

# Cross Sections of Expected Return and Book to Market Ratio: An Empirical Study on Colombo Stock Market

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## Introduction

The modern portfolio theory states that market factor is considered as only factor in determining the stock return. Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966) version of CAPM, version of Capital asset pricing model (CAPM) is commonly used to estimate cost of capital and to value financial asset. Studies found evidences in contrast to such existence of linear relationship. Friend and Blume (1970), Jensen et al. (1972) and Stambaugh (1982) found a flat relationship between stock return and market factor. Due to the inability of the market factor, researchers focused on identification of other risk factors which determine stock return. Rosenberg et al. (1985) found the Book to market equity is able to determine the variations of expected return of stock. The stocks with high book to market equity ratio earn higher return than stock with low book to market equity ratio.

The existence of positive relationship between stock return and book equity to market equity ratio (hereafter BE/ME) were confirmed by the study of Fama and French (1992), Davis (1994), Lakonishok et al. (1994), Asness (1997), Lewellen (1999), Asness et al. (2000) in US market. The relationship between stock return and BE/ME is found in international market also, for example Chan et al. (1991) in Japan; Fama and French (1998) found in international market such as Australia, Belgium, France, Germany, Hong Kong, Japan, Netherlands, Singapore, Sweden, Switzerland and UK; Fraser and Page (2000) in South Africa and Griffin (2002) in Canada. Capaul et al. (1993) in developed market such as France, German, Switzerland, UK, Japan and USA; Rouwenhorst (1999) found in developing markets such as Argentina, Brazil, Chile, Greece, Indonesia, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Philippines, Taiwan, Turkey, Venezuela and Zimbabwe. Even though the cross sectional relationship between stock return and BE/ME were found in several developed and developing markets, evidence in Sri Lankan context seem hard to find in literature. Hence there is a question exists whether the cross-sectional relationship between stock return and BE/ME exists in Sri Lankan capital market. Therefore, this study empirically tests existence of the cross sectional relationship between stocks return and BE/ME in the Colombo Stock Exchange.

## Literature Review

Rosenberg et al. (1985) tests relationship between stocks return and BE/ME in US market during the period between from January 1973–September 1984. The study found that there is a positive relation between average stock returns and BE/ME. Similarly, Chan et al. (1991) examined the related cross-sectional differences in returns and BE/ME on Tokyo Stock Exchange (TSE) during the period between from January 1971 to December 1988. They found a greater impact and significant positive relationship between the expected return and BE/ME. Chui and Wei (1998) examine relationship between BE/ME, and expected stock returns relationship in five Pacific-Basin emerging markets such as Taiwan, Hong Kong, Thailand., Korea, and

Malaysia during the period from July 1977 to June 1993. The relationship between BM/ME and return was significantly positive in Korea, Hong Kong and Malaysian Markets. However, the significant negative relationship found in Malaysia, Thailand, Korea and Hong Kong. Kothari et al. (1995) examine whether BE/ME captures cross-sectional variation in average returns stocks in NYSE and AMEX during the period from 1927 to 1990. They observed the BE/ME and returns relationship is much weaker than predicted by Fama and French (1992). Lakonishok et al. (1994) formed portfolios based on value strategies to investigate the role of BE/ME in explaining the cross-section of returns. They followed Fama and MacBeth (1973) methodology and used stocks from NYSE and AMEX during the period April 1968 to the end of April 1989. The study found that BE/ME has statistically significant predictive power in explaining return.

### Methodology

The relevant market data for this study was taken from the official website of the Colombo Stock Exchange website ([www.cse.lk](http://www.cse.lk)) and CSE data library. In addition to the market data, the accounting data and number of shares of the company were taken from financial statements of respective companies published in annual reports. All listed companies are taken into considered for this study during the period from April 2000 to March 2013. The number of companies listed in the main board of the CSE as at March 2013 is 289. However, The Bank Finance and Insurance sector firms and non-traded firms during the period and the stocks with negative BE/ME were excluded from the sample of this study. Finally, the sample of the study consists of 181 companies.

