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RELIABILITY OF BETA OF THE STOCKS LISTED ON BANKEX

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Abstract
Beta is the systematic relationship between the return on the portfolio and the return on the market. It refers to the slope in a linear relationship fitted to data on the rate of return on an investment and the rate of return of the market (or market index). In this paper, the researchers a humble attempt to investigate the stability of beta in the Indian stock market (BANKEX) during the period of 2012-2015.

Key Words: Fundamental Analysis, CAPM, Beta, Dummy Variables, Bankex.

Introduction

Fundamental analysis is the cornerstone of investing. Fundamental analysis of a business involves analyzing its financial statements and health, its management and competitive advantages, and its competitors and markets. When applied to futures and forex, it focuses on the overall state of the economy, interest rates, production, earnings, and management. When analyzing a stock, futures contract, or currency using fundamental analysis there are two basic approaches one can use; bottom up analysis and top down analysis. The term is used to distinguish such analysis from other types of investment analysis, such as quantitative analysis and technical analysis. When the objective of the analysis is to determine what stock to buy and at what price, there are two basic methodologies:

- Fundamental analysis maintains that markets may misprice a security in the short run but that the "correct" price will eventually be reached. Profits can be made by trading the mispriced security and then waiting for the market to recognize its "mistake" and reprice the security.
- Technical analysis maintains that all information is reflected already in the stock price. Trends 'are your friend' and sentiment changes predate and predict trend changes. Investors' emotional responses to price movements lead to recognizable price chart patterns. Technical analysis does not care what the 'value' of a stock is. Their price predictions are only extrapolations from historical price patterns.

Capital Asset Pricing Model

The **Capital Asset Pricing Model (CAPM)** developed by Sharpe (1964), Lintner (1965) and Mossin (1966) has been the dominating capital market equilibrium model since its initiation. It continues to be extensively used in practical portfolio management and in academic research. Its essential implication is that the contribution of an asset to the variance of the market portfolio - the asset's systematic risk, or beta risk - is the proper measure of the asset's risk and the only systematic determinant of the asset's return. Risk is the uncertainty in predicting the future events that are affected by external and internal factors. Sharpe had classified risks as systematic risk and unsystematic risk. The elements of systematic risk are external to the firm. The external factors are changes in economic environment, interest rate changes, inflation, etc. On the other hand, internal factors are the sources of unsystematic risk. Unsystematic risks are categorized as business risk or financial risk specific to the firm. The systematic risk related with the general market movement cannot be totally eradicated through diversification. The unsystematic risk, which is confine to a firm, can be eliminated or reduced to a considerable extent by choosing an appropriate portfolio of securities. Some of the sources of unsystematic risk are consumer preferences, worker strikes and management competitiveness. These factors are independent of the factors effecting stock market. Hence, systematic risk will influence all the securities in the market, whereas unsystematic risk is security specific.

Significance of Beta

Theoretically defined, beta is the systematic relationship between the return on the portfolio and the return on the market. It refers to the slope in a linear relationship fitted to data on the rate of return on an investment and the rate of return of the market (or market index). Beta is a technique of telling how volatile a stock is compared with the rest of the market. When the return on the portfolio is more than the return on the market, beta is greater than one and those portfolios are referred to as aggressive portfolios. That means, in a booming market condition, aggressive portfolio will achieve much better than the market performance. While in a bearish market environment the fall of aggressive portfolios will also be much prominent. On the other hand, when the return on portfolio is less than the market return, beta measure is less than one and those portfolios are treated as defensive. In case of defensive portfolios, when the market is rising, the performances associated with it will be less than the market portfolio. However, when the market moves down, the fall in the defensive portfolios would also be less than the market portfolio. In those situations where, the return of the portfolio accurately matches the return of the market,

beta is equal to one that rarely happens in real life situations. Beta estimation is central to many financial decisions such as those relating to stock selection, capital budgeting, and performance evaluation. It is significant for both practitioners and academics. Practitioners use beta in financial decision making to estimate cost of capital. Beta is also a key variable in the academic research; for example it is used for testing asset pricing models and market efficiency. Given the importance of this variable a pertinent question for both practitioners and academics is how to obtain an efficient estimation. This study is aimed at testing the beta stability for India. Further the stability of beta is of great concern as it is a vital tool for almost all investment decisions and plays a significant role in the modern portfolio theory.

