SIMULTANEOUSLY ESTIMATING COST OF EQUITY CAPITAL AND GROWTH RATE IN MONGOLIAN STOCK MARKET

By

Boldmaa ZUZAAN

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF BUSINESS ADMINISTRATION

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Professor Tae Hee CHOI, Supervisor

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ABSTRACT

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In this study, I simultaneously estimate cost of equity capital and growth rate in Mongolian Stock Market over the period from 2002 to 2006. Furthermore, estimated cost of equity capitals are compared with saving rates that applied to Mongolian commercial banks and with the cost of equity capital in Korea.

I show that cost of equity capital varies from low of 20% in 2006 to high of 23% in 2004; equity premium averages 9% over the years 2002 to 2006. Also I show that growth rate in residual income ranges from 1% in both 2002 and 2004 to 3% in 2005.

Dedicate to my family

ACKNOWLEDGMENTS

First of all, I would like to thank Professor Tae Hee, CHOI for advising and guiding me through all the way long to finish this thesis.

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CHAPTER I

INTRODUCTION

1.1. THE RELEVANCE OF TOPIC

Financing patterns of a company in the developing countries is different from the company that is in developed countries. In developing countries companies mostly rely on internal resources or borrow from commercial banks. In Mongolia, like other developing countries, the financing flow generally comes from commercial banks through lending. Bank loan contracts are mostly short-termed and direct credit markets for long term debt or equity actually have not existed well yet. In regard with such an actual condition of the financing market and the need to provide liquidity for privatization-linked equity issues, the development of stock markets has been received higher attention in the recent years.

Keeping in mind the necessity of development in Mongolian Stock Market, at first I aimed to value TOP-20 company stocks which have been listed at Mongolian Stock Exchange and which shape the Mongolian Stock Exchange TOP-20 index. For valuing those stocks, I had to find cost of capital for all 20 companies. While I could not find any estimated cost of equity capital of both Mongolian Stock Market and those 20 companies, I had to estimate cost of equity capital by myself. Then I decided to apply one of the most recent and appropriate models which is developed by Ohlson and Juettner-Nauroth (2005) to estimate 20 companies' cost of equity capitals, but here I failed again to get analyst forecast. Because of the its emerging market matter and lack of availability of information, there has been no analyst who can provide reliable numbers for investors and researchers in the field of stock market of Mongolia. So that letting investors, researchers and managers to be one step forward in their business or study, I changed my mind to estimate cost of equity capital of Mongolian Stock Market.

In this study I simultaneously estimate cost of equity capital and growth rate in the Mongolian Stock Market over the years from 2002 to 2006. There are several features that make this study special.

First, the cost of capital is the rate of return which investors require from their investment in equity capital. It is an important factor in company valuation, in project valuation and any other financial decisions. But in Mongolia, lack of experts and professional organizations, and availability of reliable data, and analytical studies in the field of stock market, no studies of estimating equity cost of capital have been conducted yet. So this is the first attempt to estimate cost of capital in Mongolian Stock Market.

Second, Mongolia has huge mineral resource wealth including large coal deposits, gold and copper. Based on these mineral resources, the Government of Mongolia is expected to set up Mongolian National Cooperation and distribute the cooperation's stocks to every Mongolians in order to allocate country wealth equally. Before distributing shares to the people, it is crucial to estimate accurate price of a share of Mongolian National Cooperation. But, as mentioned earlier, there is not any updated and appropriate cost of capital in Mongolian Stock Market. So estimates of cost of capitals in this study will enable not only Mongolia to value its mineral resource wealth properly but also Mongolians to get awarded from sales of properly priced shares and stream of dividends.

Third, the method that is used in this study is unique. What makes it unique is that firstly, while other methods use analysts forecast, O'Hanlon and Steele[1] use realized accounting earnings and book values. By doing that, their method avoids to capture analysts optimism/pessimism relative to the market. Secondly, the model captures essential elements such as accounting earnings, book values and prices. Lastly, similar to this model is not

apparent[2].

Forth, data used in analysis of this study is obtained from Mongolian Stock Exchange which is reliable. While most of the listed companies at the Mongolian Stock Exchange do not release annual report or disseminate financial performance to the public, I have got data varying from 63 to 82 companies over the period from 2002 to 2006.

1.2. THE METHOD AND STRATEGY

The method I use for simultaneously estimating cost of capital and growth rate is the residual income reverse-engineered model, implied by prices and current accounting data. This method is derived by James A. Ohlson (1989, 1995) and developed by John O'Hanlon and Anthony Steele (2000) for estimating cost of equity capital to obtain UK equity premium. Later on, Peter D.Easton and Gregory A.Sommers (2004) modify the model and use to simultaneously estimate cost of equity and growth rate for a US portfolio.

According to the residual income reverse-engineered method, first I compute two variables using book values, accounting earnings and average price of six months. Second, using two computed variables, I run a regression where intercept coefficient is equity cost of capital for a portfolio. Finally, with the obtained implied cost of capital and covariance between variables, I find expected growth rate for a portfolio.

1.3. THE STRUCTURE OF THESIS

The structure will divide the thesis into five chapters. Chapter one will explain the relevance of topic, the method and strategy and structure of thesis. Chapter two will overview Mongolian Stock Market regarding to its past and present. Chapter three will review the methods which are commonly used to estimate cost of equity capital. Chapter four will

[2] See P. Easton (2007)

explain the derivation of the method which is used in this thesis and describe the data used in my analysis and then present the result. Also, I will compare obtained cost of equity capital with cost of equity capital in Korea and commercial bank saving rate in Mongolia. Chapter five contains conclusion, suggestions and recommendations for the further researchers.

CHAPTER II

AN OVERVIEW OF MONGOLIAN STOCK MARKET

2.1. DEVELOPMENT OF STOCK MARKET IN MONGOLIA

In Mongolia, the concept of stock market came out with a privatization process of state-owned enterprises in order to restructure country economy and transform to the democracy. Under the socialist regime prior to 1990, almost all or 96 percent of total assets and properties of the country were owned by the state. And a citizen was not allowed to own any property.

In December 1991, Constitution and Civil laws were amended by giving the right to the people to have private property. Sooner in 1991, Law of Economic Entity was amended and Law of Privatization was approved.

Privatization Commission of the Government, formed at the same time with law amendments, classified country assets and properties into three groups. First group of properties were those which should not be privatized such as Mongolian Airlines, Railway, and Hospitals. Second group was entitled to properties which should be partially privatized. These properties were mainly from infrastructure, government supply chains, some farms and etc. Lastly, such as trade and service companies, construction, press and printing companies were classified to the third group by categorizing them as the properties that should be fully privatized. As a result, approximately 75 percent of all state properties were titled to be privatized.

The instrument for the privatization was privatization voucher. Privatization vouchers distributed for free of charge to the all citizens born before May 13, 1991 and the vouchers were issued in two types of colors which were blue and red. Blue vouchers referred to the properties in the second group and were given one piece to each person. These vouchers were

not tradable but could be nominees. Red vouchers regarded to the properties in third group and were allocated three pieces to each person. Red vouchers were tradable in secondary market.

Allowing privatization process by vouchers, the government of Mongolia established Mongolian Stock Exchange (MSE) in January 18, 1991. Following that 29 brokerage houses existed in each of 21 provinces and in the eight city districts.

The development of stock market has been divided into two periods:

- Primary market /1992 - 1995/
- Secondary market / 1995- present/

2.1.1. THE PRIMARY MARKET

On February 7, 1992, the first trade to privatize state-owned enterprises through the vouchers took place in the MSE. Some 470 state owned enterprises transformed into private companies in a way of fully or partially. Nominal price of all stocks were same which is 100 MNT[3] /0.2 USD/. People who wanted to become shareholders of certain companies, ordered to the brokerage houses by telling them the company that they wanted to buy and prices they were willing to pay for a share and then became shareholders of the companies. In case of preferred stock, it was sold only to the company employees at its nominal price.

The privatization of state-owned enterprises which started in 1992, continued until August 8, 1995. During these three and a half years of period, those 470 state owned enterprises were fully or partially privatized. As a result 1.1 million shares were owned by 48% of the population.