The book to market is calculated at the end of March each year. The book to market is defined as the net assets as at end of financial year end of a respective firm is divided by the market equity as at the end of financial year. The market equity is defined as the number of shares outstanding times closing price as at end of last trading day of financial year end of respective firm. BE/ME is sorted in ascending order and divided into ten equal number of portfolios. First decile portfolios labeled as D1, second decile portfolios labeled as D2 and so on. So that the stocks with smallest BE/ME ratio lies in the first portfolio D1 and the highest BE/ME ratio stocks are, in the last portfolio D10. The equally weighted monthly portfolio return is assigned to respective portfolio from April t to March t+1. The return is calculated monthly by incorporating dividend yield with capital gain. The portfolio is reformed each year at the end of March. The existence the cross sectional relationship between stock return and BE/ME is tested by Fama and MacBeth (1973) two step regression on monthly return of ten portfolios and natural logarithm of BE/ME of respective portfolios. The slope coefficient for each of the 10 portfolios are estimated in the first step using time series regression equation 1 across portfolios. Then portfolio returns regressed against the 10 estimated slope coefficient across time periods in the second step cross sectional regression equation 2.

$$R_{it} = \alpha_{it} + \beta_{it} BTM_{it} \text{----- Equation 1}$$

$$R_t = \gamma_{0t} + \gamma_{1t} \beta_t \text{----- Equation 2}$$

### Hypothesis

$H_0$  :The cross sectional relationship between stock return and BE/ME does not exist in the Colombo stock market.

$$H_0 : \bar{\gamma}_t \leq 0$$

$H_1$  :The positive cross sectional relationship between stock return and BE/ME does exist in the Colombo stock market.

$$H_1 : \bar{\gamma}_t > 0$$

## Results and Discussion

Table 1 shows descriptive statistic summary of monthly observation of each portfolio average monthly return from April 2000 to March 2012. The average portfolio return of highest decile portfolio D10 return is 5.93% per month when lowest decile portfolio D1 return is 3.63% per month. The differences between highest and lowest decile portfolio return is 2.2972%. The differences of return between highest and smallest decile portfolios provide evidence for existence value effect in CSE during the study period.

**Table 1: Descriptive Statistics**

Descriptive statistics										
Statistic	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
No. of observations	156	156	156	156	156	156	156	156	156	156
Mean	3.63	1.82	2.44	2.47	2.98	3.14	2.69	4.02	4.01	5.93
Median	1.25	2.04	2.14	1.24	1.86	1.88	2.12	2.79	2.29	2.43
Minimum	-21.79	-21.25	-22.30	-21.37	-20.12	-17.72	-20.89	-21.72	-23.29	-25.30
Maximum	127.78	23.69	28.05	35.04	58.31	31.42	32.19	36.25	38.46	92.97
Range	149.57	44.93	50.34	56.41	78.43	49.14	53.08	57.97	61.75	118.27
Standard deviation (n-1)	14.88	8.26	8.01	8.71	10.47	9.23	9.01	10.21	10.56	15.91
Standard error of the mean	1.19	0.66	0.64	0.70	0.84	0.74	0.72	0.82	0.85	1.27
Mean absolute deviation	9.09	6.38	6.25	6.51	7.52	7.22	6.92	7.75	8.15	10.89

Table 2 shows the test result of Fama and MacBeth (1973) two-step regression on monthly return of ten portfolios and natural logarithm of BE/ME of respective portfolio. The Fama and MacBeth coefficient of BE/ME is 0.7862 and the respective t statistics is 45.30. The t value of the Fama and Macbeth test statistics is so far from zero. The p value of the test statistics is 0.000. Therefore, the p value is less than critical alpha value 0.05 at 95% confidence level. Hence, the Fama and MacBeth coefficient of BE/ME is highly significant and rejects null hypothesis (that the cross sectional relationship between stocks return and BE/ME does not exist in the Colombo stock market). Therefore, the result reveals a significant positive relationship between portfolio return and BE/ME. This finding is consistent with study of Asness, Proter & Stevens (2000), Fama & French (1992), Davis (1994), Lakonishok, Shleifer & Vishny (1994), Asness (1997), Lewellen (1999), in US market and . Chan, Hamao and Lakonishok (1991), Fama and French (1998), Fraser & Page (2000), Griffin (2002), Rowley and Sharpe (1993), Rouwenhorst (1999) in international markets.

**Table 2: Fama and Macbeth (1973) Test Results**

Fama and Macbeth (1973) Test	
FM Coefficient	0.786283
Observation	156
Variance	0.04699
SD	0.216771
T Statistics of FM	45.30428
P value	0.000

## Conclusion

This study examines whether cross sectional relationship between stock return and BE/ME exists in Sri Lankan capital market. The sample of study includes all non-financial companies listed on main board of Colombo stock exchange during the period from 2000 to 2013. All sample of stocks are formed into ten portfolios based on BE/ME and equally weighted average monthly portfolio return is calculated and assigned to respective decile portfolios at the end of each year. The existence of cross sectional relationship between stock return and BE/ME is estimated by the Fama and MacBeth (1973) cross sectional two step regression. The analysis shows that there

is a positive relationship between portfolio return and BE/ME. Further, the study provides evidence for existence of value effect during the study period in Colombo stock exchange.

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