FORECASTING THROUGH SINGLE INDEX MODEL: A STUDY ON SELECTED INDIAN BANKS

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ABSTRACT

A model of stock returns that decomposes influences on returns into a systematic factor, as measured by the return on the broad market index, and firm specific factors. The relationship is between a security's performance and the performance of a portfolio containing it. The market model states that the security's performance is related to its portfolio's performance, according to its beta. Financial market forecasting is based on certain principles, theories and models to study the financial markets and predict what their future trend or course will be. Changes in stock prices are largely dependent on human opinions and expectations about the future performance of a stock or share. In this paper the author has tried to give a bird's eye view about the concept of Single Index Model given by William Sharpe for the practical application to find out the returns in public sector banks from Indian context. Also the author has analyzed about the correlation of these banks return and market return (Bankex). At last it is concluded by applying ANOVA, whether return from all banks are equal or not.

Keywords: Single Index Model, Correlation, Security Return, BANKEX

Introduction

Many investors don't make best investments; this is due to available of investment avenues in the market which makes the complexity of making investments. Different people have different motives for investing. Most investors invest for the getting the positive return. Since, risk is associated in every return, so investor cannot overlook the risk factor. Risk varies with the nature of return. Risk can be categorized into two types; (a) Systematic risk: it is the risk that cannot be diversified away like interest rate risk and recession and (b) Unsystematic risk: it is stock specific and can be diversified away as the investor increase the number of stocks in his or her portfolio. Investments are made to secure the future needs and for the fulfillment of objectives. So to make right investment the investor should follow the

steps. The first step for investor is to set the investment policy which involves investor`s objectives and the available amount of wealth for investing. The second step deals with security analysis which examines the several individual securities or group of securities. The third step is constructing the portfolio, where investor has to consider several issues of selecting like timing and diversifications. The final step of investment process is portfolio construction which is revised and evaluated.

James Tobin, the 1981 winner of the Nobel Prize in economics, showed that the investment process can be separated into two distinct steps - (1) the construction of an efficient portfolio, as described by Markowitz, and (2) the decision to combine this efficient portfolio with a risk less investment. This two-step process is the famed separation theorem. The method of finding the optimal risky portfolio in the Markowitz Model depends on the quality of estimates of expected security returns, and the covariance matrix. The Markowitz Model has two main difficulties:

-The number of estimates for the expected returns and covariances matrix is very high even for the portfolios with small number of securities

-The errors in the estimation of correlation coefficients

In order to solve the problem of estimating covariance and correlation uncertainty is decomposed into system-wide versus firm-specific sources.

Sharpe extended Markowitz's and Tobin's insights to develop a theory of market equilibrium under conditions of risk. First, Sharpe showed that there is along the efficient frontier a unique portfolio that, when combined with lending or borrowing at the pure interest rate (Treasury-bill rate), dominates all other combinations of efficient portfolios and, lending or borrowing. With two assumptions, Sharpe demonstrated that in equilibrium investors will prefer points along the line emanating from the pure interest rate that is tangent too. The requisite assumptions are that (1) there exists a single pure interest rate at which investors can lend and borrow in unlimited amounts and (2) investors have homogeneous expectations regarding expected returns, variances and correlations. Under these assumptions, Sharpe showed that portfolio o is the market portfolio, which represents the maximum achievable diversification.

Within this paradigm, Sharpe proceeded to demonstrate that risk can be partitioned into two sources - that caused by changes in the value of the market portfolio, which cannot be diversified away, and that

caused by non-market factors. Which is diversified away in the market portfolio? He labeled the non-diversifiable risk systematic risk and the diversifiable risk unsystematic risk. Sharpe showed that a security's systematic risk can be estimated by regressing its returns (less the pure interest rate) against the market portfolio's returns (less the pure interest rate). The slope from this regression equation, which Sharpe called beta, quantifies the security's systematic risk when multiplied by the market risk. The unexplained variation in the security's return (the residuals from the regression equation) represents the security's unsystematic risk. He then asserted that, in an efficient market, investors are only compensated for bearing systematic risk, because it cannot be diversified away, and that the expected return of a security is, through beta, linearly related to the market's expected return.

The Technique which is focused on selecting optimal portfolio using the model given by William Sharpe is called single index model. The construction of an optimal portfolio is simplified if a single number measures the desirability of including a stock in the optimal portfolio. Single index model can provide such number. The single index model assumes the co-movement between the stocks is due to the movement in the index. The basic equation underlying the single index model is:

$$\mathbf{R_i = \alpha_i + \beta * R_m}$$

Where, R_i = return on the stock

α_i = component of security that is independent of market performance

β =co-efficient in the market expected change in R_i given a change in R_m

R_m =rate of return on market index

The term α_i in the above equation is usually broken down into two elements α_i which is expected value of α_i and e_i which is the random elements of αi.