Secondary trading of shares was not allowed until Securities Law was adopted. There was no cash trading and no transaction cost.

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[3] Currency of Mongolia is called tugrik and symbolized as MNT.

2.1.2. THE SECONDARY MARKET

A term the 'Secondary market' is referred to the re-trading of a share. The Securities Law of Mongolia came into the effect on January 1, 1995. The Securities Law brought major regulations such as issuing and re-trading of stocks, proving depository, clearing and settlement services.

Then the secondary trading of a share began on August 28, 1995 in MSE. Prior to start the secondary trading, basic financial information of each enterprise was published in some local newspapers. Also, only vouchers could be used during the privatizations, in the secondary market only cash could be used for trading.

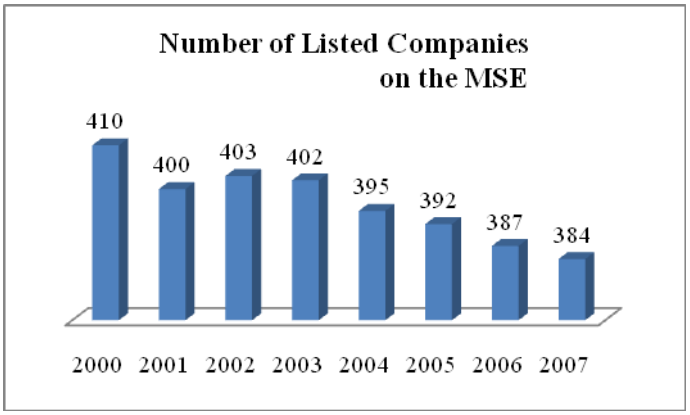
Today such trading has been going on well in process.

2.2. CURRENT SITUATION OF THE STOCK MARKET

Mongolia is in the process of developing a modern trading market structure and regulatory system for its Emerging Stock Market. Following that many positive changes have observed recently in the performance of MSE.

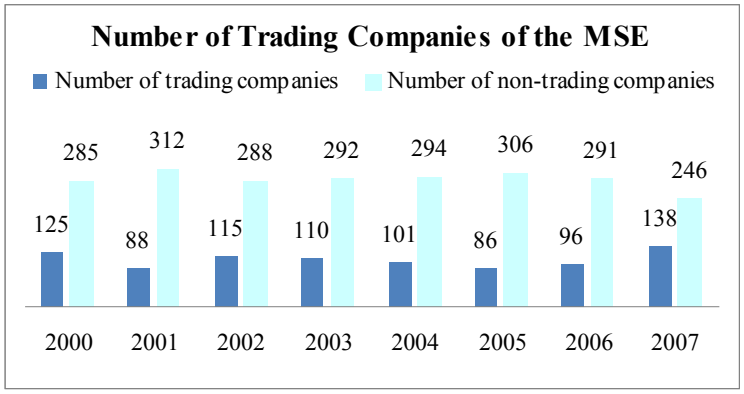
As of December 2007, 384 companies' 2.5 billion securities were registered on the MSE of which 328 private companies, 35 partially state-owned and 21 fully state-owned enterprises.

Figure 2.1



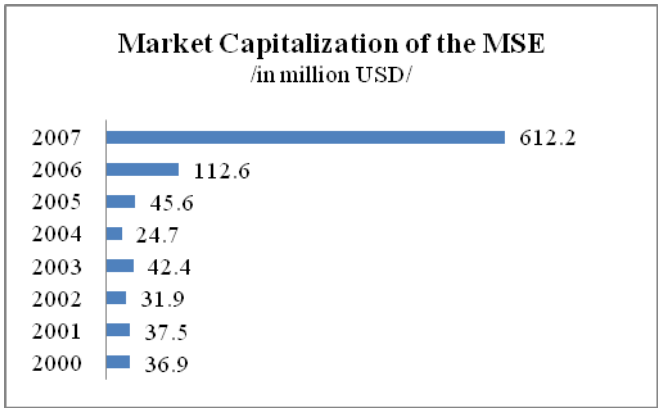
Even though a number of listed companies on the MSE have been decreased for the past years, its number of trading companies has been increased since 2005. As shown in figure 2.2, between 2000 and 2006, in average only 26% of all listed companies were somewhat[4] participated in the MSE trading. But in 2007 this number has been increased to 138 or 36%.

Figure 2.2



Total market capitalization has been increasing ever since its establishment, except 2004. As the end of 2007, total market capitalization of MSE reached to 612.2 million USD which was 5.4 times greater than it was in 2006 and 13.4 times greater than it was in 2005.

Figure 2.3



Trade in stocks has been activated a lot. As shown in Figure 2.3, in 2007 total trading value of share was increased by 42.3 million USD or 5 times from 2006 and 51.0 million USD or 25.0 times from 2005.

[4] Including the companies those are traded only one time during a year.

Figure 2.4

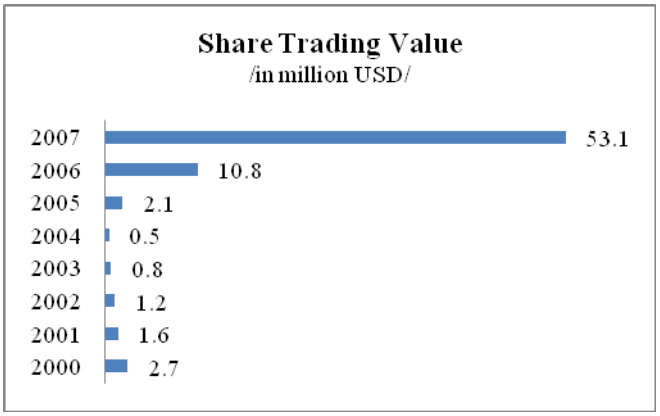
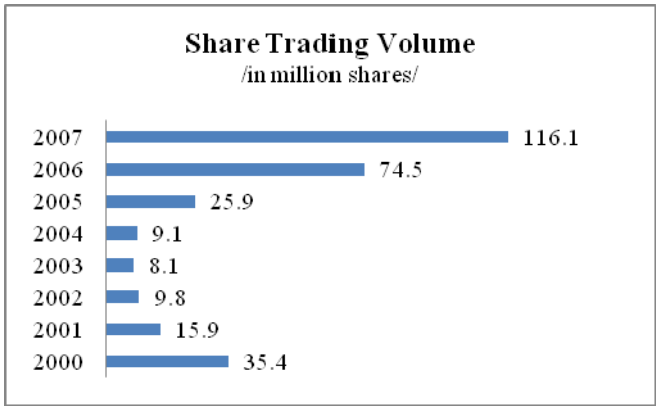


Figure 2.5



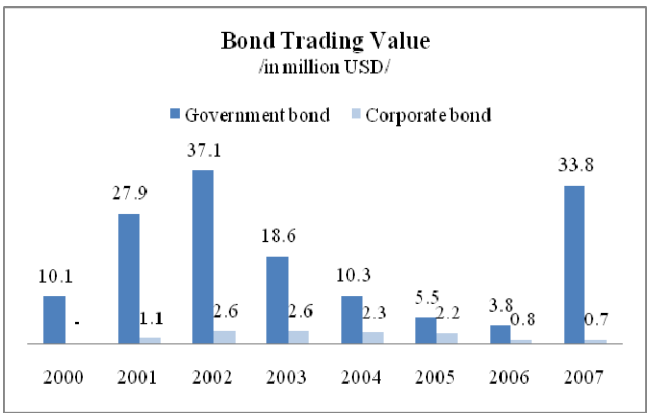
2.3. THE BOND MARKET

On October 25, 1995, the Government bond of Mongolia traded at MSE for the first time in history. Equivalent to USD 0.21 million the Government bond was sold in the first trading. Later in 2001, the first corporation bond was traded at MSE. The bond was issued by Barilga Corporation, a construction company, and the amount of the issuance was USD 4.1 million. From both government and corporate bond's first trading at the MSE, its trading is going on well in process today. As of December 2007, the MSE held 99.3 million bonds of 264 companies and 47.0 million Government bonds.

