ABSTRACT OF THE THESIS

CRITICAL EVALUATION OF PORTFOLIO SELECTION RULES

Investors strive to achieve an optimal risk-return trade off. Deciding as to what and when to buy / sell and how much of fund allocation to make are the basic but difficult task that investors have to tackle while constructing an investment portfolio. The task becomes more complex and time consuming, given the number of securities that are traded and the data inputs required for making estimates. Investment Models simplify the task of decision making to some extent. There are numerous such models available for equity investment. These models are widely used by the fund managers of institutional investors abroad. A decision support system incorporating all the necessary data and the logistics of the models would enable fund managers to construct portfolios and to analyse their performance. If the investment models are found to turn out good performance over the period consistently, the fund manager can subject the shares selected for further scrutiny before making investment decisions.

The objectives of this study are:

1. To generate equity portfolios by taking into consideration various parameters and by using the share price data from Indian Stock Markets; and
2. To critically evaluate the performance of the portfolios selected in the subsequent periods to test the applicability of the models in the Indian scenario.
Chapter I

Literature Survey pertaining to Equity Investment Models under Fundamental Analysis is covered in this Chapter. This chapter includes a survey on the performance evaluation of these models. These models can be broadly grouped into two categories:

1. The models that help investors in shortlisting securities based on the past performance from a universe are known as “Selection Models”. In this, shares under consideration are ranked / rated on the basis of one, two or more financial barometers like Price-Earnings (P/E) ratio, Price-Book value (P/B) ratio. Popular models under this category include Graham Model, Graham-Rea Model etc., This method of selection is simple to apply and easy to adopt even by individual investors.

2. The equity shares are subjected to further scrutiny by applying investment models that compute intrinsic values based on the past trend and future estimations. By comparing market values of shares with the estimated intrinsic values, the investors are actually in a position to “time” their decisions as to when to buy /sell. These models are known as “Decision Models”. Popular Models under this category include Dividend Discount Model, Earnings Discount Model etc.,

This chapter comprises three sections. The first one deals with literature pertaining to “Selection Models” and the second with “Decision Models”. Drawbacks of stock selection based on Fundamental Analysis are covered in detail in the last section.
Chapter II

Modern portfolio Theory was developed to overcome the problems of Fundamental Approach to stock selection. Arbitrary fund allocation and inadequate diversification are the problems faced by fund managers following Fundamental Analysis. Risk – return optimization models based on Modern Portfolio Theory (and its extensions) have simplified the task of portfolio generation to considerable extent. The advantage of using these models is that the fund managers are in a position to consider risk and return parameters in portfolio selection and to know the pattern of fund allocation. In other words, these models are so designed to give an idea of what, when and how many to buy/sell.

Literature survey of Markowitz Model, Sharpe Model, Elton & Gruber Model are given in the first section and empirical tests relating to Capital Asset pricing Model are covered in second section.

Chapter III

An Investment Decision Support System is developed to generate various equity investment models under Fundamental Analysis and Modern Portfolio Theory and its extensions. Performance of portfolios has been evaluated by using various parameters over different time periods. The advantage of such investment decision support system is that if a particular share is identified for investment / disinvestment by majority of the models, the investor may undertake further scrutiny / analysis of the share so selected and then finally make the decision.
Financial ratios, share prices of companies and stock indices are the main data needed for the study. The data have been obtained from the following sources:

1. The Stock Exchange, Mumbai
2. CIMM (Prowess), software package comprising corporate and stock market data.
3. Economic Times

The data used in this study are for a period of eight years from 1990 - 1998. Models of Fundamental Approach considered data of 120 shares whereas Models under Portfolio Theory included 200 shares for the study.

Investment Decision Support System is developed by using Foxpro. Various portfolios under both Fundamental Analysis and Modern Portfolio Theory (and its extensions) are generated and their performance has been evaluated. Return and risk adjusted return are the parameters used for comparing the performance of the individual securities and the portfolios formed Vis-à-vis market Index.

**Chapter IV**

Performance analysis of six Selection Models considering different financial parameters using Fundamental Analysis is included in this chapter. Of the six models, the first is by Ranking the companies, next three models are based on Sorting, and fifth one is on the basis of Rating. The last model is a modified version of Graham-Rea model that considers a combination of fundamental factors of risk and
return. Rate of return recorded by the companies selected by the models are compared with market index during the holding periods of one and two years.

Chapter V

Decision Models considered for generating portfolios are:

1. Dividend Discount Model
2. Earnings Discount Model
3. Price to Bookvalue Model
4. Regression Model

Using the past data of the companies included in the sample, intrinsic values have been computed. By comparing intrinsic values with the market price, the shares are identified for investment and for sale.

