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**Technical Stock Valuation of a Company:  
The Bangladesh Perspective**

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# Technical Stock Valuation of a Company: The Bangladesh Perspective

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## Abstract

The paper describes the relationship between risk and expected return and determination of risk free rate in valuation of a stock. The stock pricing says that the expected return of a security equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should be taken carefully considering the growth potential of the stock. Using the stock price of a company, ACI, and all share price index of Dhaka Stock Exchange (DSE) we can compute the expected return. If the average risk-free rate of 91-day government treasury bill is 7 percent, the beta (risk measure) of the stock is 1.14 and the average expected market return over the period is 10 percent, the stock expected return is 10.42 percent (7 percent + 1.14(10 percent - 7 percent)). Here the risk premium is 3.42 percent. In evaluating the ACI stock we have used the OLS method considering the unit root and other tests of significance. The time path of risk free rate is impacted by market trends. BB prudently maintains the volatility of the risk free rate using its instruments. The risk free rate has a role to maintain a tradeoff with the funds between banks and the capital market. This paper analyzes the risk free rate, risk premium, and related variables to evaluate the stock in order to maintain financial stability.

JEL Classification: C58, D53, E58 and F47

Keywords: Financial econometrics, financial market, central bank, policies, and model application

## 1. Introduction

Determination of risk free rate of 91-day government treasury bill is crucial, which is basically impacted by inflation trend in the country. Inflation rate is also used as underlying factor in determining interest rate and exchange rate in Bangladesh. The average inflation rate during 1994 to 2014 is 6.64 percent with a peak of 12.71 percent in December 1998 and a record low -0.02 percent in December 1996. Inflation reached at 10.96 percent in February 2012 starting from as low as 2 percent in 2001. Rise and fall in inflation rate does not immediately impact the banks deposit and lending interest rate due to stickiness or inelasticity of interest rate comparing inflation rate. Usually banks are followed average inflation rate (6.64 percent) rather using extreme high (12.71 percent) or low (-0.02 percent) in determining risk free rate, deposit and lending rate and exchange rate in Bangladesh. High CRR and SLR in reserve money (RM) are also contributed to follow the historical average rate of inflation calculation in determining risk free rate in Bangladesh. Prevailing fixed deposit (term deposit) rate for six months tenor 12.50 percent is ample to attract local currency and foreign funds in the banking system. Bangladesh observed stable money demand function with limited short term fluctuation and long run convergence. Dhaka inter-bank offered rate (DIBOR) is calculated for near term and far term settlement accepting rational expectation. Surge in inter-bank call money rate is addressed using Open Market Operation (OMO) of BB. To reduce the currency growth and mobilize

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the marginal savings risk free instrument of Directorate of National Savings (DNS) has role in Bangladesh. Exercise reveals that comparing India and Pakistan DNS rates is higher comparing average inflation rate in the country. However considering average inflation rate and discussed sectoral development average expected market is assumed at 10 percent level along with 7 percent of risk free rate allowing short term market fluctuation. The regression result suggests that the beta (risk measure) of the ACI stock is 1.4. The ACI is over performed comparing the market. All this helps to evaluate the ACI stock expected return at 11.20 percent level, which is robust comparing the long term investment perspective. Cochrane and Hansen (1992) have suggested that fluctuation in stock prices can be explained by time-varying discount rates and future excess returns. Cochrane and Hansen (1992) also pointed out by using an alternative methodology to decompose the variability of stock prices also found the variability of excess return to be more important than the variability of dividend growth.

## **2. Objective of the study**

To understand and examine the underlying factors of an investment decision in a stock market and related economic factors affecting the stock price valuation and direction toward financial stability is the concern of this study.

## **3. Investigative Methodology**

Judgmental and econometrics exercise have been pursued in analyzing theoretical and practical issues related to stock price valuation from multidimensional perspective for maintaining financial stability.

## **4. Discussion**

The remainder of the paper is organized as follows: Section 5 reviews the literature survey in details considering elements of stock price evaluation and financial stability. Section 6 analyzes the evaluation of ACI stock price. Determinants of risk free rate and financial stability issues are described in Section 7. Section 8 concludes with suggestions and policy interactions.

## **5. Literature Review**

The major implication of the model is that the expected return of an asset will be related to a measure of risk for that asset known as beta according to Sharpe et.al (1999). Bhatti, M. H. (2010) has been concluded that the CAPM is not supportive in high risk securities, it is only supportive in low risk securities and CAPM is not valid in Pakistan Stock Market. Because CAPM in most of the years give results of expected return totally different from the actual returns. In this test 60 samples of the different companies were taken and out of 360 only 28 results were supportive and show the accuracy of CAPM. While in the study of Bangladesh the Capital Asset Pricing Model (CAPM) is strongly supportive in Bangladesh stock market in reference to Baten, M. M. (2006).

