry				
Industrials	0.0022 (1.000)				
Property and Construction	-0.0191 (1.000)	-0.0213 (1.000)			
Resources	-0.0347 (1.000)	-0.0369 (1.000)	-0.0156 (1.000)		
Services	-0.0412 (0.298)	-0.0434 (0.178)	-0.0221 (1.000)	-0.0065 (1.000)	
Technology	-0.0232 (1.000)	-0.0254 (1.000)	-0.0041 (1.000)	0.0115 (1.000)	0.0180 (1.000)

Note:
[a] Different mean is equal to row mean minus column mean
*, **, and *** represent the statistical significance at the 0.1, 0.05, and 0.01 level, respectively.

In Table IV as below shown, the results of linear regression that the cost of equity capital is regressed on financial ratios (i.e. SIZE, LEV, and BTM) are reported (H2-H4). The p-value of the regression model is corrected for heteroscadasticity consistent. The coefficient on SIZE is statistically significant at the 0.05 level with the negative direction, supporting the H2. Therefore, the larger the firm size the lower the firm's the equity costs. The coefficient on LEV and BTM is positive and statistically significant at the 0.01 level, supporting the H3 and H4, respectively. Thus, the firm with higher leverage and/or book-to-market ratios has higher equity capital costs. The regression model is also included the industry fixed effect (i.e. I1-I5) to control for industrial environment. The adjusted R^2 is 0.2684, which means that the explanatory variables are able to explain the dependent variables by 26.84%.

TABLE IV
LINEAR REGRESSION OF THE H2-H4 TESTS: FINANCIAL RATIOS AFFECTING THE EQUITY CAPITAL COST (N=387)

Variables [a]	**Coe.**	**Robust Std. Err.**	**t**	**P-value** [b]
Constant	0.3243	0.0976	3.32	0.001***
SIZE	-0.0101	0.0039	-2.56	0.011**
LEV	0.1439	0.0333	4.32	<.000***
BTM	0.0537	0.0149	3.61	<.000***
I1	-0.0029	0.0192	-0.15	0.879
I2	-0.0278	0.0142	-1.95	0.051*
I3	-0.0237	0.0173	-1.37	0.172
I4	-0.0319	0.0137	-2.33	0.020**
I5	-0.0069	0.0148	-0.46	0.643
Adj.R^2				0.2684
F-value				<.0000***

Note:
[a] Interested variables are firm size (SIZE), financial leverage (LEV), and book-to-market ratio (BTM). The industry fixed effect is treated as the control variables that I1 is a dummy variable coded one if a firm is in Industrials, and zero otherwise, I2 is a dummy variable coded one if a firm is in Property and Construction, and zero otherwise, I3 is a dummy variable coded one if a firm is in Resource, and zero otherwise, I4 is a dummy variable coded one if a firm is in Service, and zero otherwise, and I5 is a dummy variable coded one if a firm is in Technology, and zero otherwise.
[b] P-value under heteroskedasticity robust standard errors.
*, **, and *** represent the statistical significance at the 0.1, 0.05, and 0.01 level, respectively.

V. CONCLUSIONS AND DISCUSSIONS

The purposes of this paper are to study the difference in equity capital costs in six industries, and how firm characteristics relate to the equity capital costs of Thai listed companies. The equity capital costs are measured by using the implied rate of returns of a company derived from forecast earnings by consensus analysts. Firm factors consist of leverage, firm size, and book-to-market ratios. The empirical evidences show that there is no difference of the equity capitals across the industry groups, suggesting that investor requires the same rate of returns to all firms in Thai capital market. Among six industry groups, Agro and Food Industry and Industrials have highest equity capital costs while those costs of Resource and Service are lowest. This indicates that the industry group's equity capital cost levels are consistent with the 2007 Fact Book Report by the SET, in that security turnovers of both Agro and Food Industry and Industrials are low (1.69 and 6.02, respectively), implying higher equity capital costs. While the turnovers of both Resource and Service are high (29.96 and 10.00, respectively), suggesting lower equity capital costs [18].

Furthermore, the equity capital cost of Thai listed firms decrease with their larger size, suggesting that larger sized companies are less likely to face information asymmetry problems, hence lowering risk and costs, consistent with the previous research [5]. However, the equity capital cost will be increased for the firms with high leverage and book-to-market ratios. Financing of the firms by long-term debts results in covenant restriction on future investment; therefore, the market charges higher rate of returns for those firms. For the firm that their stock price is undervalued, investors can expect more growth opportunity for that firms so they will require a higher rate of return in exchange. Overall, the research results explain the principal-agency problems that asymmetric information in forms of size, capital structure, and market performance affects the firm capital costs.

This study contributes to literatures in that the return rates of each industry in the emerging capital market are the same but vary depending on firm characteristics. Therefore, the research results contrast to those findings in the developed economy that the industry types affect the way of the equity capital costs [3]. The study also practically contributes to corporate stakeholders including regulators of Thai capital market to promote the investment in the SET. The research's findings is a source of knowledge for investors and creditors in making a decision on investing and lending, in that size, financial leverage, and book-to-market can shape the rate of returns for the firm.

Nevertheless, this paper is subject to several limitations. First, the requirement of the PEG measure results in the number of deleted firms so this paper suggests the interpretation of the results with cautions. Second, the possible reasons of insignificant H1 testing are that industry classification by the SET may not clear to divide firms into similar industry environments. Instead of industries, sectors are more likely to show different result as the scope of business attributes is narrow. However, investigation of the costs of capital across the sectors can limit the number of firms in each sector so the less sample affects the power of test. Industry type measure alone has poor predictive power of the variation in the equity capital costs, therefore, factors involved with industry-specific effects, e.g. competitive advantage, market share, and/or stock volatility, are more likely to relate the capital cost. Third, this study considers only the aspects of information asymmetry of agency conflicts and litigation risk that affect the firm capital costs. The signalling hypothesis can explain the capital cost effect, for example firm fundamentals involved with institutional environment of firms, e.g. ownership structure, more likely shape their equity costs as the governance mechanism, leaving the room for future research.

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