Technical stock valuation of a company: Bangladesh perspective

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Abstract

Background: The paper describes the relationship between risk and expected return and determination of risk free rate in valuation of a stock. In a stock pricing we find that expected return of a stock is the sum of risk-free government bill rate and risk premium. If this expected return does not fulfill the required return, then the investment should be taken carefully considering the growth potentiality of the stock.
Findings: We can compute the expected return using the ACI stock price and DSE all share price index. If the average risk-free rate of 91-day government Treasury bill is 7 percent, the beta (risk measure derived from regression) of the stock is 1.14 and the average expected market return over the period is calculated as 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.
Methods: In evaluating the ACI stock we have used the OLS method considering the unit root and other tests of signification. The time path of risk free rate is impacted by trend, seasonality, cycle and irregularities. BB prudently maintains the inflation rate among others through risk free rate using its instruments.
Application/Improvements: Risk free rate has role to calculate the value of a stock and maintaining inflation and GDP growth. This paper analyzes the risk free rate, risk premium and related variables to evaluate the stock in order to maintain financial stability.

Keywords: Financial econometrics**,** financial market, central bank and policies and model application
JEL Classification: C58, D53, E58 and F47

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 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. Fluctuation in stock prices can be elaborated by time-varying discount rates and future excess returns [11].

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 knows as beta [1]. It 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 [2]. 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 [3]. Literature review found that the stock markets of Bangladesh are weak form and inefficient [4]. Stock prices have a significant positive effect on long term money demand and its exclusion can lead to serious miss calculation in the money demand function in both near and long term [5]. 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 [6]. 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[7]. Under the assumption of constant discount factor stock prices were too volatile with movement in future dividends [8,9]. 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 [10].

6. Evaluation of ACI stock price

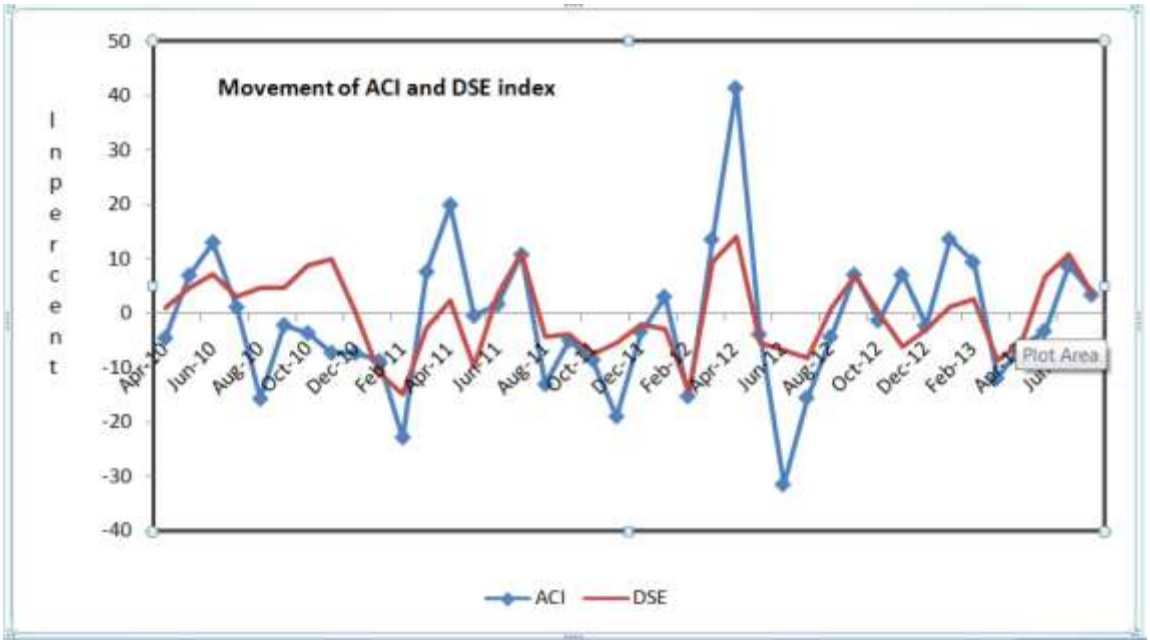
Recent developments in financial econometrics suggest the use of nonlinear time series structures to model the attitude of investors toward risk and expected return. For example “A major contribution of the auto regressive conditional heteroskedasticity (ARCH) literature is the finding that apparent 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 [12]”. “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 [13]”. 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: A. linear Time Series: shocks are assumed to be uncorrelated but not necessarily identically independent distributed (iid) [13]. B. nonlinear Time Series: shocks are assumed to be iid, but there is a nonlinear function relating the observed time series $\{Xt\}^{\infty}_{t=0}$ and the underlying shocks, $\{\varepsilon t\}^{\infty}_{t=0.}$

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. We can calculate the average risk-free rate of 91-day government treasury bill is as 7 percent, the beta (risk measure measured from regression) of the stock is 1.14 and the average expected market return over the period is as 10 percent, then the stock expected return is 10.42 percent (7 percent +1.14(10 percent -7 percent)). Here the risk premium is 3.42 percent. This paper calculates the risk of a stock, expected return and determines the risk free rate in valuation of a stock. Literature on 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 exceed 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). Additional incorporation of variables such as risk free rate, CPI, gold price and petroleum price increased the ACI beta at 1.24 percent. This reflects that other factor is closely associated with the pricing of ACI. 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, which supports the theory. The movement of ACI and DSE can be seen in Figure 1.