First three models group investment decisions into four broad categories viz., Very Strong Buy, Strong Buy, Strong Sell and Sell. Portfolios are generated in four periods and their performance is evaluated in subsequent periods. Performance evaluation is done by comparing return and risk adjusted return with the market index during holding periods of one year and two years. Under Regression model, decisions have been grouped under Buy and Sell categories and the performance have been evaluated in subsequent one and two year periods.
Chapter VI

Risk-return optimisation portfolios selected by Elton & Gruber Model and their performance evaluation are included in the first Section of this Chapter.

Risk and return estimates needed as inputs for the model have been taken by using adjusted share prices for a period of 48 months. Proportion of investible funds allocated to each of the shares included in the portfolio (as suggested by the model) is considered for reckoning the return of the portfolios during the evaluation period. Results of these optimisation models have been analysed on the basis of return and risk adjusted rate of return for the holding periods of one year and two years.

Capital Market Theory explains how assets are getting priced in the market place. A widely tested equilibrium model that tries to explain the association between risk and return is Capital Asset Pricing Model (CAPM). Testing of the CAPM involves estimation of portfolio betas. Returns as well as excess returns are used for estimating betas as per the following combinations:

1. Portfolios based on non-overlapping betas computed during non-overlapping periods;
2. Portfolios based on overlapping betas computed during overlapping periods.
3. Portfolios based on non-overlapping betas computed during overlapping periods;
4. Portfolios based on overlapping betas computed during non-overlapping period.
The CAPM tests carried out are:

- **Predictive Model**, where the associationship between portfolio betas in time period $t$ and returns in time period $t+1$ is tested.
- **Non-Predictive Model**, where associationship between both risk and return at time period $t$ is tested.

In the last section, liquidity is included as a parameter in Markowitz model and in the CAPM. The proxy used for liquidity is impact cost. By including impact cost as a proxy to measure liquidity, it is shown that the portfolios selected by Markowitz model have become more diversified.

**Chapter VII**

Results of various portfolio selection models under Fundamental Analysis as well as extensions of Modern Portfolio Theory are summarized in this Chapter. Highlights of the results are:

**Models considered under Fundamental Analysis:**

- The inference from the analysis of various selection models is that financial ratios when used in isolation for identifying stocks for investment / disinvestment could not produce impressive results. A combination of growth, profitability, leverage and liquidity when considered gives better portfolio selection. The results of the models under this category showed that the selection could not consistently beat the market index
and no conclusion can be drawn as to the holding period of the portfolio as well.

- Performance of Decision Models considered in this study has been consistent over the testing periods.

- Most of the portfolios identified for disinvestment could beat the market index on the basis of evaluation measures identified.

- The portfolios generated by the model for investment had in certain periods outperformed the market proxy on return as well as risk adjusted return basis. In most of the cases, the portfolios recorded consistent performance.

- Dividend Discount Model selected few shares for investment than for sale whereas the percentage scrips identified for buying was more than the shares in the disinvestment category by other three decision models.

- Portfolio composition remained more or less constant over the periods in case of DDM selection. More number of new shares was added to the portfolio in the last formation period by other decision models. Inference as to the market movement was possible when the DDM was considered for stock selection.
Models Considered under Modern Portfolio Theory & Capital Market Theory:

Performance of the portfolios identified by Elton and Gruber Model is summed up as follows:

- Out of five portfolios generated and monitored for a period of one year, three portfolios had outperformed market index on the basis of portfolio return.

- Out of five portfolios generated and monitored for a period of two years, two portfolios had outperformed market index on the basis of portfolio return.

- It is observed that the securities with relatively low beta were recommended by the model for the inclusion in the portfolio in large proportions than the ones with high betas.

- A drawback of employing this model is the concentration of funds deployed in few shares i.e., though the selected portfolio comprises around 15-20 shares, more than half of the funds are recommended for investment in only 4-6 shares.

Capital Asset Pricing Model tests under both predictive and non-predictive models, using Natex as well broad based RBI Index as market proxies, have clearly indicated that the CAPM does not hold good in the Indian Capital Markets. The results are on the lines of recent research findings reported, based on the data from developed countries.
Annexures:

Annexure 1:
Portfolios selected by all four Decision Models in May 1994 by using data from 1990 to 1994 are compiled and given in this.

Annexure 2:
Portfolios selected by Elton & Gruber Model in six consecutive time periods are included. Starting from April 1994, portfolios have been constructed every six months to evaluate the performance with the market index.

Annexure 3:
Portfolios selected by Dividend Discount Model have been analysed by considering the fundamental factors of the scrips included in the portfolios.

Annexure 4:
Variables used for testing risk-return trade-off under four different portfolio combinations are given in this Annexure.