Market inefficiency is the major drawbacks for developing countries like Bangladesh where the regulatory system and information transparency is not certainly proficient to get the confidence of the investors and provide the sufficient basis for analyzing the data without anomalies. Evidences found that the stock markets of Bangladesh are weak form inefficient pointed out by Moberk, A., Keasey, K. (2000). Sometimes it is assumed that to some extent stock markets of Bangladesh are weak form efficient. In this paper it was tried to analyze what are the influence of some micro economic factor such as net asset value per share, dividend percentage and earnings per share on the equity return of bank leasing and insurance companies of Bangladesh? Stock prices have a significant positive effect on long term money demand and its omission can lead to serious misspecification in the money demand function in both short and long term elaborated by Baharumshah et.al (2009).

Rahman et.al (2006) in their article an attempt has been made to investigate and done an empirical study where the CAPM is still alive in DSE with the consideration of two more variables.

This study also attempts to take into account whether the Fama-French's CAPM model is applicable in Bangladesh DSE with the consideration not only the beta factor but also the factors such as book to market value and size (market capitalization and sales), involve to determine the stock return in an emerging market like Bangladesh and minimize the gap between theoretical and empirical studies. Girard and Rahman (2007) suggest use a multifactor CAPM model to investigate whether country investable risk drives cross-sectional expected returns in investable emerging market stocks in addition to established firm-specific risk components such as beta, size, and price-to-book-value ratio. LeRoy and Porter,(1981) and Shiller(1981) found that under the assumption of constant discount factor stock prices were too volatile with movement in future dividends. The decomposition of stock price movement is very sensitive to what assumption is made about the presence of permanent changes in either real dividend growth or excess stock return mentioned by Wohar and Mark(2006).

### **Data used:**

ACI monthly data ranging April, 2010- July, 2013 is captured in estimating beta value. DSE all share price index is used to capture the market sentiment. Starting point April, 2010 is considered to calculate the after share market slowed down effect of 2010. Later on July, 2013 new index was launched. These factors insist us to chose this data range.

## **6. Evaluation of ACI stock price**

Recent developments in financial econometrics suggest the use of nonlinear time series structures to model the attitude of investors toward risk and expected return. For example, Cochrane and Hansen, (1992 ) have remarked that “a major contribution of the auto regressive conditional heteroskedasticity (ARCH) literature is the finding that apparent changes in the volatility of economic time series may be predictable and result from a specific type of nonlinear dependence rather than exogenous structural changes in variables.”

Bera, A. K., and Higgins, M. L. (1993) have argued that “it is both logically inconsistent and statistically inefficient to use volatility measures that are based on the assumption of constant volatility over some period when the resulting series moves through time.” In the case of financial data, for example, large and small errors tend to occur in clusters, i.e., large returns are followed by more large returns, and small returns by more small returns. This suggests that returns are serially correlated.

