
BOOK TO MARKET RATIO AND EXPECTED STOCK RETURN: AN EMPIRICAL STUDY ON THE COLOMBO STOCK MARKET

Mohamed Ismail Mohamed Riyath

Sri Lanka Institute of Advanced Technological Education (SLIATE),
Sammanthurai, Sri Lanka.
riyath.i@sliate.ac.lk

Athambawa Jahfer

Department of Accountancy and Finance,
South Eastern University of Sri Lanka, Oluvil, Sri Lanka.
jahfer@seu.ac.lk

Abstract

The book to market capitalization of firms become one of the common risk factor on asset pricing models. The impact of book to market equity of firms on stock returns was initially found in US market and subsequently tested in many international markets both in developed and developing markets. However, the empirical test of value effect in Sri Lankan stock market seems hard to find in literature. Therefore, this study examines existence of value effect on stocks returns in the Colombo stock market as an emerging capital market. The analysis show a weak positive cross sectional relationship between stock return and Book to Market ratio of stock and existence of value effect.

Keywords: *Book to market equity ratio, Colombo stock market, cross sectional relationship, Value effect.*

Introduction

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. The CAPM postulates that the market factor is the only factors which determined variations of expected return of stocks. Earlier studies immediate after the formulation of the model found supportive evidences for CAPM that is there is a liner positive relationship existed between stock return and market factor Black (1972) and Fama and MacBeth(1973) However, subsequent studies found evidences in contrast to such existence of linier relationship. Friend and Blume (1970), Jensen, Black, and Scholes (1972) and

Stambaugh (1982) found a flat relationship between stock return and market factor. This findings risen the doubt on market factor as a single factor to determining the expected stock return. Due to the inability of the market factor, researchers focused on identification of other risk factor which determines stock return. Rosenberg, Reid, and Lanstein (1985) found the Book to market equity is able to determine the variations of expected return of stock. They states that there is a positive liner relationship exist between book to market equity and stock return. The stocks with high book to market equity ratio earn higher return than stock with low book to market equity ratio. The return differences between higher and lower book to

market stocks is known as value premium.

The existence of value premium and positive relationship between stock return and book to market ratio were confirmed by the study of Fama and French (1992), Davis (1994), Lakonishok, Shleifer, and Vishny (1994), Asness (1997), Lewellen (1999), Asness, Porter, and Stevens (2000) in US market. The value premium is found in international market also, for example Chan, Hamao, and Lakonishok (1991) in Japan; Fama and French (1998) found value premium 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, Rowley, and Sharpe (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 existence of the value premium were found in several developed and developing market, evidences for existence of value effect in Sri Lankan context is seems hard to find in literature. Hence, there is a question that weather the value effect is exist in Sri Lankan capital market. There is an another question that weather the cross sectional relationship between stock return and book to market ratio is exist in the Sri Lankan capital market. Therefore, this study empirically examines the existence of value effect and cross sectional relationship between stocks return and Book to Market ratio in the Colombo stock market.

Literature review

Rosenberg et al. (1985) test relationship between stocks return and BE/ME in US market. For this test they used 1,400 of the largest U.S. companies from the New York Stock Exchange (NYSE), and a few from other exchanges like the AMEX and NASDAQ in the COMPUSTAT database during the period between from January 1973–September 1984. They found a positive relation between average stock returns and BE/ME (book value of common equity (BE) / market value of common equity (ME)). Higher return earned by the stocks which are having higher value of BE/ME and lower return earned by stocks which are having lower value of BE/ME than control for betas in US market.

Similarly, Chan et al. (1991) examined the related cross-sectional differences in returns on a Japanese stocks to four explanatory variables for returns were tested: size, book/market ratio, earnings/price ratio, cash flow/price ratio. They applied alternative statistical specifications and various estimation methods on Stocks data taken from the Tokyo Stock Exchange (TSE) during the period between from January 1971–December 1988. They found a greater impact and significant positive relationship between the expected return and Book/market and cash flow/price ratios. However, after controlling for other variable, the impact of the Earning / Price ratio was insignificant.

Fama and French (1998) presented additional out-of-sample evidence on the value premium which examined returns on market, value, and growth portfolios in developed and emerging stock markets. They included thirteen major

markets and in sixteen emerging markets during the period from 1974 to 1995. They found that the value stocks tend to have higher average returns over growth stocks in twelve major market out of thirteen major markets during the test period. Also they found a value premium in emerging markets in the period 1987-1995.

Chui and Wei (1998) examine relationship between market beta, book-to-market equity, and size and expected stock returns relationship in five Pacific-Basin emerging markets such as Taiwan, Hong Kong, Thailand., Korea, and Malaysia during the period July 1977 through June 1993. The regression ran on based on portfolio data, result showed the significant negative size effect in Korean Market. 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 when ran regression on based on individual stock. But same result as portfolio regression found book to market effect. Finally they concluded that a strong size effect in all five market while the book to market effect significantly impact in Hong Kong, Korea, and Malaysia only. However beta and return relationship is insignificant and flat.

