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Validity of beta in explaining expected returns of securities listed in the Colombo Stock Exchange - Sri Lanka

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Abstract: The share market has become a main source of raising funds for the entire economy. Therefore it's important for a country to attract lucrative investors to invest in share market. At the same time, if an investor is in a position to predict the prices or returns into certain extent, it helps him to make rational decisions on the stock market dealings, which enables him to allocate resources efficiently. In line with the Capital Asset Pricing Model (CAPM), the empirical results of studies indicate that beta is a significant variable in predicting average stock returns of a stock market. This study investigates the validity of beta explaining the expected returns of securities listed in the Colombo Stock Exchange (CSE). In addition to that, this research further explore any other factors which is responsible for influencing the predictability power of forecasting share returns of companies. Companies were selected on the basis of size and liquidity of companies. Data analysis was performed by selecting 90 companies out of total 287 listed companies in the CSE covering five year period from 2008 to 2012 with a view to provide empirical evidence on CAPM, which states that expected returns on securities are a positive linear function of market beta. Conceptual model has been developed to predict expected return using Beta, Earning to Price Ratio and Company Size by applying statistical techniques such as correlation coefficient, coefficient determination and regression analysis. This study finds that beta is a significant variable in explaining average stock returns of companies. But Earning to Price Ratio and Size of the company has weak negative and weak positive relationships respectively with average security returns.

Keywords: Beta, Expected Return, Capital Asset Pricing Model, Colombo Stock Exchange

1. Introduction

The share market has become a popular subject among the public including investors as well as academic researchers since it plays a vital role in the country's economy. Further it is the most important economic indicator of a country since under the globalization of share market has become a main source of raising funds for the entire economy.

Gurley and Shaw (1955) are among the first to study the relationship between financial markets and real sector activity. They explain that one of the differences between developed and a developing country is that the financial system is more developed in the former. McKinnon (1973) and Shaw (1973) found that the development of financial markets has been significantly correlated with the growth of national income/output.

As long as financial markets have existed, researchers have tried to predict and forecast them, in the hope that good prediction would bring them great fortune. Later researchers tried to find whether stock returns are predictable in current context by considering the different micro and macro factors. Microeconomic factors include firm-specific fluctuations such as changes in corporate decisions and fundamentals, while macroeconomic factors contain economy-wide fluctuations such as changes in policies or regulations. This question is important since return predictability has direct implications for financial models of risk and return. It is also of interest to practitioners in the investment management industry concerned with asset allocation, market timing strategies, and active risk management. Many researchers have done studies to identify the relationship between risk and return in share market in different countries, but there is

paucity of research pertaining to the CSE. It's important to identify whether share return is predictable, because an investor holds different opinions on the risk of investment of shares unlike in the case of the fixed -interest bearing securities. A speculative investor always tries to evaluate his decision based on the expected future market price and cash dividend. Hence, if an investor is in a position to predict the prices or returns into certain extent, it helps him to make rational decisions on the stock market dealings, which enables him to allocate resources efficiently.

Therefore this study attempts to identify whether the beta (ß) has any predictability power to forecast stock returns of companies listed in CSE and if not, identify other significant factors which helps to forecast expected returns of securities. In this regard, the involved research problem is whether there is a validity of beta (ß) in relation to share returns of companies listed in the CSE. This study is paramount important because, CSE reported negative beta value for selected companies. We calculated beta values using published share prices for this research.

Therefore we find that it is important to study the impact of beta for the share return in companies listed in the CSE. At the same time, find any other factors which could change the share return of those selected companies. This research paper organizes as follows. Next section describes nature and peculiar characteristics of the Colombo Stock Exchange (CSE) and brief description about beta, Section 3 reviews the literature related to validity of beta explaining expected returns of securities. Section 4 discusses methodological approach applied and section 5 reports results and discussion. Section 6 concludes the paper.