The single index model equation therefore becomes:

$$\mathbf{R_i = \alpha_i + \beta * R_m + e_i}$$

Single index model has been criticized because of its assumption that stock prices move together only because of common co-movement with the market. Many researchers have found that there are influences beyond the market like industry related factors that cause securities to move together. Empirical evidence however reveal that the more complex models have not been able to consistently outperform the single index model in terms of their ability to predict ex-ante (future) co-variances between stock returns.

Objectives of the Study

The objectives of the present study are to find out:

- To formulate the correlation between Bankex and individual stocks.
- To find out risk associated with each security with respect to the market.
- To find out Return from all individual security through Single Index Model.

Hypothesis

The Author assumed that there is positive relationship between the bankex and individual stocks; assuming certain risk associated with each security with respect to the market; and Return from all securities are equal, i.e. $r_1 = r_2 = r_3 = ... = r_{15}$; i.e. here as null hypothesis, as against the alternative hypothesis that all returns are not equal.

$H_0 1: \beta > 0$ (Positive risk)

$H_0 2: r_1 = r_2 = r_3 = ... = r_{15}$

(Return from all security are equal)

Methodology

This paper enlightens about Sharpe`s Single Index Model in order to know the securities` independent component return as well as its dependent return from market. In this paper the author has selected 15 securities of the banks comprised in BANKEX (BSE-BANK.BO) in order to find out Correlation, risk and return by applying Sharpe Single Index Model. In order to calculate these values, absolute figures (stationary data) are taken, to make all data into same scale. The data is based on secondary source which had been tracked continually for the period from 1st April 2011 to 31st March 2012, it has been obtained from www.bseindia.com and yahoo finance. In this paper the expected return, intercept and the beta for all the 15 banks have all been calculated using the formula postulated by William Sharpe. Finally, hypothesis is resulted by applying ANOVA.

Analysis and Interpretations

The Author found a positive correlation between market return (Bankex) and all individual stock return of banks. The correlations for United Bank, Union Bank, Allahabad Bank, Vijaya Bank, Syndicate Bank, UCO Bank, State Bank of India, Punjab National Bank, Oriental Bank, Indian Bank, IDBI, Indian Overseas Bank,

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	226.1684	14	16.15488	0.067956	0.999999	1.75823
Within Groups	35658.85	150	237.7257			
Total	35885.02	164				

Table: Analysis of Variance

Dena Bank, Corporation Bank and Central Bank are 0.95, 0.92, 0.09, 0.36, 0.78, 0.91, 0.85, 0.86, 0.81, 0.74, 0.81, 0.88, 0.82, 0.83 and 0.77 respectively. This is because all the securities are operating under same industry. There is a high (positive) correlation between United bank return and Market index (Bankex) and low (positive) correlation between Allahabad Bank and Market Index (Bankex). From the point of view of risk, the highest risk is associated with Indian Bank (0.99) and lowest risk is at Allahabad bank with reference to markets.

The return by applying Sharpe`s Single index model form individual security are 0.33, 0.34, -0.58, 0.92, -1.25, 0.47, 0.61, 0.68, 0.27, -1.32, 0.41, 1.24, -0.82, 1.08 and -0.016 for United Bank, Union Bank, Allahabad Bank, Vijaya Bank, Syndicate Bank, UCO Bank, State Bank of India, Punjab National Bank, Oriental Bank, Indian Bank, IDBI, Indian Overseas Bank, Dena Bank, Corporation Bank and Central Bank respectively. It depicts that most of the banks` (10 numbers of banks) returns are positive, which is a symbol for the forecasters to carry out technical analysis and there to predictions.

From the hypothesis, author has drawn the conclusion that there is no difference among the returns of all the banks from the Analysis of Variance (ANOVA) at 5% level of significance, as depicted in the table below.

Findings and Conclusion

The Finance theory can be used to form informative prior beliefs in financial decision-making. This study uses theoretically motivated prior information about expected returns in portfolio selection. Equivalent beta securities give equivalent market positions and show the same sensitivity to the changes in the macro economy. There is a linear relationship between security returns and the common factor. All the banks have a positive correlation with the market return, as because all the securities are operating under same industry. There is a high (positive) correlation between United bank return and Market index (Bankex) and low (positive) correlation between Allahabad Bank and Market Index (Bankex). From the point of view of risk, the highest risk is associated with Indian Bank (0.99) and lowest risk is at Allahabad bank with refers to market. It depicts that most of the banks` (10 numbers of banks) returns are positive, which is a symbol for the forecasters to carry out technical analysis and there to predictions. All the banks are also performing under risk as compared to the market (Bankex).

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