Figure 1. Movement of ACI and DSE index



Drawing OLS regression model stating dependent and independent variables:

$$Y = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + U_i$$

Here dependent variable is ACI stock price denoted by Y and the independent variables are - X_1 = DSE all share price index; X_2 = Risk free rate of return; X_3 = Consumer Price index (CPI); X_4 = Gold Price and X_5 = Petroleum Price.

6.1. Data used

ACI monthly data ranging April, 2010- July, 2013 is captured in estimating beta value in Table 1 & 2. 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.

Table 1. Regression of ACI and DSE

Dependent Variable: ACI

Method: Least Squares
Sample: 2010M04 2013M07
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.966595	1.570704	-0.615390	0.5420
DSE	1.137708	0.219661	5.179371	0.0000

R-squared	0.413814	Mean dependent var	-1.166465
Adjusted R-squared	0.398388	S.D. dependent var	12.80369
S.E. of regression	9.931003	Akaike info criterion	7.477907
Sum squared resid	3747.743	Schwarz criterion	7.562351
Log likelihood	-147.5581	Hannan-Quinn criter.	7.508439
F-statistic	26.82588	Durbin-Watson stat	1.311209
Prob(F-statistic)	0.000008		

Table 2. Regression of ACI, DSE and related variables

Dependent Variable: ACI

Method: Least Squares
Sample: 2010M04 2013M07
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.010902	2.124196	0.946665	0.3505
DSE	1.244717	0.225810	5.512226	0.0000
TBILL	-0.231788	0.230091	-1.007376	0.3209
CPI	-3.342698	1.925086	-1.736389	0.0915
GOLD	-0.108116	43.56681	-0.002482	0.9980
PETRLEUM	18.50999	28.00575	0.660935	0.5131

R-squared	0.489164	Mean dependent var	-1.166465
Adjusted R-squared	0.414041	S.D. dependent var	12.80369
S.E. of regression	9.800962	Akaike info criterion	7.540319
Sum squared resid	3266.001	Schwarz criterion	7.793651
Log likelihood	-144.8064	Hannan-Quinn criter.	7.631916
F-statistic	6.511506	Durbin-Watson stat	1.568975
Prob(F-statistic)	0.000240		

The plots of ACI and DSE exhibits normal distribution pattern shown in Figure 2 & 3. As a result, we find there is no unit root in the ACI and DSE data, which support to conduct of OLS method.

Figure 2. Random plot of ACI index data

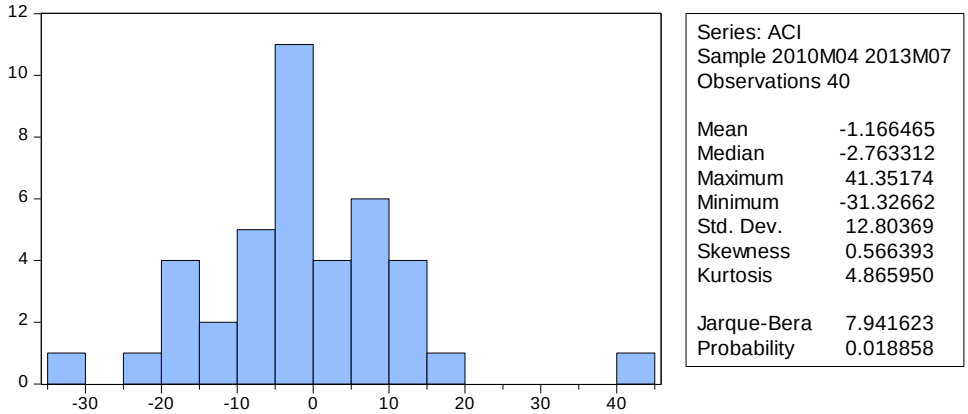
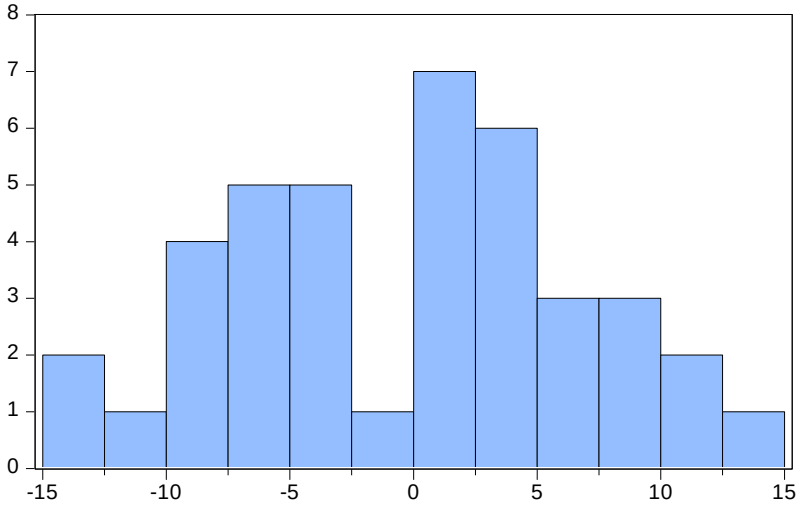