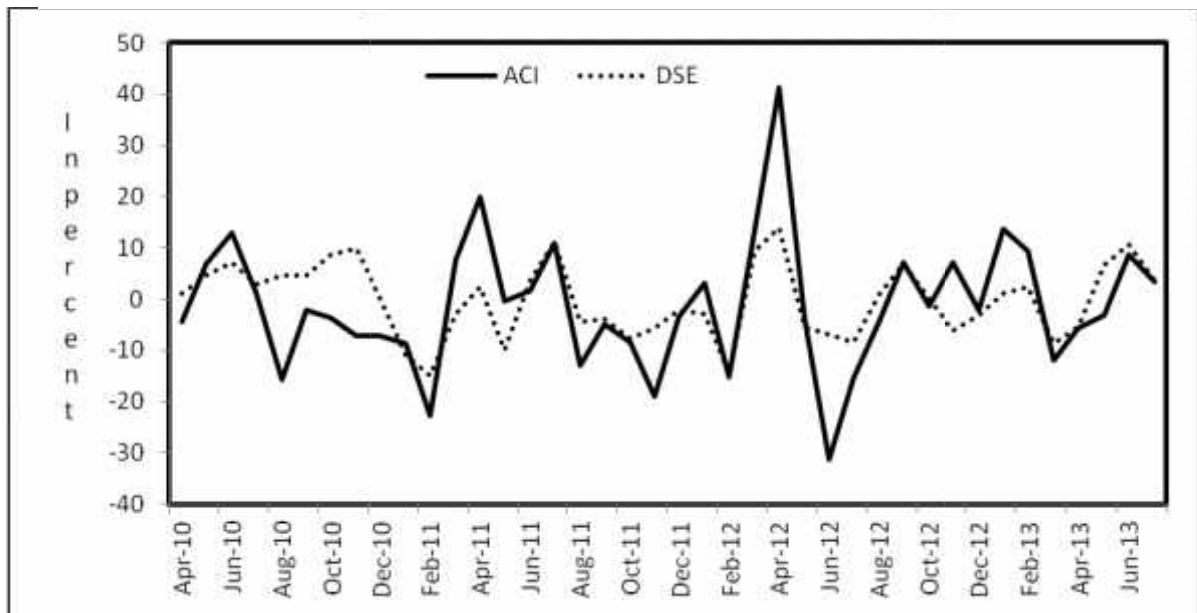
When dealing with nonlinearities, Campbell and MacKinlay (1997) make the distinction between: A. linear Time Series: shocks are assumed to be uncorrelated but not necessarily identically independent distributed (iid). B. nonlinear Time Series: shocks are assumed to be iid, but there is a nonlinear function relating the observed time series  $\{X_t\}_{t=0}$  and the underlying shocks,  $\{t\}_{t=0}$ .

However, considering the essence of ARCH model we have deployed OLS model to determine the fair price of an investment. We have tested the properties of OLS and found that our model is iid, which addressed the clustered errors and nonlinearities mentioned in ARCH model. Calculating the risky asset's rate of return using capital asset price pricing model (CAPM) can then be used to discount the investment's future cash flows to their present value and thus arrive at the investment's fair value. One can then compare the fair price with its market price. If the price estimate is higher than the market's, one can consider the stock may move lower. If the price estimate is lower, it could consider the stock to be overvalued. Using the ACI stock price and DSE all share price index we can compute the expected return. If the average risk-free rate of 91-day government treasury bill is 7 percent, the beta (risk measure) of the stock is 1.14 and the average expected market return over the period is 10 percent, the stock expected return is 10.42 percent (7 percent +1.14(10 percent -7 percent)). Here the risk premium is 3.42 percent. Literature survey shows the average ROE is around 6.00 percent in Bangladesh comprising good performing and shocking performing stock.

The paper describes the relationship between risk and expected return and determination of risk free rate in valuation of a stock. The stock pricing says that the expected return of a security equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should be taken carefully considering the growth potentiality of the stock.

The beta of ACI indicates that it is over performed compare to market (DSE) in terms of beta coefficient of ACI, which 1.14 percent. It may be noted that the ACI stock has been randomly choosing in this exercise. So ACI choice is free from biasness. ACI and DSE regression is significant at less than 1 percent level. Standard error is the root of variance. Dividing DSE coefficient with the standard error we get the t-Statistic. The value of t-Statistic is 5.18 shown in Table-2. Here, in the model the F-statistic is high (26.83). The adjusted  $R^2$  value (0.40) is less than  $R^2$  value (0.41). These tests suggest that there is no autocorrelation problem in the ACI (dependent) and DSE (independent) model. However, theoretically increase in risk free rate and CPI has negative relation with ACI stock price. The rise in interest rate will increase the bank deposit rather investing money in individual stock. The movement of ACI and DSE can be seen in Figure 1. The variance of ACI is higher comparing DSE resulting higher risk-return relationship.

Figure 1: Movement of ACI Stock Price and DSE Index



Source: Dhaka Stock Exchange, 2015

Additional incorporation of variables such as risk free rate, CPI, gold price and petroleum price increased the ACI beta at 1.24 percent (Table-3) with higher volatility. But the P-value in the multiple regression model is higher than 10 percent level. In this regard I have tested pair-wise multicollinearity. It may be noted that multicollinearity is a sample phenomenon. Presence of multicollinearity may be increased the P-value more than 10 percent level. But the multicollinearity test model suggests (Table-1) the correlation coefficient of the DSE, T Bill, CPI, gold and petroleum is less than 50 percent level. So there is no multicollinearity issue in increasing p-value. Higher pair-wise correlation impact the variance inflated function (VIF) resulting lower t-Statistic. But the t-Statistic is higher only in case of DSE and ACI relationship. In other cases the t-Statistic is less than 2. The p-value for each term tests the null hypothesis that the coefficient is equal to zero (no effect).