2. The Colombo Stock Exchange (CSE)

Sri Lankan share market is one of growing capital markets. CSE is a company limited by guarantee established under the Companies Act No.17 of 1982 and licensed by the Securities & Exchange Commission (SEC) to operate as a Stock Exchange in Sri Lanka. It is the central, and only authorized market for securities listed for public transactions. The CSE has a fully owned subsidiary, the Central Depository System (Pvt.) Limited (CDS), which acts as a depository for all shares traded on the Exchange. The CDS is responsible for the recording and processing of all share transactions, eliminating the delays involved in the settlement of transactions. The CDS has a comprehensive database of securities listed on the CSE, and a market information system making it one of the most modem integrated systems of any stock exchange worldwide (Exchange, CSE Technology:Colombo Stock Exchange, 2012).

The CSE was one of the first exchanges in the region to successfully automate its activities, and has been able to notably enhance the transparency and efficiency of the securities market. A two-tiered system of listing was introduced in 1997, a Main Board and a Second Board. The former comprises of large companies and the latter comprises of medium and new companies, all of which are listed for both debt and equity securities. In 1998 the CSE was admitted as a member of the World Federation of Exchange (WFE) in recognition of its technology, systems and regulations. The CSE provides the market for price discovery in an active secondary market, which gathers the widespread attention of investors. It has 287 companies which belong to 20 industry sectors. The CSE announces beta (ß) values corresponding to each listed company and investors are accustomed to use announced beta values for their rational investment decisions.

Because, rational investors hold diversified portfolios from which diversifiable risk is more or less eliminated. However, relevant measure of risk of an investment is its non-diversifiable or systematic risk. All securities do not have the same degree of non-diversifiable risk because the magnitude of economy wide factors tends to vary from one company to another. Different securities have differing sensitivities to variations in market returns. It is important to mention that though not perfect, beta represents mostly widely accepted measure of the extent to which the return on a financial asset fluctuates with the return on market portfolio. By definition the beta value for market portfolio is equal to 1 ($ß_m = 1$). Consequently investors compare this value with individual beta values of companies to foresee whether chosen company for investment would give high returns or provide less return in comparison to the market portfolio. The next section reviews the literature.

3. Literature Review

Harvey (1991) argues that the expected returns on a portfolio of securities from a particular country are partly determined by the country's world risk exposure, the extent of which depends on the level of integration of the local market with global markets. In a study of the impact of dividend and earnings on stock prices, Hartono (2004) argues that a significant positive impact is made on equity prices if positive earnings information occurs after negative dividend information. Also, a significant negative impact occurs in equity pricing if positive dividend information is followed by negative earning information. Docking and Koch (2005) discovers that there is a direct relationship between dividend announcement and equity price behavior.

In 1952 Markowitz presented a portfolio theory through a pioneering research. In his theory he explained that how a rational risk averse investor could achieve more efficient portfolio by holding a combination of shares in an efficient market. However his research did focus basically on the individual investor, but failed to address the total market. Sharpe (1964) and Lintner (1965) marked the birth of asset pricing theory, which is commonly known as the Capital Asset Pricing Model (CAPM). The basic idea in the CAPM was that the expected return of well-diversified portfolio is positively related to the market risk, which is denoted by beta (ß). In simply CAPM states that expected returns on securities are a positive linear function of beta (ß). Further

many researches Black, Jensen and Scholes (1972), Fama and MacBeth (1973) find evidence supporting the positive relationship of average stock return and beta.

Still Bos and Newbold (1984), Fabozzi and Francis (1978) and Lee and Chen (1980), investigated a variety of financial markets, find evidence of beta instability of stock and portfolio returns. Chiao,Hung and Nwanna (2004) investigated that intra and inter period beta instability in the Taiwan market stock market from 1982 to 1998. Therefore, it is important to investigate the impact of beta in return generating process in the CSE.