As shown in figure 2.6, trading value of both government and corporate was decreased between 2002 and 2006. But in 2007, government bond trading reached to 33.8 million USD which was second highest trading amount since its first trading. Trading value

of corporate bond as illustrated in figure 2.6 was stable from 2002 to 2005. In 2006, trading value of corporate bond went down by 1.4 million USD comparing with 2005. Maintaining trading amount of 2006, in 2007 corporate bond trading value was 0.7 million USD which was accounted for 1% of the MSE total trading value.

Figure 2.6



As presented in table 2.1, the government bonds have been purchased by banks in most cases, rarely by companies and individuals since its first issuance. In contrast, corporate bond trading has been conducted regularly by companies and individuals in recent years. As shown in table 2.2, commercial banks primarily purchased corporate bonds from 2001 to 2005. Replacing commercial banks' role in corporate bond trading, companies' and individuals' participation in corporate bond trading has been increased since 2006.

Table 2.1

Government Bond Trading by Investors						
Years	*Banks*		*Companies*		*Individuals*	
	million USD	*%*	*million USD*	*%*	*million USD*	*%*
2000	8.9	88.0	1.2	12	0.01	0.1
2001	7.6	99.0	0.1	0.4	0.07	0.2
2002	36.5	99.0	0.5	0.9	0.02	0.1
2003	8.5	99.6	0.0	0.2	0.04	0.2
2004	10.3	100.0	-	0	-	0.0
2005	5.5	100.0	-	0	-	0.0
2006	3.8	100.0	-	0	-	0.0
2007	33.8	99.8	0.1	0.2	0.00	0.002

Table 2.2

Corporate Bond Trading by Investors						
Years	*Banks*		*Companies*		*Individuals*	
	million USD	*%*	*million USD*	*%*	*million USD*	*%*
2001	0.5	49.4	0.0	4.2	0.5	46.4
2002	1.2	45.7	0.5	17.9	1.0	36.4
2003	1.4	58.0	0.8	32.2	0.2	9.7
2004	2.1	90.0	0.1	5.3	0.1	4.7
2005	1.3	60.5	0.2	10.8	0.6	28.7
2006	-	-	0.4	46.5	0.4	53.5
2007	-	-	0.2	26.5	0.5	73.5

2.4. LISTING, DELISTING AND SECUTY CATEGORIZATION

2.4.1. LISTING CRITERION

The MSE employs two types of listing criteria for companies whose either bond or stock is expected to be listed. Specific listing criterion is dedicated to the strategically important state-owned enterprises, while general listing criterion is applied to the any others companies. Each listing criterion requires minimum market capitalization, number of shareholders, duration of corporate existence, and so on.

2.4.2. DELISTING

Delisting of stocks is occurred in the cases of re-organized companies, such as transformed, amalgamated, merged, and bankrupt or liquidated, or decision has been made by the Governing body.

2.4.3. STANDARD CATEGORY OF SECURITIES

Securities which already listed at MSE are categorized into two sections which are High section and Low section. Securities in High section are classified into three classes, A

class, B class and C class regarding to its market capitalization, number of shareholders, duration of company existence and return on asset. For those high class stocks, MSE might grant some discount. Securities, which do not meet the requirements for High section, are a classified to the Low section.

2.5. TAXATION

There are no tax exempts for listed companies. According to Economic Entity and Organization Income Tax Law of Mongolia, income from dividends and gains of a shareholder shall be taxed at the rate of 10%. Non-resident legal entity derived income from dividends and gains of a shareholder within the territory of Mongolia shall be taxed at the rate of 20%. Tax is not imposed on government bond. Now there is no taxation for the individual who receives income from share dividend and interest of bond.

2.6. FOREIGN PARTICIPANTS

Foreign investors are allowed to buy stocks and it is regulated by Foreign Investment Law of Mongolia. So far there has been no limit to the foreign investors for holding shares and no requirement to be investors. As shown in table 2.3, a number of foreign investors who participated in trading have been increased last years. In 2006, 26.74% of total trading at MSE was done by foreign investors.

Table 2.3

Market Participants		
Years	*Foreign Investor (%)*	*Domestic Investors (%)*
2000	0.5	99.5
2001	1.0	99.0
2002	0.0	100.0
2003	-	100.0
2004	0.1	99.9
2005	5.5	94.5
2006	26.7	73.3

2.7. FEES

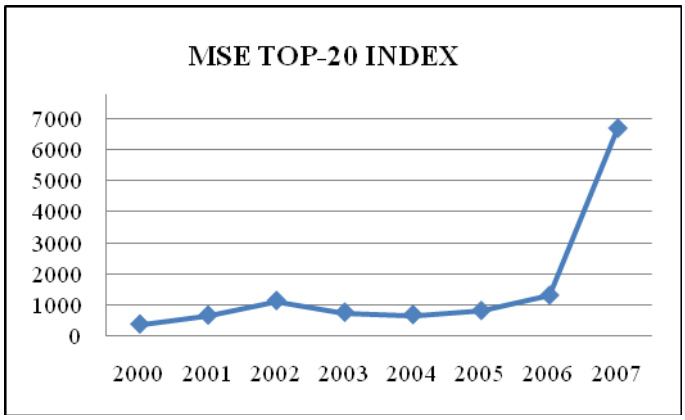
Companies are obliged to pay types of fees to the MSE: Initial listing fee and annual fee. Initial listing fee differs from 500 000 MNT to some million MNT depending on the amount of IPO. Annual fee for the listed companies varies from 400 000 MNT to million MNT according to the total book value of shares. Listing fee for the bond is 0.1% of total trading value.

In addition to the brokerage fee, both selling and buying parties are titled to pay transaction fee. Transaction fee ranges from 0.3% to 0.5% of total transaction amount.

2.8. THE MSE INDIXES

From the Start of secondary market to 2002, the MSE calculated TOP-75 index. Since 2002, MSE has been calculated TOP-20 index which consists of 20 company stocks those are leading by the market capitalization and daily average trading volume in the MSE. The TOP-20 index is updated twice a year. TOP-20 index is calculated by closing time of a trading session. Changes in the indexes are calculated by comparing to the indexes of the previous day trading session. In 2007, TOP-20 index has jumped up by 5279 or 5 times than it was in 2006. The MSE TOP-20 index movement for last seven years is shown in exhibit 2.7.

Figure 2.7



Despite of TOP-20 index, the MSE calculates another 8 kinds of indexes: 7 sector-based indexes and a composite index which consists of all listed companies at the MSE. 7 sector-based indexes include mining, agriculture, industry, trade and service, tourism, transportation, and construction sector. The sector-based index is calculated by picking up the best 10 company stocks of a sector.

2.9. BROKERAGE-DEALER COMPANIES

The company that wishes to conduct either brokerage-dealer or underwriting businesses has to be a membership of the MSE. In order to possess a membership of the MSE, the company needs to meet several qualifications such as director of the company has to be a Mongolian, highly educated and experienced in the field of finance and economy not less than 2 years; the company has to be pledged to comply with the regulations which are actualized in the MSE. Total amount of contributed capital is not less than MNT 50 million for the brokerage company and not less than MNT 200 million for underwriting company; number of employees should be more than 3 for the head office and not less than 2 for the branches. Employees need to be examined and certified by the MSE etc.

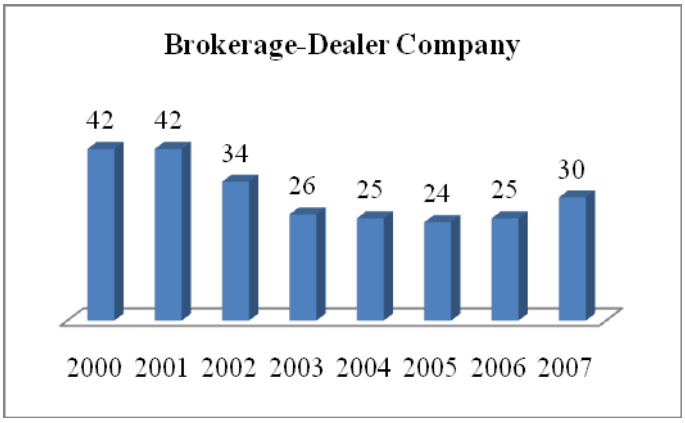
Companies that qualify above requirements are licensed by the Financial Regulatory Commission [5](FRC) and allowed apply to the MSE for a membership. The final decision is made by the Board of Director of the MSE.