A low p-value ( $< 0.05$ ) indicates that I can reject the null hypothesis. In other words, a predictor that has a low p-value is likely to be a meaningful addition to my model because changes in

the predictor's value are related to changes in the response variable. Conversely, a larger (insignificant) p-value suggests that changes in the predictor are not associated with changes in the response. Apart from developed country's capital market the TBILL, CPI, gold and petroleum price has no impact on ACI stock pricing according to the conducted study and econometric analysis of the stipulated sample data set.

Drawing OLS regression model stating dependent and independent variables:

$$Y = \beta_0 + U_i \dots \dots \dots (1)$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + U_i \dots \dots \dots (2)$$

Here, dependent variable is ACI stock price denoted by Y and the independent variables are: X<sub>1</sub> = DSE all share price index; X<sub>2</sub> = Risk free rate of return; X<sub>3</sub> = Consumer Price index (CPI); X<sub>4</sub> = Gold Price and X<sub>5</sub> = Petroleum Price.

Table-1 Correlation coefficient

	DSE	TBILL	CPI	Gold	Petroleum
DSE	1				
TBILL	0.128	1			
CPI	0.234	0.148	1		
Gold	0.286	0.277	0.348	1	
Petroleum	0.149	0.301	0.136	-0.064	1

Source: Authors' Calculation

Table-2: Empirical Results (ACI and DSE)

Variable	Coefficient	t-Statistic	Probability	F-statistic
DSE	1.1377	5.1794	0.0000	26.8259

Source: Authors' Calculation

Table-3: Empirical Results (ACI and all variables under consideration)

Variable	Coefficient	t-Statistic	Probability
DSE	1.2447	5.5122	0.0000
T-Bill	-0.2318	-1.0074	0.3209
CPI	-3.3427	-1.7364	0.0915
Gold Price	-0.1081	-0.0025	0.9980
Petroleum Price	18.6000	0.6609	0.5131

F-statistic=6.5115

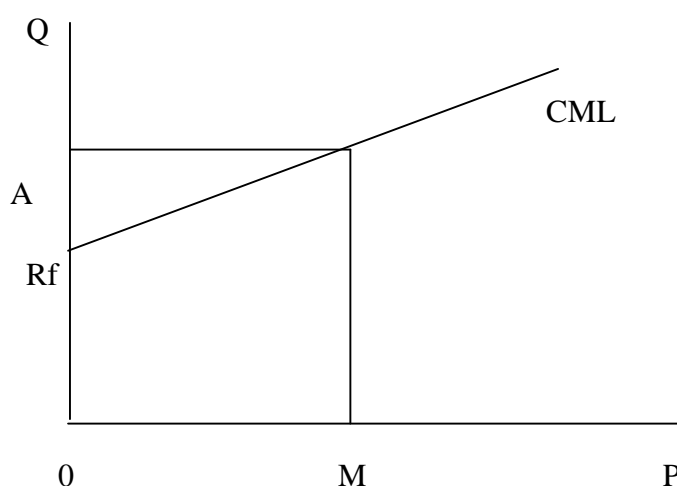
Source: Authors' Calculation

The bar diagram of ACI exhibits normal distribution pattern, which support to run OLS. ACI data exhibits normal distribution with Jarque-Bera 7.94 and provability 0.019. Chart of DSE data also demonstrated normal distribution.

### Capital market line (CML) diagram.

The vertical axis (0 to Q) is theoretical illustration of expected market return (Figure 2). The horizontal line 0 to P is the measure of riskiness. The 0 to Rf is the return on 91-day government treasury bill return. The distance between A and Rf is the risk premium. The distance of 0 to A is the expected return. CML is the Capital Market Line.