Subsequently, several studies have uncovered that stock return is not solely depends on beta and it is not a strong indicator on generating returns. Knez & Ready (1997) investigate the robustness of the results obtained by Fama & French (1992) explaining cross sectional1 differences in expected returns, using a technique called Least Trimmed Squares (LTS) and find that the negative relation between firm size and average returns is driven by a few extreme positive returns in each month. They find consistent as well inconsistent results to the said research studies. They find significant E/P and size effects and which is consistent with cook & Rozeff (1982) who attach equal importance to both factors, but inconsistent with Banz & Breen (1986), who reported that there is no separate E/P ratio dominates size. However, Reinganum (1982) finds that size dominates E/P. At the same time, Lakonishok & Shapiro (1984) find that neither the beta nor variance or residual standard deviation can explain returns of companies.

Thus this research aims to focus whether there is an actual validity of beta (ß) in relation to expected return of securities listed in the CSE. At the same time, this research attempts to identify any other factors which influence expected returns.

4. Research Methodology

4.1. Data Collection Method

This study is conducted by analyzing the secondary data, the share prices and financial data relating to the sample of companies in the share market as described above. Data, specially the share prices relating to those companies in the sample gathered from the CSE, while financial data are gathered from the published annual reports of listed companies. Details of the selected sample explained in the following section.

4.2. Sampling Method

The sample in this study contains 90 Companies from CSE. These 90 companies are selected based on the beta values published by CSE.

The sample of the study is selected on the basis of categorizing companies as high risk companies, moderate and low risk companies in the following order.

30 Companies which are having highest BETA value (BETA >> 1)

30 Companies which are having lowest BETA value (closer to BETA=0).

30 Companies which are having moderate BETA value (closer to BETA=1)

4.3. Hypotheses Development

The research objectives outlined above tested using following three hypotheses.

Black, Jensen & Scholes (1972) reported the first empirical evidence on CAPM find that average return of a portfolio of stocks was positively related to the beta (ß) of the portfolio using data from 1930s to 1960s. Basu (1983) finds that high Earnings to Price ratio (E/P) stocks on average generate higher returns than low E/P stocks in tests that include size ß as explanatory variables. Lakonishok & Shapiro (1986) find that neither the beta nor variance or residual standard deviation can explain the cross sectional variation in returns; only size appears to matter.

Therefore, researchers motivated to develop following hypotheses.

H_1: There is a positive relationship between beta and expected return (Black & Jensen, 1972)

H_2: There is a positive relationship between earning to price ratio (E/P) and expected return (Basu, 1983)

H_3: There is a positive relationship between company size and expected return (Lakonishok & Shapiro, 1984).

4.4. Model Specification

Following model developed to estimate the values of depended and independent variables.

$$\text{Expected Return (ER)} = C0 + C1\,(X1) + C2\,(X2) + C3\,(X3) + \varepsilon$$

Where
X1 = Beta value
C1 = Coefficient of Beta value
X2 = Earning to Price Ratio (E/P)
C2 = Coefficient of E/P
X3 = Company Size
C3 = Coefficient of Company Size
ε = Random error term

For the purpose of this study only capital gains are considered as returns. Because, it is understood that dividends, bonus and right issue returns are depend on the organization policy.

Market returns in this study are the average percentage differences of the end of the month and the beginning of the month All Share Price Index, which measures the share prices movements of all listed companies in the CSE. Researchers are of the view that, a true index for market portfolio is not a reality since there is no such index in the world which includes all risky assets previously mentioned.

The Market Return is calculated using the following formula.

$$R_{mt} = [\,ASI\ t - ASI\ (t-1)]\ /ASI\ (t-1)$$

Where,

R_{mt} = Market Return at the end of month t

ASI_t = All Share Price Index at the end of month t

$ASI_{(t-1)}$ = All Share Price Index at the beginning of month t.

Individual security return is the average percentage difference of the end and the beginning share prices of each month. The observed Stock Return is calculated in the following way;

$$R\,it = \frac{\left[price_{it} - price_{it-1}\right]}{price_{it-1}}$$

Where,

R it = Stock Return of security i at the end of month t

price it = Price of the security i at the end of month t

price (it-1) = Price of the security i at the beginning of month t

Black, Jensen & Scholes (1972) as the first empirical evidence on CAPM find that average return of a portfolio of stocks was positively related to the beta (ß) of the portfolio using data from 1930s to 1960s. Therefore, we select beta as an independent variable for this model.