As the end of 2007, the MSE has 30 member companies which are brokerage-dealer companies. Brokerage-dealer companies provide services according to the agreement conducted with the customers. Brokerage commission ranges from 2.0% to 3.0% of the total

[5] FRC operates under the supervision of the Parliament of Mongolia and regulates and supervises all aspects of capital markets except banking sector. The FRC gives an approval to the capital market professionals and registration of the securities at IPO.

trading value. Figure 2.8 is presenting number of brokerage-dealer companies for the years.

Figure 2.8



2.10. TRADING

Trading takes place in the Exchange Trading Hall of MSE using Computer Trading System (CTS) and continuous from Monday to Friday for an hour between 11 am to noon. Market participants select the member brokerage-dealer company of MSE and give an order to the company. The brokers of the brokerage-dealer companies enter clients' orders into the computer network located in the trading hall of the MSE. Entered orders are automatically matched in accordance with the price priority and time priority rules. According to the price priority rule, a selling (buying) order with the lowest (highest) price takes priority. Under the time priority rule, an earlier order takes priority over others at the same price. The matched orders are executed if proposed buying and selling orders are matched at the same price.

2.11. DEPOSITORY, CLEARING AND SETTLEMENT

Securities Clearing Settlement and Central Depository House[6](SCSCDH) executes the settlement and savings of the securities and keeps a record of the dematerialized securities registration. In order to participate in stock trading, anyone has to open an account at SCSCDH and put money in the bank account of SCSCDH for the purchase of stock. Based

[6] Securities Clearing Settlement and Central Depository House was one of department of MSE between 1992 and 2003. Since October 2003, it has been working as an independent organization.

on the bank deposit order, transaction officer places cash on client's account at SCSCDH. Information about the clients' account is reported to the MSE using network program by 10.30 am. After the MSE trading ends, daily transaction is sent to SCSCDH and inspected. Then inspected stock and cash transactions are automatically recorded to the participants' accounts. Information regarding to accounts is only given to client's brokerage-dealer company.

The SCSCDH uses delivery versus payment system for settling transactions of securities. The settlement of transactions in securities executed at MSE is implemented on the next business of transaction occurred day (T) which is T+1. For Government and corporate bonds, settlement of transactions is effected at the same with the transaction occurred day (T) which is T+0.

All listed company stocks on the MSE are deposited as non-physical form in the SCSCDH.

2.12. INFORMATION DISCLOSURE

All listed companies are obliged to submit audited half-year and annual financial statements to the FRC and MSE by next year April. The listed companies' information about securities transactions and reports are elaborated correctly in accordance with related methodology and submitted to the FRC on time specified. Releasing and distributing a brief financial report to shareholders are required to listed companies.

CHAPTER III

APPROACHES TO ESTIMATE COST OF EQUITY CAPITAL

Estimating of cost of equity capital is challenging. There have been several approaches to obtain cost of equity capital of an individual stock and a portfolio. But there is no consensus about which one is the best.

In this section, I will review some commonly used methods to estimate cost of equity capital for an individual stock and a portfolio and lay out arguments around the models.

3.1. CAPITAL ASSET PRICING MODEL (CAPM)

3.1.1. THE MODEL

The CAPM is the most widely used valuation model as it can be easily applied to the most common types of investment. Prominently, almost three-quarters of financial managers use CAPM to estimate the cost of equity capital[7].

This model is proposed individually by economists William Sharpe (1964) and John Lintner (1965). In general, the CAPM describes the relationship between the risk of a particular stock and its expected return to the investor. The equation of CAPM to estimate cost of equity is:

$$R_s = R_f + \beta_s * (R_m - R_f)$$

Where:

[7] See John R. Graham and Campbell R. Harvey. "The Theory and Practice of Corporate Finance: Evidence from the Field.", *Journal of Financial Economics* 60 (2001).

R_s is the expected return on a stock.

R_f is the risk free rate.

(R_m-R_f) is the expected market premium.

β_s (beta) is a stock's sensitivity to changes in the value of market portfolio.

The CAPM states that expected stock return is positively and linearly related to its market beta. That means high (low) value of expected stock return tends to be associated with high (low) value of its beta. Therefore, according to the CAPM, investors require higher levels of expected returns to compensate them for higher expected risk.

3.1.2. ASSUMPTIONS

When scholars develop a theory, they set a number of assumptions which show that how the things are expected to act in the world. There is a special set of assumptions that make the CAPM valid. These are:

- All investors have rational expectations about asset returns. This is everyone has the same information at the same time.
- All investors have the same one-period time horizon such as six months, one year and so on.
- All investments are infinitely divisible, which means that it is possible to buy or sell fractional shares of any asset or portfolio.
- There are no taxes or transaction costs involved in buying or selling assets.
- There is no inflation or no change in interest rates, or inflation is fully anticipated.
- Capital markets are in equilibrium which means that all investments properly priced in line with their risk levels.
- Investors can borrow or lend any amount of money at the risk free rate.

- Investors are risk averse.

3.1.3. ARGUMENTS

However, the CAPM is widely applied to investment and in corporate finance, a number of researchers' evidence suggests the existence of factors which are relevant for asset pricing and which are not captured in CAPM.

In particular, Basu (1975, 1977) reported that portfolios of high earning yield securities trading on NYSE appear to have earned higher risk –adjusted rate of return than the portfolio which consists of randomly selected securities. Similarly, Banz (1981) found that the common stock of small firms had, on average, higher risk adjusted returns than the common stock of large firms. According to him, size effect appears to have been existed for at least forty years. Moreover, Reinganum (1981)'s tests based on a composite AMEX-NUSE sample firms, demonstrate that the size effect subsumes the E/P effects. In order words, although the size and earnings' yield anomalies seem to be related to the same set of factors missing from the one-period CAPM specification, these factors appear to be more closely associated with firm size than with E/P ratios. Furthermore, Fama and French (1992, 1993) find that three factors which are the market factor, size factor and book-to-market factor capture much about average stock returns. In the presence of these three variables, market beta does not have any explaining power.

Nevertheless, the model states much about the way how returns are determined in the securities market. Using the CAPM, corporate financial managers can estimate cost of equity capital on their own.

3.2. THREE FACTOR MODEL

3.2.1. THE MODEL

Fama and French (1992, 1993) propose a three- factor model and they found that investors are concerned three separate risk factors rather than just one. The model is that a security's expected return depends on the sensitivity of its return to the market return and the return on two portfolios which are formed by firm size and book-to-market ratio. The expected-return equation of the three-factor model is:

$$R_s = R_f + \beta_{market}*(R_m - R_f) + \beta_{size}*(SMB) + \beta_{book\text{-}to\text{-}market}*(HML)$$

Where:

R_s is the expected return on a stock.

R_f is risk free rate which is one-month Treasury bill rate observed at the beginning of the month.

SMB Small minus Big which is size factor

HML High minus Low which is book-to-market factor

β beta coefficients correspond to each factors

3.2.2. STEPS TO PERFORM SMB AND HML RISK FACTORS

1. Size factor SMB (Small minus Big)

In Fama and French's empirical tests, stocks are allocated into two groups which are small and big. The allocation is based on whether stock's market value of equity (ME, stock

price multiples number of shares outstanding) is below or above the median ME of a portfolio. If the stock's ME is higher (lower) than median ME of the portfolio, it will be classified to the part of big (small) size stocks of a portfolio.

2. Book-to-market factor HML (High minus Low)

Here, stocks are classified into three groups which are low, medium or high in terms of book-to-market equity ratio. This classification is based on the breakpoints for the bottom 30%, middle 40% and top 30% of the values for the group of stocks.