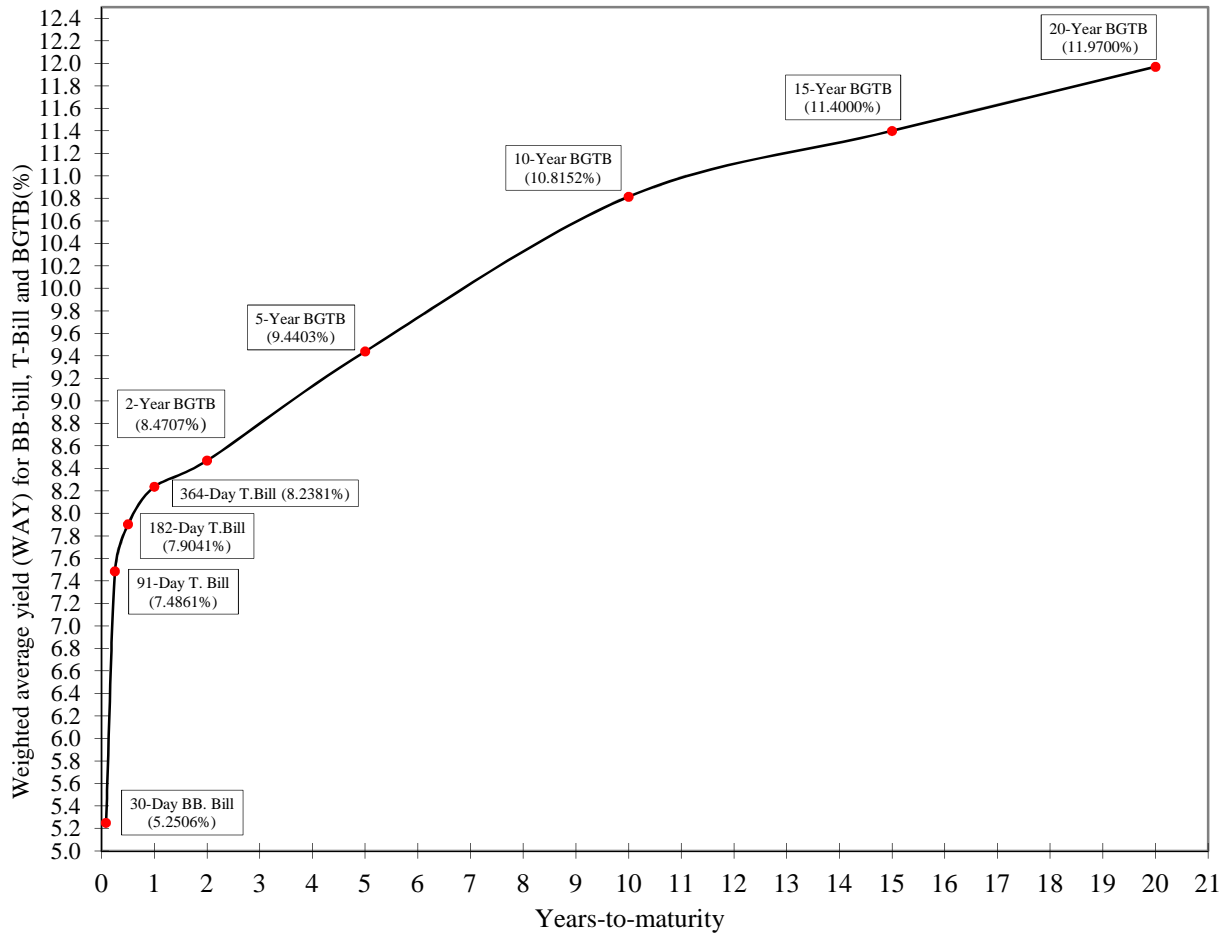
Figure 2: CML Diagram



### 7. Determinants of risk free rate and financial stability issues

Trends of call money rate, overall liquidity of the market and government finance need are the underlying factors of determination of risk free rate in Bangladesh. Theoretically rise in call money appreciate the Taka comparing foreign currency. Export, import and remittances are impacted by exchange rate. BB prudently maintains this rate bearing in mind the consequences of inflation and output. As a lender of last resort BB supply and mop-up the liquidity allowing market first in balancing liquidity. Considering interest rate, exchange rate, inflation and GDP growth BB use its instrument to attain the financial stability. Due to lack of secondary market banks are using yield curve rates for valuation of government securities in their book according to Sayed (2014). Development of secondary market using government securities will enhance the liquidity in the market in case of need. The outcome of BB's policy action can be shown in yield curve (Figure 3) shown next.

Figure 3: Yield curve on BB-bill, T-Bill and BGTB\_(as of Mar 31, 2015)



Source: Monetary Policy Department, Bangladesh Bank, 2015.

## 8. Conclusion with suggestions and policy interactions

The deposit rate and lending rate of banks are determined using the risk free rate as an underlying factor. The average inflation rate and call money rate are contributed in arriving risk free rate and average market rate. Government savings instrument rates are also crucial in this regard. The ACI beta is calculated econometrically bearing in mind the elasticity of ACI stock price comparing Market (DSE). Expected return and growth potentiality of the company stimulate the stock valuation. Central bank role is crucial in determining risk free rate and stimulating informed investment decision in banks and capital market by the individuals.



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