Theoretically beta (ß) measures the contribution to the market risk from the security. It is the index of market risk. It measures the volatility of security returns to the volatility of the returns of the market portfolio. Theoretically, calculation of beta (ß) involves expected data. But it is very difficult to predict the expected behavior of the market prices of a security and the index of the market portfolio to measure beta (ß). Therefore researchers used historical data to measure beta.

Therefore, beta (ß) is defined here for the purpose of this study as a measure of the relationship between historical security and market returns. Beta is calculated by using the following model.

$$E(Rp) = Rf + [(Rm - Rf) / SD(Rm)]SD(Rp)$$

$$E(Rp) = Rf + ß\,[Rm - Rf]$$

Where,

E(Rp) = expected return of the portfolio

E(Rm) = expected return of the market portfolio

Rf= Risk-free rate

SD(Rm) = Risk of the market portfolio (standard deviation)

SD (Rp) = Risk of the portfolio In other words,

$$\beta = \frac{\text{Covariance of market and individual security}}{\text{Market Variance}}$$

Other independent variable of this study is size of the company. Its derivation and sample calculation is explained in the next section.

Lakonishok & Shapiro (1986) find that neither the beta nor variance or residual standard deviation can explain the cross sectional variation in returns; only size appears to matter. Therefore, researchers considered size as an independent variable for this model.

This refers to the size of the company of the security concerned. In this study, size is defined as the total market value of common stocks at the end of the financial year. i.e. the market capitalization of a stock as at the end of financial year. The size of a company calculated as follows;

$$Size = P_t \text{ X } N$$

Where,

P_t = Traded Share Price as at the end of the financial year t

N = Number of ordinary share issued as at financial year end

Last independent variable of this model is earning to price ratio. Its derivation and calculation is explained in the next section.

Basu (1983) finds that high Earnings to Price ratio (E/P) stocks on average generate higher returns than low E/P stocks. Therefore, researchers consider E/P ratio as an independent variable for this model.

Earnings to price ratio (E/P ratio) refers to the earnings divided by market value equity (MV) of the end of the financial year as a percentage, where earnings per share (EPS) are defined as the after-tax net income before extraordinary items, minority interest and ordinary dividends but after exceptional items divided by the weighted average number of ordinary shares outstanding during the year.

Market Value of the common equity issued, at the end of the financial year, 31st March or 31st December is concerned in line with the financial years of selected companies of this study.

Following formula is applied for this calculation,

E/P ratio = [EPS/MP] x 100, Further it is noted that E/P ratio has been defined for positive earnings only. Earnings take the value of earnings when they are positive and it takes zero value when they are negative. For the purpose of calculation of E/P ratio, the market value of shares as at 31st March is considered for the companies which the financial year ends 31st March and value as at 31st December is taken for those companies which the financial year ends 31st December.

In order to arrive at an equal base for all calculations of share return, beta, E/P ratio and company size, the relevant weights for those selected companies for the study have been considered on the basis of average market capitalization of the CSE. In this context, average market capitalization has been selected to neutralize any exceptional impact during that period.

Since the selected companies are in different sizes with different share prices and earnings potentials by their nature, it is not possible to analyze the impact of above discussed variables as they are. As a solution to this, the weighted average figures of those variables are taken in to consideration based on market capitalization of companies and it was separately calculated to use in the analysis.

5. Results and Discussions

5.1. Share Return & Beta (ß)

Table 01. *correlation coefficient (r) and coefficient determination (r2) between Beta (ß) & Share Return*

Share Return vs. BETA	
	BETA
Correlation Coefficient (r)	0.71
Coefficient Determination (r^2)	52%

As presented in Table 01 the correlation coefficient (r) and coefficient determination (r^2) values between share return and beta are 0.71 and 52% respectively. In general, if the correlation coefficient is in between 0.5 and 0.8, it is assumed that there is a strong relationship between the two variables under consideration. Accordingly, this (r) 0.71 provides a very clear idea that there is a strong positive relationship between share return and beta. Further the subjected coefficient determination (r^2) gives the value of 52%. i.e.52% of the variation in the share return can be explained by the beta of those companies.