Book-to-market equity ratio is computed dividing book value of equity (BE) by ME. BE is determined by book value of shareholders equity plus balance sheet deferred taxes and investment tax credit (if available), plus post-retirement benefit liability (if available), minus the book value of preferred stock. Depending on the availability, Fama and French uses the redemption, liquidation, or par value to estimate book value of preferred stock.

After allocating stocks of a portfolio into groups regarding to size and book-to-market(BE/ME) ratio, six size – BE/ME portfolios (S L, S M, S H, B L, B M, BH) are defined as the intersections of the two ME and the three BE/ME groups.

SMB is the difference between the average of the returns on the three small-stock portfolios (SL, SM and SH) and the average of the returns on the three big-stock portfolios (BL, BM and BH).

HLM is the difference between the average of the returns on the two high BE/ME portfolios (S H and B H) and the average on the two low-BE ME portfolios
(S L and B L).

3.2.3. ARGUMENTS

One of the arguments around the Fama and French three-factor model is debate of Kothari, Shanken and Sloan (1995). They argue that average stock return and BE/ME ratio are weakly related. In their test, Kothari, Shanken and Sloan (1995) use different source from Fama and French for BE/ME ratio and they could not find a significant relationship between average stocks return and BE/ME ratio. Also they hypothesis that the reason why Fama and French's test shows high effect of BE/ME to average stock return is due to bias in data selection in COMPUSTAT. In order to make things clarify, Breen and Korajczyk (1995) use data from COMPUSTAT that is free from bias and then test validation of Fama and French three factor model. In their result, the effect of BE/ME ratio to average stock return is less than half of the effect that Fama and French estimated.

However the argument on validation of Fama and French three-factor model is on-going, its application in describing asset returns has been performed well in not only for U.S stock market, but also for in overseas stock markets such as Indian, Istanbul, Hong Kong Stock Markets.

3.3. REVERSE-ENGINERED VALUATION MODELS

Reverse-engineered valuation models have been used by the number of scholars to obtain estimates of cost of equity capital. These reverse-engineered valuation models include the dividend capitalization model, the residual income valuation model and the abnormal growth in earnings model. These models can be used not only for estimating a firm specific cost of equity capital, but also for a portfolio's cost of equity capital.

However, some recent studies have examined those methods and concluded that

estimating cost of equity using reverse-engineered valuation models is not reliable enough. To invert reverse-engineered valuation models either for cost of equity of a firm or a portfolio, it is needed to assume forecast horizon and calculate terminal value which captures residual income or abnormal earning beyond the horizon. The terminal value is computed by treating the horizon residual income or abnormal earning as perpetuity growing at assumed rate. So that scholars say that probably that assumed growth rate in residual income beyond horizon can be most important factor to make reverse-engineered valuation models' estimation powerless.

In responding that, while other scholars assume growth rate to invert residual income model, Easton, Taylor, Shroff and Sougiannis (2002) and Easton (2004) develop the methods to simultaneously estimate the cost of equity capital and the expected growth rate for a portfolio of stocks. Their methods differ from O'Hanlon and Steele's method that I use in this study by using analysts forecast.

Therefore consistent with my study, in this section of the thesis I will lay out methods that estimate cost of equity capital and expected growth rate simultaneously for a portfolio by using analysts forecast and those are applied to a group of stocks of Korea and US.

3.3.1. Easton, Taylor, Shroff and Sougiannis (ETSS, 2002)

The method is derived from the residual income valuation formula with the underlying assumption of no arbitrage existence and clean surplus accounting condition[8]. The method may be written as follows:

$$P_t = B_t + \sum_{t=1}^{\infty} \frac{E_0[X_t - r * B_{t-1}]}{(1+r)^t}$$

Where:

[8] Current year book value of equity equals previous year book value of equity plus current earnings minus dividend.

P_t is price per share.

B_t is the book value of common equity per share.

r is expected rate of return.

X_t is the (comprehensive) EPS for fiscal period t-1 to t.

$[X_t - r*B_{t-1}]$ is residual income per share for period t-1 to t.

E is expectation operator.

This equation can be re-written as follows to isolate the finite period using four-year earnings forecast and recognizing clean surplus accounting.

$$P_t = B_t + \frac{[X_{CT} - (R-1)*B_t]}{(R-G)}$$

.

Where X_{CT} equals $\sum_{t=1}^{4} E_0[X_t] + \sum_{t=1}^{\infty}((1+r)^{4-t}-1)E_0[d_t]$ which is aggregate four-year cum-dividend earnings and $R=(1+r)^4$ is one plus the four-year expected return on equity and $G=(1+g)^4$ is one plus the expected perpetual growth rate in four-year residual income.

After rearranging the equation, they transfer this model to form the following regression relation:

$$\frac{X_{CT}}{B_t} = \gamma_0 + \gamma_1\left[\frac{P_t}{B_t}\right]$$

Where $\gamma_o=[(1+g)^4-1]$ and $\gamma_1=[(r+1)^4-(1+g)^4]$ and expected rate of return and growth can be obtained as follows:

$$g = \sqrt[4]{\gamma_0 + 1} - 1$$

$$r = \sqrt[4]{\gamma_1 + (1+g)^4} - 1$$

This method is applied to the portfolio of stocks followed by I/B/E/S, for Dow Jones Industrial Average, and for the portfolio of stocks in energy, utility, auto and banking industries for the years 1981 to 1998.

3.3.2. Easton, P (2004)

The model is derived by Easton (2004) based on the abnormal growth rate in earnings model which can be written as follows:

$$P_t = \frac{eps_{t+1}}{r} + \frac{agr_{t+1}}{r*(r-g_{agr})}$$

Where:

agr_{t+1} is expected abnormal growth in earning for t+1 to t+2 and equals eps_{t+2} + r* dps_{t+1}-(1+r)* eps_{t+1}.

g_{agr} is the rate of change in abnormal growth in earnings beyond the two-year forecast horizon.

Easton rearranges the equation to obtain following regression:

$$\frac{ceps_{t+2}}{P_t} = \gamma_0 + \gamma_1 \frac{eps_{t+1}}{P_t} + u_t$$

Where $ceps_{t+2}$ is the forecast of two-year ahead cum div-earnings (that is, eps_{t+2} +r *dps_{t+1}) , and $\gamma o = r*(r-g_{agr})$ and $\gamma_1 = 1+ g_{agr}$.

He applied this model to 1499 portfolios, formed by 20 stocks, using I/B/E/S forecast over the years 1981 to 1999.

3.3.3. Tae Hee, CHOI (2007)

Tae Hee CHOI derives the model from RIM which is similar is ETSS method with the no arbitrage assumption and clean surplus accounting condition. The model can be expressed as follows:

$$P_t = B_t + \sum_{t=1}^{2} \frac{E_0[eps_t - r*B_{t-1}]}{(1+r)^t} + \sum_{t=3}^{\infty} \frac{E_0[eps_t - r*B_{t-1}]}{(1+r)^t}$$

Where t indexes years.

The difference between this form of the model and the form used by ETSS is that perpetual growth rate in residual income is starting from second year while ETSS start from fourth year. After rearranging, the equation is re-written as follows:

$$P_t = B_t + \frac{Z_T - (R-1) * B_t}{R - G}$$

Where Z_T is expected aggregate two-year cum-dividend earnings and $R=(1+r)^2$ is the one plus two year expected return on equity and $G=(1+g)^2$ is one plus expected perpetual growth rate in two-year residual income.

Rearranging equation yields:

$$\frac{Z_T}{B_t} = \gamma_0 + \gamma_1 \frac{P_t}{B_t} + \varepsilon_t$$

Where regression coefficients can be used as follows:

$$g = \sqrt{\gamma_0 + 1} - 1$$

$$r = \sqrt{\gamma_1 + (1+g)^2} - 1$$

He applied the method to Korean stocks that are listed either on Korean Stock Exchange or on the KOSDAQ (Korea Securities Dealers Automated Quotation) over the years 2000 to 2006. He found cost of equity capital for industries such as energy, finance, health care, services, industrials, information and technology, telecommunication.