Kothari, Shanken, and Sloan (1995) examine whether beta and Book to Market captures cross sectional variation in average returns. They used annual return (for estimating beta) and monthly returns (for estimating BE/ME) of all stocks in NYSE and AMEX during the period 1927 to 1990. They observed a linear relationship between the beta and cross-

section of expected stock returns. The BE/ME and returns relationship is much weaker than predicted by Fama and French (1992). Further they suggested that the data taken from the COMPUSTAT is affected by a selection bias and provides indirect evidence. Therefore they used S&P 500 from 1947 to 1987 as alternative data source to overcome the bias on the data and the analysis found that the relationship between BE/ME and average return is weak.

Lakonishok et al. (1994) formed portfolios based on value strategies to investigate the role of different characteristic of firms such as sales growth (GS), size, E/P, C/P and Book to market 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 and found that all variable including B/M have statistically significant predictive power in explaining return. But the size factor does not exist.

Methodology

The relevant market data for this study were taken from the official website of the Colombo Stock Exchange website (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. However, the financial firms and stocks with negative BM ratios were excluded from the sample of this study.

The book to market is calculated at end of March each year. The book to market is defined as the net assets as at end of financial year of a respective firm is divided by the market equity as at 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. Book to Market equity ratio 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 Book to Market ratio lays in the first portfolio D1 and the highest Book to Market ratio stocks lays in the last portfolio D10. The equally weighted monthly portfolio return is assigned to respective portfolio from April t to March t+1. The portfolio is reformed each year at the end of March. The existence of value effect is tested by the return differences between two extreme decile portfolios.

Hypothesis

H_0 : value effect is not exist in the Colombo stock market.

H_0 : average portfolio return of D1 \geq average portfolio return of D10

H_1 : value effect is exist in the Colombo stock market.

H_1 : average portfolio return of D1 < average portfolio return of D10

The existence the cross sectional relationship between stock return and Book to Market ratio is tested by Fama and MacBeth (1973) Eugene two step regression on monthly return of ten portfolios and natural logarithm of Book to market equity ratio of respective portfolio. In the first step Estimate the slope coefficient for each of the 10 portfolios 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

Table 1. Number of Stocks of Portfolios

Number of Stocks										
Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
2000	15	14	15	14	13	16	15	16	14	13
2001	14	15	14	15	15	15	15	16	15	16
2002	15	13	14	12	13	16	15	15	14	14
2003	16	16	15	15	17	14	15	17	17	15
2004	15	18	18	15	17	17	17	18	18	18
2005	17	17	17	18	17	18	17	19	18	18
2006	16	17	17	19	18	19	19	19	19	18
2007	16	17	18	19	18	19	19	19	19	19
2008	15	19	18	19	18	19	19	18	19	18
2009	18	19	18	18	19	19	17	19	19	18
2010	18	18	18	19	18	17	19	18	18	18
2011	18	18	18	18	19	18	19	18	19	18
2012	18	18	19	18	18	19	18	19	18	18

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stock return and Book to Market ratio is 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 Book to Market ratio is exist in the Colombo stock market.

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

RESULTS AND DISCUSSION

Table 1 shows number of stocks included in the sample of this study in each decile portfolio at end of March t each year.

Table 2 shows average book to market value for respective decile portfolio each year as at end of March. The given book to market value is calculated by aggregating whole book to market value of each stock and divided by number of stocks outstanding of the respective portfolio. The values demonstrate that the

average book to market value is increases from low decile book to market portfolio to high decile portfolio each year.

Table 3 shows average annual monthly equally weighted return for respective decile portfolio each year as at end of March t+1. The average annual monthly return of each stock is the average of twelve month return from April t to March t+1. The given average annual monthly portfolio return of each decile portfolio is calculated by aggregating whole average annual monthly return of each stock and divided by number of stocks outstanding of the respective portfolio. The values indicate that the highest decile portfolio return is higher than the lowest decile portfolio. The differences of return between highest and smallest decile portfolios, provide evidence for existence size effect.

Table 4 shows the test result of Pearson correlation between Natural Logarithm of