5.2. Share Return & Earnings to Price (E/P) Ratio

Table 02. *correlation coefficient (r) and coefficient determination (r^2) between Earnings to Price (E/P) Ratio & Share Return*

Share Return vs. E/P	
	E/P
Correlation Coefficient (r)	0.28
Coefficient Determination (r^2)	8%

According to the Table 02, the correlation coefficient (r) between E/P ratio share return is 0.28, and that means there is a weak positive relationship between these two variables. In line with the coefficient determination (r^2) value of 8%, the E/P ratio does not appear to be an important factor in explaining the average returns of companies in CSE.These results are inconsistent with the evidence of Fama & French (1992), find that the E/P ratio shows a strong positive relationship with average return, indicating that the average returns increase with E/P ratio when earnings are positive. But the implication given by the results of this research study is that E/P ratio is a weak factor in explaining the share returns of the companies during the period 2008 to 2012.

5.3. Share Return & Company Size

Table 03. *correlation coefficient (r) and coefficient determination (r^2) between company size & Share Return*

Share Return vs. Company Size	
	Company Size
Correlation Coefficient (r)	0.79
Coefficient Determination (r2)	62%

Based on the results of Table 03 the correlation coefficient (r) of these two variables is 0.79. That means there is a strong positive relationship between company size and share return. In other words, the fluctuations in share returns seem to be predictable, since there is a tendency to share returns become negative as the size of company decreases. In addition to that, the coefficient determination (r^2) of 62% gives the indication that the 62% of the variations in the share returns can be explained by the size of company.

However these results are different from the evidence in the previous studies on the US market which finds a negative relationship between size and share return. In a more comprehensive study, Fama & French (1992) find that size shows a strong negative relationship with average returns.

5.4. Share Return & Company Size

Table 04. *Regression Analysis with E/P Ratio, Company Size and Beta as independent variables*

R		0.8762
R Squared (R^2)		0.7676
Coefficient (C0)	Coefficient (C0)	0.0001
	P-Value	0.0362
Beta value (X1)	Coefficient (C1)	0.0082
	P-Value	0.0386
Earning to Price Ratio (E/P) (X2)	Coefficient (C2)	-0.1405
	P-Value	0.0000
Company Size (X3)	Coefficient (C3)	0.0011
	P-Value	0.0000

According to the figures in Table 04 suggested model can be analyzed as follows.

Estimated Regression line based on coefficients in the Table 04 is;

$$ER = 0.0001 - 0.1405X2 + 0.0082X1 + 0.0011X3$$

6. Conclusion

The general conclusion drawn from the study reveals that beta (ß) and size of the company have strong positive relationship and weak positive relationship with the average security returns in CSE respectively. Further, study finds that E/P ratio has negative impact on share return. But these results are contrary to correlation coefficient values reported with respect to independent variables. This means that according to the correlation coefficient with share return and independent variables, E/P ratio had weak positive relationship and company size has strong positive relationship. Therefore, it can be concluded that this change of sign and degree of impact of dependent variables occurred due to the multicollinearity. But there is no impact to the model due to multicollinearity.

However, Strong positive relationship of beta of companies with share return is in line with the central prediction of the Capital Asset Pricing Model (CAPM) and which supports the Fama & MacBeth (1973) evidence that there is a positive relationship between beta and share return. In addition to above, it does support to findings of Black, Jensen & Scholes (1972) as the first empirical evidence on CAPM, which justifies that average return of a portfolio of stocks is positively related to the beta values.

Therefore, this research justifies the theoretical relationship between beta values of companies generating

stock returns of one of the emerging stock markets in the world and authors contributes to the existing body of knowledge pertaining to validity of beta explaining expected returns of companies.

It is suggested that future research directions to focus on this issue of investigation by expanding the sample by including all listed companies in the CSE covering more than five year period and diving the sample into two periods (sub-period analysis) while indentifying separately significant economic changes reported in the country.

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