CHAPTER IV

THE RESEARCH DESIGN

4.1. THEORETICAL BACKGROUND

The method that is used in this study is derived by James A.Ohlson in 1989 and 1995 and developed by John O'Hanlon and Anthony Steele in 2000. Later on, in 2007, Peter D.Easton and Gregory A.Sommers modify the model and use to simultaneously estimate cost of equity and growth rate for a portfolio.

Based on the theoretical framework of Ohlson, O'Hanlon and Steele develop the method and apply for the stocks of in the United Kingdom to find an equity risk premium for the years 1968 to 1995. But they apply the method to obtain cost of equity capital at a firm specific level and then plot these estimated a firm specific cost of equity capital along the CAPM Securities Market Line. Then they measure a portfolio equity premium by regressing of cost of equity capital corresponding to beta estimates.

In 2007, Easton and Sommers adapt O'Hanlon and Steele's model and use the model to estimate simultaneously cost of equity and growth rate for a portfolio for the years 1993 to 2004 in United States. They not only apply the method of O'Hanlon and Steele to find a portfolio cost of equity capital and in addition to that they estimate expected growth rate for a portfolio using regression coefficients.

Why this model is preferable rather than other reverse-engineered valuation models which are mentioned in previous chapter? First, while other methods use analysts forecast, O'Hanlon and Steele use realized accounting earnings and book values. By doing that, their method avoids to capture analysts optimism/ pessimism relative to the market. Second, the

model captures essential elements such as accounting earnings, book values and prices. Third, similar to this model is not apparent[9]. Fourth, variables used in the model are obtainable from Mongolia Stock Market.

There are three assumptions underlying this method:

- Present value relationship. The present value of expected dividends determines the market value.
- Clean surplus accounting. The accounting data states clean surplus accounting.
- Asset prices are a linear with the set of current information.

4.2. THE MODEL

There are several steps that should follow for derivation of the method:

Step 1:

Market value of a firm, $P(z_t)$, equals present value of its expected future streams of dividends :

$$P(z_t) = \sum_{T=1}^{\infty} \frac{E[d_{t+T}]}{(1+k)^T} \qquad \text{(PVED)}$$

Where

$P(z_t)$ is market value of equity at time t

d_t is the dividend paid at time t

k is the cost of equity capital which is assumed to be constant for simplification

E is expectations operator

Step 2:

Accounting earning states clean surplus accounting:

$$x_t = y_t - y_{t-1} + d_t$$

[9] See Peter D. Easton (2007)

Where:

x_t is the accounting earnings for the period t-1 to t

y_t is the book value of equity at time t

y_{t-1} is the book value of equity at time t-1

Step 3:

Consider a firm in a multiple date uncertainty economy and a context of the firm in relative to the financial market, (z_t), is described by four information variables.

$$(z_t) - (x_t, y_t, d_t, v_t)$$

Where:

$x_{t,}$ is earnings at time t

y_t is book value of equity at time t

d_t is dividend

v_t other information

These four information variables capture value relevant information in the market and are represented by z_t that is an information vector of dimension (n x 1). The stochastic evolution of z_t is described by a Markovian linear regressions system[10]. This model is referred Linear Information Dynamics:

$$z_{t+1} = (\Omega + F)\, z_t$$

Where Ω is a matrix of dimension (4 x 4) comprising the coefficients of the z_t and F represents error term and random influences. These terms have zero mean and unpredictable. Expectations of information variables T periods for the future are defined by $E(z_{t+T}|z_t)=\Omega^T z_t$. In particular, expectations of dividends T period for the future are defined by:

$$E(d_{t+T}|z_t)=(0\ 0\ 1\ 0)\ \Omega^T z_t$$

[10] See O.Hanlon and Steele (2000) pp1072.

Where (0 0 1 0) is a vector that is third element equals one, while others are zero.

Step 4:

Replacing the above equation into the PVED which is defined in step 1, $P(z_t)$ yields:

$$P(z_t) = \sum_{T=0}^{\infty} \frac{(0\ 0\ 1\ 0)\Omega^T z_t}{(1+k)^T} = (0\ 0\ 1\ 0)\left\{\sum_{T=0}^{\infty} \frac{\Omega^T}{(1+k)^T}\right\} z_t$$

Defining A as follows:

$$A = \left\{\sum_{T=0}^{\infty} \frac{\Omega^T}{(1+k)^T}\right\}$$

$P(z_t)$ can be written as follows:

$$P(z_t) = (0\ 0\ 1\ 0)\, Az_t$$

The third row of the matrix A is defined as $(\beta_1, \beta_2, \beta_3, \beta_4)$, where β terms are coefficients, thus $(0\ 0\ 1\ 0)\, A = (\beta_1, \beta_2, \beta_3, \beta_4)$. It follows:

$$P(z_t) = (\beta_1, \beta_2, \beta_3, \beta_4)\, z_t = (\beta_1, \beta_2, \beta_3, \beta_4).\ (x_t, y_t, d_t, v_t)'$$

$$P(z_t) = \beta_1 * x_t + \beta_2 * y_t + \beta_3 * d_t + \beta_4 * v_t \qquad (1)$$

Where β coefficients correspond to each variables of z_t and the cost of equity, the assumptions of linearity give linear valuation equation.

Considering the effect of dividend to the all factors in above linear equation (1), he used Miller and Modigliani (1961) dividend policy irrelevance. The Miller and Modigliani property that change in current dividend has following effect:

$\frac{\partial(P(z)_t)}{\partial(d_t)} = -1$ the market value of equity is reduced with the same amount of dividend;

$\frac{\partial(y_t)}{\partial(d_t)} = -1$ the dividend reduces the book value of equity by the amount of dividend;

$\frac{\partial(x_t)}{\partial(d_t)} = 0$ the dividend does not affect current earnings;

$\frac{\partial(v_t)}{\partial(d_t)} = 0$ independent of dividends.

After differentiating equation (1) with respect to dividend it gives:

$$1 = 0 \quad 1 * \beta_2 \mid 1 * \beta_3 \mid 0$$

$$\beta_3 - \beta_2 - 1 \quad (a.1)$$

Replacing β_3 using (a.1) and d_t using clean surplus accounting, $d_t = x_t - y_t + y_{t-1}$, into equation (1), it leads to:

$$P(Z_t) = \beta_1 * x_t + \beta_2 * y_t + (\beta_2 + 1) * (x_t - y_t + y_{t-1}) + \beta_4 * v_t$$

$$P(Z_t) = y_t + (\beta_1 + \beta_2 - 1) * x_t + (\beta_2 - 1) * y_{t-1} + \beta_4 * v_t \quad (a.2)$$

To remove a term $(\beta_2 - 1)$ from (a.2) and to get formula more familiar, he used the method that cost of equity capital equals dividend yield plus price appreciation which can be written as follows:

$$k = \frac{E(d_{t+1})}{P(z_t)} + \frac{E(P(z_{t+1}) - P(z_t))}{P(z_t)}$$

$$(1 + k) * P_t = E_0[P_{t+1} + d_{t+1}]$$

Releasing expectation operator and expressing P_{t+1} by equation (1) while again substituting for d_{t+1} using clean surplus accounting and for β_3 using (a.1), the equation leads:

$$(1 + k) * P_t = (\beta_1 + \beta_2) * x_{t+1} + \beta_2 * y_t + \beta_4 * v_{t+1} \quad (a.3)$$

Differentiating equation (a.3) with respect to d_t under the condition of:

$\frac{\partial(P(z)_t)}{\partial(d_t)} = -1$ the market value of equity is reduced with the same amount of dividend;

$\frac{\partial(y_t)}{\partial(d_t)} = -1$ the dividend reduces the book value of equity by the amount of dividend;

$\frac{\partial E(x_{t+1})}{\partial(d_t)} = -k$ the dividend affects next period's expected earnings by yielding negative cost of equity capital that is -k;

$\frac{\partial(v_t)}{\partial(d_t)} = 0$ independent of dividends; it gives:

$$(\beta_2 - 1) = (1 - \beta_1 - \beta_2) * k \quad (a.4)$$

Using (a.4) to substitute $(\beta_2 - 1)$ for in equation (a.2):

$$P(Z_t) = y_t + (\beta_1 + \beta_2 - 1) * x_t + (1 - \beta_1 - \beta_2) * k * y_{t-1} + \beta_4 * v_t$$

$$P(Z_t) = y_t + (\beta_1 + \beta_2 - 1) * (x_t - k * y_{t-1}) + \beta_4 * v_t \quad (a.5)$$