Table 2. Book to Market Ratio of Portfolio

Year	BTM									
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
2000	0.36	0.89	1.20	1.46	1.69	2.06	2.53	3.33	4.33	8.46
2001	0.37	0.98	1.48	1.79	2.30	2.72	3.21	3.82	5.03	14.71
2002	0.32	0.85	1.22	1.57	1.86	2.17	2.55	3.24	3.99	7.84
2003	0.30	0.67	0.92	1.17	1.46	1.80	2.19	2.75	3.69	119.84
2004	0.29	0.49	0.73	0.95	1.14	1.48	1.89	2.31	2.99	74.54
2005	0.11	0.30	0.46	0.61	0.74	0.92	1.13	1.40	1.89	56.79
2006	0.14	0.35	0.50	0.65	0.76	0.89	1.10	1.32	1.70	50.99
2007	0.17	0.37	0.56	0.73	0.89	1.04	1.25	1.48	1.96	32.23
2008	0.15	0.42	0.64	0.79	0.90	1.03	1.28	1.57	1.89	21.32
2009	0.29	0.61	0.85	1.09	1.34	1.66	2.06	2.49	3.04	18.25
2010	0.18	0.38	0.48	0.59	0.71	0.85	1.03	1.27	1.83	17.52
2011	0.09	0.21	0.30	0.37	0.45	0.52	0.65	0.87	1.07	13.30
2012	0.18	0.34	0.50	0.61	0.74	0.86	1.02	1.36	1.66	4.24

Table 3. Average Monthly Return of Portfolios

Average Monthly Return										
Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
2000	-1.66	-1.10	0.24	-0.21	1.26	0.05	0.86	0.17	-0.01	1.41
2001	3.44	5.44	3.93	2.04	2.79	4.49	5.12	3.19	7.01	5.37
2002	2.82	2.06	3.67	1.72	0.99	2.88	4.01	3.12	3.01	9.50
2003	10.52	5.08	4.60	4.05	6.18	5.00	3.56	3.27	10.33	13.02
2004	6.91	4.47	4.85	8.68	4.93	5.97	5.43	6.89	17.33	16.87
2005	1.77	0.89	2.87	3.70	2.47	1.78	2.84	5.33	6.00	5.50
2006	-1.10	0.30	1.30	-1.56	5.40	1.99	1.60	1.18	1.05	1.76
2007	3.46	-0.21	2.01	1.13	1.69	2.66	2.58	5.90	2.87	6.78
2008	0.03	-1.25	-1.52	-2.74	-2.01	-1.10	-2.36	1.21	-0.93	-0.60
2009	8.79	5.90	5.29	8.71	9.45	9.48	7.53	10.46	8.49	9.45
2010	21.40	6.35	7.46	6.89	10.47	7.07	6.93	9.39	8.20	12.44

Book to Market equity of each stock and monthly return of each stock. The correlation coefficient is 0.046 on 24014 observations during the study period. The p value is 0.00 is less than alpha value of 0.05. Therefore the null hypothesis is rejected at 95% confidence level and the correlation is significant. It is evidence that there is a weak positive correlation between market capitalization and stock return exist in stocks listed on CSE during the study period.

Table 5 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 while lowest decile portfolio D1 return is 3.63% per month. The differences between highest and lowest decile portfolio return is 2.2972%, Standard Deviation is 14.99%, Standard Error Mean is 1.20029% and t statistic is 1.914%

Table 4 Correlation between Monthly Stock Return and BTM

Correlations			
		Return	Ln BTM
Return	Pearson Correlation	1	.046**
	Sig. (2-tailed)		.000
	N	25349	25349
Ln BTM	Pearson Correlation	.046**	1
	Sig. (2-tailed)	.000	
	N	25349	25349

** . Correlation is significant at the 0.01 level (2-tailed).

Table 5. 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

with 155 degree of freedom. The statistical test is shows that the p value is 0.0285, which is less than alpha value of 0.05. Therefore null hypothesis is rejected at 95% confidence level. The alternative hypothesis is the average monthly return of highest decile portfolio D10 is higher than lowest decile portfolio. The study provides evidence for existence of value effect in the Colombo stock market during the study period.

Table 6 provides the test result of Fama and MacBeth (1973) two step regression on monthly return of ten portfolios and natural logarithm of Book to market equity ratio of respective portfolio. The Fama and MacBeth (1973) coefficient of Book to market ratio is 0.7862 and the respective statistics is 45.30. Therefore, the Fama and MacBeth (1973) of Book to market ratio is highly significant and rejects null hypothesis that the cross sectional

relationship between stocks return and Book to Market ratio is not exist in the Colombo stock market. Therefore, the result shows significant positive relationship between portfolio return and Book to market ratio and provides evidence for existence of value effect during the study period in Colombo stock exchange.

Conclusion

This study examines existence of value effect on stocks returns in the Colombo stock 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 book to market ratio and equally weighted average monthly portfolio return is calculated and assigned to respective decile portfolios at the end of each year. The existence of vale effect is estimated by the

Table 6

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

differences of portfolio return between highest and lowest book to market decile portfolio. The analyses show that the highest decile portfolio of stocks earns higher return than lowest decile portfolio of stocks. Therefore, the study concludes that there is a value effect exist in the Colombo stock market during the study period. The existence of cross sectional relationship between stock return and Book to Market ratio is estimated by the Fama and MacBeth (1973) cross sectional two step regression. The analyses show that positive relationship between portfolio return and Book to market ratio and provides evidence for existence of value effect during the study period in Colombo stock exchange. The findings of this study are consistent with the previous studies.

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