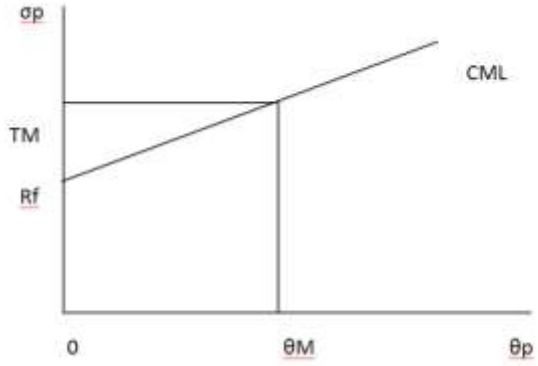
Figure 3. Random Plot of DSE index data



Series: DSE	
Sample 2010M04 2013M07	
Observations 40	
Mean	-0.175678
Median	0.548760
Maximum	14.00696
Minimum	-14.88698
Std. Dev.	7.239472
Skewness	-0.078933
Kurtosis	2.247622
Jarque-Bera	0.984992
Probability	0.611099

6.2. Capital market line (CML) diagram.

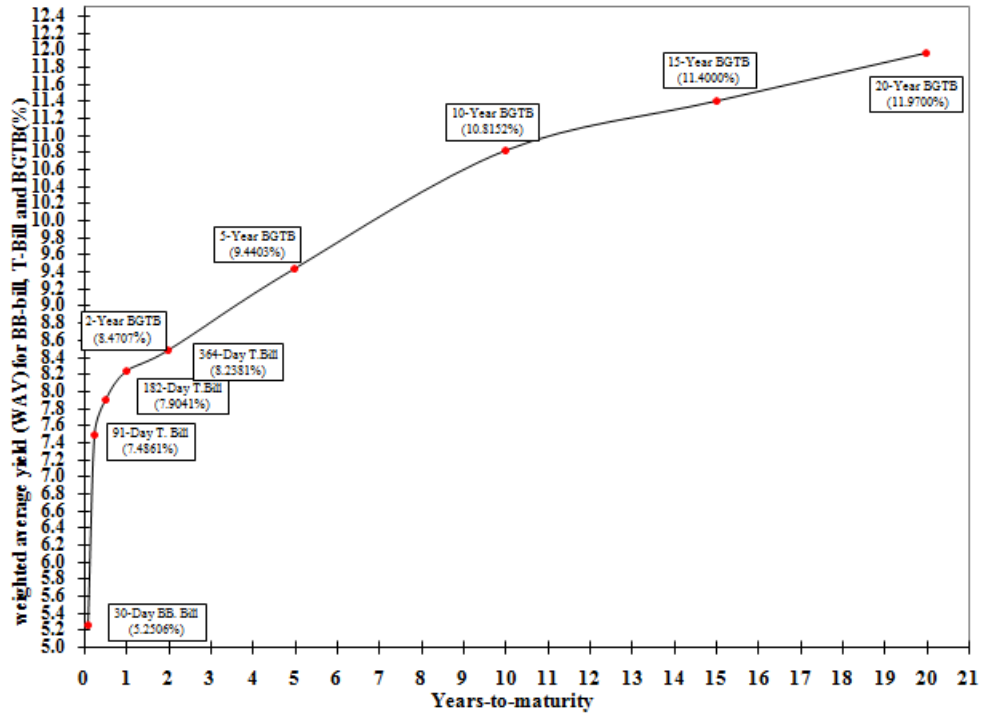
The vertical axis of CML is showing the expected market return. The horizontal line is the measure of riskiness. 0-Rf is the return on 91-day government Treasury bill return. The TM-Rf is the risk premium. The distance of 0-TM is the expected return.



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 [14]. 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 plot shown next in Figure 4.

Figure 4. Yield curve on BB-bill, T-Bill and BGTB (as of Mar 31, 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 consequences of balance sheet value effect of the listed companies. Expected return and growth potentiality of the company stimulate the stock valuation. Financial innovation through quantitative monetary easing of the BB will effectively monitor the interest rate bringing stability in inflation for stable GDP growth and individual expected return attaining financial stability in the country.

9. Acknowledgements

Views expressed in this paper are their own and do not reflect those of Bangladesh Bank.

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