Defining x_t^a and α as follows:

$x_t^a = x_t - k * y_{t-1}$

α = β_1 | β_2 1

$P(z_t)$ can be written as follows:

$$P(z_t) = y_t + \alpha * x_t^a + \beta_4 * v_t \qquad (2)$$

Where x_t^a is abnormal earning, the equation (2) alternatively can be written as follows:

$$P(z_t) - y_t = \alpha * x_t^a + \beta_4 * v_t \qquad (3)$$

Price of a share is unpredictably volatile and its movement is related with released financial data. So that $P(z_t)$ is averaged by daily prices around the release of the annual financial statements. Also all other information variables that is not captured in accounting data is diminished by averaging[11]

$$\sum_{j=1}^{j=n} P(z_{j,t}) - y_t = \alpha * x_t^a + \beta_4 \frac{1}{n} \sum_{j=1}^{j=n} v_{j,t} \qquad (4)$$

After averaging price and other information variables, the equation leads to following regression model:

[11] O'Hanlon and Steel (2004) note 14, pp 1079

$$P(z_t^a) - y_t = \alpha * x_t^a + e_t \qquad (5)$$

Where $P(z_t^a)$ stands for averaged daily price around the release of annual financial statements and e_t denotes subsumed other information variables in white noise error term. Separating abnormal earnings (residual income) into its constituent parts gives a following equation:

$$P(z_t^a) - y_t = \alpha * (x_t - k * y_{t-1}) + e_t = \alpha * x_t + \alpha * k * y_{t-1} + e_t \qquad (6)$$

Deflating both side of equation (6) by $\alpha^* y_{t-1}$, the model is transformed to form the following regression model:

$$\frac{x_t}{y_{t-1}} = \gamma_0 + \gamma_1 \left(\frac{P(z_t^a) - y_t}{y_{t-1}} \right) + e_t \qquad (7)$$

Where regression coefficients can be used as follows:

$k = \gamma_0$ cost of equity capital for a portfolio.

$g = \frac{\gamma_0 - \gamma_1}{1 + \gamma_1}$ expected growth rate for a portfolio[12].

4.3. DATA

All data used in this study are obtained from the MSE[13]. The sample consists of 63 to 82 companies over the years from 2002 to 2006. As research design requires, I use accounting data and prices.

For accounting data, I employ year beginning and year ending book value of equity, earnings during a year and number of shares outstanding. Consistent with the theoretical framework, most companies' earnings state clean surplus accounting.

[12] Derivation of growth rate, from the equation is developed by Easton and Sommers (2007)

[13] Companies listed in MSE are obliged to submit their year-end financial statements by next year April to MSE. The MSE insert those company financial data into excel sheet and upload in MSE home page. Also it is available in paper format from the MSE.

For the price, I use six months daily average price[14].

I did not delete the companies those show negative book value of equity and negative earnings. Rather I use all data obtained from the MSE.

4.3.1. DESCRIPTION OF THE SAMPLE

Table 4.1 presents descriptive statistics for the companies in the sample of this study.

As shown in Panel A of table 4.1, I distribute sample companies into 8 industry sectors. Those are:

- Coal/ Mining
- Construction/ Building materials
- Food manufacturing/ Retail
- Non-food Manufacturing/Retail
- Clothing/Textile, Transportation
- Leisure/Service
- Agriculture and Brewing/Alcoholic production.

Number of companies in a sector ranges from smallest of 1 company in Brewing/Alcoholic production sector and the biggest of 13 companies in Construction/ Building materials industry. While most studies illustrate telecommunication, health care and financial industry, I did not specify these sectors. Because so far there has been only one listed company from both telecommunication and financial industry, and no company has been listed at the MSE from health care sector.

Panel B of table 4.1 shows the sample variables in terms of market capitalization. Market capitalization varies from the lowest of 61 USD in 2003 to the highest of 200 million USD in 2006 and the median ranges from 4 330 USD in 2002 to 210 827 USD in 2006.

[14] Six-months daily average price is used by O'Hanlon and Steele (2000).

Panel C of table 4.1 shows price-to-book ratio, it ranges from negative 3.69 in 2006 to 16.84 in 2004 and the median varies from 0.02 in 2004 to 0.27 in 2006; the standard deviation of price-to-book ratio ranges from 0.39 in 2004 to 3.17 in 2006. Some companies' negative book values of equity cause negative price-to-book ratio for the all years except 2004.

Price-to-earnings ratio for the companies in my sample is presented in Panel D of table 4.1. Each year contains companies that state negative earnings. However a company performs negative earnings from its operation, it has been apparent that the company's stock is purchased by investors and at the same time price is increasing. Price-to-earnings ratio ranges from the lowest of negative 98.77 in 2006 to the highest of 1335.26 in 2004; the median price-to-earnings ratio ranges from zero both in 2002 and in 2004 to 1.98 in 2006.

Table 4.1
Descriptive Statistics for the Companies in the Sample

Panel A: Distribution by Industrial Sector

Industrial Sector & Number of companies in Sector

Year	*Total*	*Coal / mining*	*Construction / Building materials*	*Food manufacturing / Retail*	*Non-food retail / manufacturing*	*Clothing / textile*	*Transportation*	*Leisure / Service*	*Agriculture*	*Brewing / alcoholic production*
2002	82	8	12	12	12	4	5	16	12	1
2003	66	7	12	8	7	5	4	10	11	2
2004	63	10	13	9	8	5	5	5	6	2
2005	69	8	8	12	8	8	5	9	9	2
2006	64	6	8	12	9	10	5	5	7	2

Panel B: Market Capitalization / in USD/

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	11,497,900	160	4,330	1,461,840
2003	66	15,504,446	63	16,458	1,955,990
2004	63	5,456,510	61	11,384	988,784
2005	69	13,772,055	475	24,284	1,722,222
2006	64	199,856,209	451	210,827	26,274,227

Note: Exchange rate USD 1= MNT 1,125, 1,168, 1,209, 1,221, 1,165 respectively in 2002, 2003, 2004, 2005, 2006

Panel C: Price-to-book Ratio

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	8.80	- 0.32	0.02	0.98
2003	66	16.84	- 1.06	0.05	2.11
2004	63	2.16	0.00	0.03	0.39
2005	69	2.48	- 1.53	0.06	0.43
2006	64	15.13	- 3.69	0.27	3.17

Panel D: Price-to-earnings Ratio

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	0.51	- 0.21	- 0.00	0.08
2003	66	341.80	- 7.97	1.23	44.63
2004	63	1,335.26	- 88.31	-	170.76
2005	69	194.18	- 60.41	- 0.07	28.11
2006	64	162.10	- 98.77	1.98	29.60

Panel E: Total Asset /in USD/

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	64,304,142	10,755	577,779	10,039,036
2003	66	64,492,197	13,099	574,794	11,219,669
2004	63	35,469,481	17,515	493,861	5,475,822
2005	69	61,510,568	12,381	710,897	9,922,706
2006	64	61,423,730	46,136	1,032,023	10,997,782

Panel F: Debt-to- market capitalization Ratio

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	606.184	0.016	13.734	112.106
2003	66	2,065.296	0.005	10.848	392.665
2004	63	56.645	0.001	0.292	7.336
2005	69	745.609	0.009	8.125	109.679
2006	64	431.948	0.011	1.330	59.529

Panel G: Debt-to-total asset Ratio

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	1.224	0.003	0.224	0.273
2003	66	1.371	0.002	0.279	0.356
2004	63	1.827	0.001	0.247	0.342
2005	69	1.591	-	0.372	0.393
2006	64	1.725	-	0.349	0.392

Panel H: Return on Total Asset (ROA)

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	0.410	- 0.375	-	0.104
2003	66	0.467	- 0.028	0.011	0.099
2004	63	1.055	- 0.044	0.733	0.306
2005	69	0.900	- 1.110	- 0.004	0.207
2006	64	1.376	- 0.690	0.014	0.315

Panel I: Return on Common Equity (ROE)

Year	*Available observation*	*Max*	*Min*	*Median*	*Standard deviation*
2002	82	0.491	- 1.749	0.001	0.316
2003	66	2.603	- 0.206	0.015	0.498
2004	63	3.306	- 2.332	1.003	0.581
2005	69	2.583	- 1.224	0.002	0.418
2006	64	2.969	- 0.618	0.051	0.518

Both small and big companies regarding to its total asset amount is included in the sample. As shown in Panel E of table 4.1 total asset amount ranges from 10 755 USD in 2002 to 64.7 million USD in 2003; the median total asset ranges around 493 861 USD in 2004 to 1 million in 2006.