Review of Literature

The estimation of beta for individual securities using a simple market model has been widely evaluated as well as criticized in the finance literature. One important aspect of this simple market model is the assumption of symmetry that propounds the estimated beta is valid for all the market conditions. Many studies questioned this assumption and examined the relationship between beta and market return in different market conditions, but the results are mixed and inconclusive. Several studies are carried out to study the nature and the behavior of beta. **Baesel (1974)** studied the impact of length of the estimation interval on beta stability. Using monthly data, betas were estimated using estimation intervals of one year, two years, four years, six years and nine years. He concluded that the stability of beta increases significantly as the length of the estimation interval increases. **Levy (1971)** and **Levitz (1974)** have shown that portfolio betas are very stable whereas individual security betas are highly unstable. Likewise **Blume (1971)** used monthly prices data and successive seven-year periods and shown that the portfolio betas are very stable where as individual security betas are highly unstable in nature. He observed that, the stability of individual beta increases with increase in the time of estimation period. Similar results were also obtained by **Altman et al (1974).** In both the cases, initial and succeeding estimation periods are of the same length. **Allen *et al.* (1994)** have considered the subject of comparative stability of beta coefficients for individual securities and portfolios. The usual perception is that the portfolio betas are more stable than those for individual securities. They argue that if the portfolio betas are more stable than those for individual securities, the larger confidence can be placed in portfolio beta estimates over longer periods of time. But, their study concludes that larger confidence in portfolio betas is not justified. **Alexander and Chervany (1980)** show empirically that extreme betas are less stable compared to interior beta. They proved it by using mean absolute deviation as a measure of stability. According to them, best estimation interval is generally four to six years. They also showed that irrespective of the manner portfolios are formed, magnitudes of inter-temporal changes in beta decreases as the number of securities in the portfolios rise contradicting the work of **Porter and Ezzell (1975). Chawla (2001)** investigated the stability of beta using monthly data on returns for the period April 1996 to March 2000. The stability of beta was tested using two alternative econometric methods, including time variable in the regression and dummy variables for the slope coefficient. Both the methods reject the stability of beta in majority of cases. Many studies focused on the time varying beta using conditional CAPM **(Jagannathan and Wang (1996)**. **Fama and French (1992, 1996), Jegadeesh (1992)** and others revealed that betas are not statistically related to returns. **McNulty et al (2002)** highlight the problems with historical beta when computing the cost of capital, and suggest as an alternative- the forward-looking market-derived capital pricing model (MCPM), which uses option data to evaluate equity risk. rate. Few research studies are available in the Indian context to examine the factors influencing systematic risk. **Ray K.K (2010)** had examined the stability of beta for India market for a ten year period from 1999 to 2009. The monthly return data of 30 selected stocks are considered for examining the stability of beta in different market phases. This stability of beta is tested using three econometric models i.e. using time as a variable, using dummy variables and the Chow test. There are 9 stocks where all the three models reported similar signal of beta instability over the market phases. **Sromon Das (2007)** test the stability of betas of individual stocks over a period of time using two econometric tests on NSE Nifty (February 1999 to September 2007), and sub-divided the sample period into 3 sub-periods, two bullish and one bearish. The author found that under one method (regression using time as a variable) 85% of the stocks had a stable beta, while using the second method (regression using dummy variables) 65% of the stocks had stable betas.

Research Methodology

There is no dearth of literature on studies relating to estimation of Beta but researcher did not found any specific research on banking sector. Therefore a humble attempt is made by the researcher to study the effect on stability of beta of different banks during the recession. For this purpose, the portfolio of banking industry which is represented by BANKEX on BSE has been chosen. Daily stock and BANKEX closing prices were collected and were used to find out the returns. The following formula has been used to find out the returns of the stock prices.

$$R_i = LN(P_t/P_{t-1})$$

Where P_t= closing share price at time t, P_{t-1}=closing share price at time t-1, LN= Natural Log, R_i = Stock Return.

The formula to find out market return is

$$R_m = LN (B_t/B_{t-1})$$

Where B_t = closing market price at time t, B_{t-1}=closing market price at time t-1, LN= Natural Log, R_m = Market Return.
April 2012 to December 2012 has been identified as bullish phase because the market rose from to 6152 to 11418 giving 86% returns. After that from January 2013 to November 2013 the market fell from high of 11418 to the bottom of 4365 level resulting in fall of around 62% and so it identified as bearish phase. And from that bottom of 4365 to 10652 in the month of March 2015 giving a return of 144% again which is again bullish phase.

Market Phase	Market Phase Timing		Market Type
	Start	End	
Phase I	April 07	Dec 07	Bullish
Phase II	Jan 08	Nov 08	Bearish
Phase III	Dec 08	Mar 10	Bullish

After these three market phases are identified, the beta value has been computed for each stock for each market phases following the below mentioned regression equation.

$$Ri,t = \alpha + \beta Rm + e \text{……..(I)}$$

Ri,t = Return on scrip i at time period t, Rm = Market rate of return at time period t, e = Random error, α & β= Parameters to be estimated.

The above regression equation is applied to calculate beta coefficient of each stocks for each market phases separately and taking the entire ten years period. As the objective of the paper is to test the stability of beta in different market phases, the hypothesis has been set accordingly.

Objectives of the Study

1. To estimate beta of the stocks listed on BANKEX.
2. To study stability of the beta over three phases.

Hypothesis of the Study

H_0: There is no significant difference in beta of the stocks over different market phases.
H_1: There is a significant difference in beta of the stocks over different market phases.

Sample Selection

In order to carry out particular study 11 stocks from BANKEX for the period of 1st April 2012 to 31st march 2015 were considered. The closing prices of these 11 stocks were taken for a period of 3 years i.e.; from 1st April 2012 to 31st march 2015 from the BSE website.

