CONCLUSION AND IMPLICATION

8.1 Summary and conclusions

The primary objective of the study was to understand the risk return relationship and factor structure of the return generating process, in a multifactor framework of Arbitrage pricing theory in the Indian stock market. The results of the study shows of the return generating process involved an identification of Arbitrage pricing theory factor structure, magnitude and direction of relationship in the Indian stock market with the help of a set of macroeconomic variables, as well as on the basis of theoretical foundations that explains its effects on future cash flow and discount rate.

A portfolio consisting of 22 shares constructed from 145 selected shares based on a set of criteria, belonging to large cap, medium cap and small cap companies. The portfolio was randomly constructed and equally weighted, based on the criteria of the lowest normalized portfolio variance and theoretical considerations of diversification. The share returns are observed on
monthly basis and log returns were used along with unanticipated changes in macroeconomic variables for multivariate normality testing. Result of the multivariate test in Canonical correlation analysis, indicates that the series of log returns and residuals of macroeconomic variables were endorsed to multivariate normality, and hence the factor structure, magnitude and direction of relationship identified from the analysis tenable to reliability assumptions which in turn leads to interpretations and generalizations of the result.

The macroeconomic variables have been selected on the basis of theoretical background, as the variables are affecting the future cash flow or discount rate or both. These variables used for generating a forecasted series by employing forecasting methods, ranging from Linear trend to Auto regressive integrated moving average methods, considering the nature of the data. The forecasted series are then used to generate unexpected movements in macroeconomics variables. Multicollinearity among the macroeconomic variables was tested through a series of repeated process, by using a linear regression, taking one of the macroeconomic variables as dependent variable. The final set of macroeconomic variables for factor identification test consists of fourteen macroeconomic variables.

The risk return relationship hypothesis of Arbitrage pricing theory was tested by using a set of standard methodologies, which have been modified to suit the Indian condition and statistical developments. Modifications made to the basic methodologies are in respect to the raw return of individual security returns instead of excess return of portfolio. The reason for this change is that data relating to excess return of portfolios is not available and the study is based on randomly constructed equally weighted portfolios which have been considered as a cross section of the market. In addition, the discount rate of treasury bills, which may consider as risk free rate, data based on the common
procedure of issue is not available for the entire study period, as the procedure itself changed from fixed discount rate to auction driven market rate. Statistical development related to Canonical Correlation Analysis which overcomes the disadvantages of multiple regressions, facilitated to explore simultaneously, the many to many relationships is also a reason for modifying the methodology. Canonical Correlation Analysis which facilitate to carry out testing the APT hypothesis through factor extraction, identification of factors, its magnitude and dimension of relationship, and make it possible to explain the variation in the share returns with the help of variation in unanticipated changes in the macroeconomic variables.

The result from the APT test suggests that return generating process of the Indian stock market is characterized by a multifactor structure and identified that a four factor model substantially explains the variations in share returns. The maximum number of factors in this process is based on the lowest number of variables in the variable sets. Though, a fourteen factor or a twelve factor model provides a larger explanation for the variation in the portfolio returns, the marginal contribution of additional factors is low. Based on the criteria of marginal contribution of explanatory power, a model with smaller number factors may be more efficient in explaining the variations in share returns and it increases the practical use. Considering this, it may conclude that a four factor model substantially explains the return generating process in the Indian stock market. From these complex risk factors, identification of macroeconomic variables behind these risk factors were made by using canonical cross loadings, and its magnitude and direction of relationship were exposed by Eigen value weighted canonical cross loadings. From the complex risk factors, based on magnitude, Banking systems credit to government (BCG), which have multiple impact on growth in investments and
credit environment, Net investments of foreign institutional investors (FII) which have directly linked to investment climate and credibility of the economy, Money supply (M3), connected to investment and credit environment and Market turnover (BSET) associated with liquidity environment were identified as the prominent state variables, explains the return generating process in the Indian stock market. This leads to the conclusion that, in Indian stock market, a four factor model substantially explained the variations in share returns in the APT frame work, and the major environments determining the return generating process in portfolio context were the credit, investment climate and liquidity.