Panel F of table 4.1 shows debt-to-market capitalization ratio. Debt-to-market capitalization ratios of the sample companies ranges from 0.001 in 2003 to 2065 in 2003; the median debt-to-market capitalization ratio ranges from 0.292 in 2004 to 13.7 in 2002.

All companies in the sample have balance amount in liability part. Mostly small firms have balance in accounting payables and short-term loan accounts. In addition to these two accounting items, big firms have balance amount in long-term loan account. As shown in Panel G of table 4.1, debt-to-total asset ratio ranges from zero in 2005 to 1.82 in 2004; the median debt-to-total asset ratio ranges from 0.22 in 2002 to 0.372 in 2005.

Return on total asset of sample companies is summarized in Panel H of table 4.1. Return on total asset ranges negative 1.11 in 2005 to 1.37 in 2006; the median return on total asset negative 0.004 in 2005 to 0.767 in 2004; standard deviation of return on total asset ranges from 0.099 in 2003 to 1.9 in 2004.

As shown in Panel I of table 4.1, return on common equity ranges from negative 1.79 in 2002 to 3.306 in 2004; the median return on common equity ranges from 0.001 in 2002 to 1.006 in 2004; the standard deviation of return on common equity ranges from 0.418 in 2005 to 2.254 in 2004.

4.4. EMPIRICAL RESULTS

Table 4.2 presents the estimation of cost of equity capital and growth rate in residual income in Mongolian Stock Market. Although a number of observations in the sample vary over the years, estimates of cost of equity capitals and growth rates remain relatively constant.

Table 4.2

Annual Estimates of the Cost of Equity Capital (k) and the Growth Rate in Residual Income (g)

Year	***n***	**k= γ_o**	**g = $(\gamma_o - \gamma_1)/(1+\gamma_1)$**	***R^2***	***T-bond***	***Equity premium***
2002	82	22%	1%	47%	15%	7%
2003	66	21%	2%	15%	14%	7%
2004	63	23%	1%	45%	8%	15%
2005	69	22%	3%	68%	14%	8%
2006	64	20%	2%	48%	11%	9%

As shown in table 4.2, γ_o or cost of equity capital (k) varies from a low of 20% in 2006 to a high of 23% in 2004; averages at 21.6%. Earlier years or from 2002 to 2004 stock market yielded higher than later years. Starting from 2004, cost of equity capital has been decreasing by 1% - 2% by year.

Growth rate in residual income ranges from 1% in both 2002 and 2004 to 3% in 2005; averages at 1.8% over the years.

Explanation power of the method relative to the variables used in this study is explained by R square. In the regression R square ranges a low of 15% in 2003 to a high of 68% in 2005. Except 2003 and 2005, R square show consistent numbers over the years.

The estimated equity premium that is cost of equity capital minus T-bond rate[15] varies from 6% in 2003 to 15% in 2004. 15% of equity premium in 2004 is due to the T-bond interest rate change. In 2004, T-bond interest rate was changed vice versa. In other years, while shorter maturity such as 30-days and 60 days T-bond rate has been yielded lower rate

[15] Validation date of T-bond varies every year. We select the rate that is near to the days in a year.

that longer maturity such as 240-days and 18 months T-bond rate was yielded, in 2004 shorter maturity T-bond interest rate was higher than longer maturity T-bond interest rate.

In table 4.3, cost of equity capital is compared with deposit rate in commercial bank. Deposit rates shown in the table 4.3 are average of all commercial banks' 12 months saving rates. There are several types of saving products that Mongolian commercial banks offer in terms of saving period, interest rates and so on. But in this comparison I have used 12-month deposit rate since the estimated rates are yearly based.

As presented in the table 4.3, while stock market return ranges from 20% in 2006 to 23% in 2004, the commercial banks deposit[16] money around at the rate of 19% in 2006 to 23% in 2002 which is almost similar. Premium of investing stock market rather than depositing at commercial bank ranges from a low of negative 1% for both 2002 and 2003 to a high of 2% in 2005.

Table 4.3

Comparison on Cost of Equity Capital and Bank Savings Rate

Year	***Cost of equity capital***	***Bank savings rate***	***Stock Market Premium***
2002	22%	23%	-1%
2003	21%	22%	-1%
2004	23%	22%	1%
2005	22%	20%	2%
2006	20%	19%	1%

So now it is no wonder why in Mongolia people prefer depositing money in commercials banks rather than investing in stocks since there has been around 1% of premium. It is obvious that investing in stocks is riskier than depositing in banks and it should be compensated more than 1% comparing with its risk loading matter.

[16] Obtained from Annual reports of the Bank of Mongolia.

Cost of equity capital for Mongolian Stock Market is compared with Korean Stock Market[17] in table 4.4.

Table 4.4

Comparison on Cost of Equity Capital in Mongolia and Korea

Year	***Cost of Equity Capital in Mongolia***	***Cost of Equity Capital in Korea***	***Difference***
2002	22%	22%	0%
2003	21%	18%	3%
2004	23%	20%	3%
2005	22%	15%	7%
2006	20%	13%	7%

As would expect, cost of equity capital for Mongolian companies is higher than those for Korean companies. The difference varies low of zero in 2002 to a high of 7% in both 2005 and 2006.

[17] For the Korean Stock Market, we use cost of capital that is estimated by Tae Hee CHOI (2007).

CHAPTER 5

CONCLUSION

Similar to the situation of other developing countries, in Mongolian most companies' financial flow comes from either commercial bank through lending or internal source. Direct credit markets for long term debt or equity has not been developed well yet. Due to this situation, the Mongolian Stock Market has been paid high attention in recent years. In order to develop stock markets, any developing countries need abundant experts and professional organizations, availability of reliable data, and analytical studies in the field of stock market. But today all of these factors lack in Mongolia.

With this regard, making my contribution to the development of Mongolian Stock Market through this study I simultaneously estimate cost of equity capital and growth rate in the Mongolian Stock Market over the period from 2002 to 2006. The method used in this study is derived by Ohlson (1989, 1995) based on book values, earnings and prices and developed by O'Hanlon and Steele (2000).

I show that cost of equity capital varies from low of 20% in 2006 to high of 23% in 2004; equity premium averages 9% over the years 2002 to 2006. Also I show that growth rate in residual income ranges from 1% in both 2002 and 2004 to 3% in 2005.

Contrasting the estimated cost of equity capital to commercial bank savings rate, there has been around 1% of premium for investing stocks rather than depositing money in the bank. Even though both depositing money in the bank and investing money in the stocks loads risk pattern, it is obvious that investing money in stock is far more risky than depositing money in the bank which should not be compensated only by 1% of premium. I premise the reason is due to high savings rate in Mongolian commercial banks.

Comparing cost of equity capital in two countries between Mongolia and Korea, the

difference ranges from zero in 2002 to 7% in both 2005 and 2006. In other words, the gap averages 4% over the years 2002 to 2006. As would expect, cost of equity capital for Mongolian Stock Market is higher than Korean Stock Market.

At last, I believe that my result will be referred to the investors and managers who need cost of equity capital for making right financial decisions. Also, I believe that the study will give some guide to the further researchers and market practitioners for estimating cost of equity capital. Based on this study, coming research can be more advanced such as covering affluent numbers of sample data or estimating industry specified cost of capital.

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