Statistical Analysis

In case of testing the beta stability, dummy variables are used in above mentioned regression equation (1) for the slope coefficients. As three market phases discovered, there are 2 dummy variables used in the new equation.
The new regression equation is reframed as follows:

$$Ri,t = \beta_0 + \beta_1 * R_m + \beta_2 * D_1 * R_m + \beta_3 * D_2 * R_m + e \text{……..(II)}$$

Where:
D_1 = 1 for phase 1 (April 2012- December 2012) data
= 0 otherwise.
D_2 = 1 for phase II (January 2013- November 2013) data
= 0 otherwise
$R_{i,t}$ = return on stock I in period t.
R_m = return on market in period t.
e = error term and
$\boldsymbol{\beta_0, \beta_1, \beta_2 \& \beta_3}$ = coefficients to be estimated.

As there are 3 market phases, we use 2 dummy variables in the above equation (2). The use of 3rd dummy variable would lead to a dummy variable trap. We treat the 3rd phase viz. Dec-13 to March 10 as the base period. The significance of β_2 & β_3 will enumerate whether the beta is stable over the time periods or not. For the beta to be truly stable over the entire period, all coefficients like, β_2 and β_3 should be statistically insignificant. The logic is that if β_2 & β_3 are insignificant, the equation reduces to the following, thus implying that beta is stable over time.

$$R_{i,t} = \beta_0 + \beta_1 * R_m + e$$

Table 1: Testing the Stability of Beta

Model	Variables Entered	Variables Removed	Method
1	Jan-Nov 2013, April-Dec 2012(a)	.	Enter

a. All requested variables entered.
b. Dependent Variable: Axisbeta

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.739(a)	.546	.518	.229764248

a. Predictors: (Constant), Jan-Nov 2013, April-Dec 2012

Table 3: Anova

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.094	2	1.047	19.833	.000(a)
	Residual	1.742	33	.053		
	Total	3.836	35			

a. Predictors: (Constant), jan-nov 2013, april-dec 2012
b. Dependent Variable: Axisbeta

Table 4: Beta Values of Individual Securities Over all the Three Phases

Name of the Company	Overall		Phase I		Phase II		Phase III	
	β	p-value	β	p-value	β	p-value	β	p-value
Axis Bank	1.037	0.000*	0.553	0.000*	1.124	0.784	1.099	0.000*
Bank of Baroda	0.815	0.005*	1.083	0.001*	0.841	0.346	0.758	0.000*
Bank of India	0.889	0.382	1.022	0.176	0.899	0.777	0.869	0.000*
Canara Bank	0.761	0.136	1.047	0.121	0.80	0.557	0.864	0.000*
Federal Bank	0.587	0.578	0.542	0.315	0.585	0.525	0.646	0.000*
HDFC Bank	0.815	0.000*	0.915	0.000*	0.866	0.001*	0.662	0.000*
ICICI Bank	1.276	0.001*	1.084	0.000*	1.23	0.090	1.332	0.000*
Kotak Mahindra Bank	1.112	0.342	0.947	0.186	1.119	0.952	1.112	0.000*
Punjab National Bank	0.818	0.001*	1.117	0.001*	0.788	0.791	0.809	0.000*
State Bank of India	0.927	0.004*	1.147	0.026*	0.854	0.100	0.973	0.000*
Union Bank of India	0.740	0.001*	0.958	0.000*	0.827	0.010	0.569	0.000*

* As p value is less than 5% level of significance it means that we fail to accept null hypothesis and coefficient of Beta is significant.

Conclusion

- It can be observed from Annexure 1 that there are 6 stocks out of 11 whose beta value is greater than 1 in *Phase I*. The banks whose beta is greater than 1 are Bank of Baroda, Bank of India, Canara Bank, ICICI bank, Punjab National Bank and State Bank of India.
- However in case of *Phase 2* this number has reduced to 3 stocks out of 11. The banks whose beta is greater than 1 are Axis bank, ICICI bank and Kotak Mahindra Bank.
- In case of *Phase 3* the banks whose beta is greater than 1 are Axis bank, ICICI bank and Kotak Mahindra Bank.
- Out of 11 stocks only ICICI bank's beta has remained above 1 throughout all 3 phases as well as the overall beta. But none of the company's overall beta value is more than the phase wise beta.
- When the value of Beta is more than 1, this stocks are considered to be more volatile.
- There are 3 banks whose beta value has remained less than 1 in all three phases including the overall period. These banks are Federal bank, HDFC bank and Union Bank of India. These stocks are considered to be less volatile than the market.
- There are 4 banks whose beta values are consistently declining over time. These banks are Bank of Baroda, Bank of India, HDFC bank and Union Bank of India.
- There are only 2 banks whose beta value shows an increasing trend over the phases. These banks are ICICI bank and Federal Bank.
- There are 3 stocks of 11 whose beta value is greater than 1 for the entire period. Those banks are Axis bank, ICICI bank and Kotak Mahindra Bank. The beta value of ICICI is greatest 1.276. While the Federal bank has lowest beta of 0.587 for the entire period taken into consideration.

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