Second objective of this study was to assess the impact of systematic risk factors influence on size of capitalization. For assessing the impact of risk factors on size of capitalization, for a period of five years from 2006, three portfolios were constructed based on size of capitalization. All these well diversified portfolios, for large, medium and small cap, were constructed by following the same criteria, as in the case of market portfolio and same set of macroeconomic variables were used. Multivariate test for normality assumptions endorsed the result. Test results of Arbitrage pricing theory indicated that for large cap shares, five factors substantially explained the return generating process, and the highly priced variables were Market turnover (BSET), Net investment of foreign institutional investors (FII) Import, (IMP), Banking sectors credit to government (BCG), Export (EXP) and Exchange rate (EXR). For the mid cap portfolio the highly priced variables in the order of impotence were, Net investment of foreign institutional investors (FII), Gold price (GOLD), Money supply (M3), Market turnover (BSET), banking sectors credit to government (BCG) and Export (EXP), for a factor structure of six highly priced relationships. A four factor
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model substantially explained the return generating process in small cap segment and the highly priced variables were Net investment of foreign institutional investors (FII), Money supply (M3), Market turnover (BSET), Exchange rate (EXR), Call money interest rate (CALM), Inflation (CPI) and Banking sectors credit to government (BCG). It leads to the conclusion that, based on size, the factor structure, systematic risk factors, its magnitude and direction of relationship were changed in explaining the return generating process during the period of 2006 to 2011.

Influence of time period on systematic risk factors is also considered as third objective this study. Time period based comparison was made for three phases on large cap portfolios. The reason for selecting the large cap portfolio is that before 2004, there was no standardized classification and reporting of data for small and medium sized companies. Three randomly selected equally weighted portfolios were constructed for this purpose on large cap segment for the three phases. Return on these portfolios was explained by fourteen macroeconomic variables, which are proxies of systematic risk factors. After endorsing the conditions of multivariate normality, the result of the Arbitrage pricing theory test reveals that, for the period of 1994 to 2000, a four factor model substantially explained the return generating process. Important priced variables in this period were Net investment of foreign institutional investors, Import, Foreign exchange reserve, and Export. In the second phase the highly priced variables were Exchange rate, Money supply, Index of industrial production general, Gold price, Import and Net investment of foreign institutional investors, in a factor structure consisting four highly loaded functions. In the third phase the highly priced macroeconomic variables representing systematic risk factors were Market turnover, Net investment of foreign institutional investors, Banking sectors credit to government, Export,
and Exchange rate, for a five factor model that substantially explaining the return generating process. Result of the study reveals that, the factor structure, number of priced factors, magnitude and direction of relationship were changed among the three phases of the study. It led to the conclusion, that in tune with the openness of the economy and related policy changes, the systematic risk factors, its magnitude and direction of relationship were varying with periods selected for the study covering a reasonable time span, in Indian stock market.

8.2 Implications

The research results suggest that APT based multifactor return generating process could be endorsed in the Indian context. An understanding of the factor structure of the return generating process and the impact of specific systematic risk factors; its magnitude and direction of relationship on asset returns is expected to be of value to a fund manager in formulating strategies for risk management of portfolios. Another implication of this study is that, in formulating policies on stock market and for its orderly development, an understanding about the return generating process, the factor structure, magnitude and direction of relationship may provide a better insight and expect to yield the desired result to the government.

Based on structure correlations of individual company’s share returns to its variate and its magnitude and direction of relationship are identifiable. This facilitated to analyse the relationship with identified systematic risk factors; an understanding about the return generating process may provide a better insight to investors and more fruitful in their investment decision making, as they are mainly concentrating on firm specific variables. Based on the platform of Arbitrage pricing theory and the magnitude and direction of relationship of
identified risk factors, an analysis of industry and firm specific variables may provide a better insight for investment decision making on individual firm’s shares and expected to be worth full for further research.

A modified research design using canonical correlation analysis to explain the return generating process based on Arbitrage pricing theory framework and introduction of Eigen value weighted canonical cross loadings for identifying the relative importance and direction of relationship of systematic risk factors are useful direction of this study and the same has been applied first time in India. Therefore, it is appropriate that, research findings and the resulting conclusions are considered only as a starting point for future research in this area. In addition, as the study reports, systematic risk factors were varying in tune with the time period covering five to six years, a study based on shorter period in an overlapping nature may provide valuable inputs for formulating more accurate trading and risk management strategies and may be a fruitful direction for future research.

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