CHAPTER 6: SUMMARY AND CONCLUSIONS

The focus of this study has been on developing a behavioral model for understanding asset market behavior. Popular stock investment strategies are often fads based on market generated data, especially share price as opposed to accounting data given in the company financial reports. Agents assume the current market valuation to be a reflection of the markets assessment of future prospects. Acting on the belief that prices will be what they were, investors use market valuation to pick stocks. Such behavior is self fulfilling and inertia becomes the basis for the market action.

This behavioral pattern is captured by the use of lagged price variables in our model. Further, by identifying factors that influence market valuation, we infuse dynamism into the model. Professional financial analysts too spend considerable resources in trying to predict both changes in fundamentals and also possible changes in the sentiment of other investors. The focus on lagged price variables is the distinctive feature of our behavior model.

The behavioral inertia approach involves the use of a simple regression exercise. Complex econometric techniques though highly popular generally do not serve much purpose. When using any of the more advanced estimation procedure the researcher can never be sure whether the complication treated by the chosen technique is an incidental manifestation of deeper misspecification or not. By assuming inertial decay we derive a log-linear model to describe stock price behavior. The model's specification is guided by theory rather than an outcome of sample data. Since no inductive searches for suitable econometric models are made, there is no pre-test bias. Any problem in empirical testing either in the form of misspecified error terms or coefficients with wrong sign is treated as evidence against the theory under examination. This is in contrast to the usual approach of modifying a model to arrive a better fit to the data in hand. This latter approach is not a desirable method of model building as corrections made by looking at apparent deviations from the assumptions may or may not eliminate the root cause of the problem.

In the behavioral inertia approach no distribution assumptions are made about the error term except them being identically and independently distributed. Further, by including caprice or random behavior we explicitly incorporate error term into theory.

In the financial literature most studies use stock beta and accounting variables to model stock prices. A model that is often used as a benchmark in studying returns behavior is the Fama and French (1993) three-factor model. To begin with, we undertook an empirical estimation of the Fama and French model using the sample data set. In this model three-factor portfolios accounting for beta, book-to-market value and size are used to explain cross-sectional variation in average returns. A simple univariate regression exercise at the stock level showed poor performance of all the variables. The multifactor model also did not bring about any appreciable improvement in the result. In the Fama and French model high book-to-market value firms and small size firms are treated as more risky than low book-to-market value firms and large sized firms. The risk associated with high book-to-market value firms gets priced and is reflected in higher returns and positive coefficient on the HML factor portfolio (h_i) as against low book-to-market firms which will have negative loadings on h_i. Similarly, small firms will have higher expected returns and positive slope on SMB as against big firms which have lower expected returns and negative slope on SMB.

The Fama and French model is tested using portfolios constructed on the basis of BE/ME and EPS/P ranking. The results show poor performance of the model in explaining average returns on the various constructed portfolios. In particular in the BE/ME ranking the null hypothesis of the three-factor portfolios being minimum variance efficient is accepted only for the six size-BE/ME equal weighted portfolios, and the small and medium BE/ME value weighted portfolios. A similar number of portfolios in the EPS/P ranking also accept the null hypothesis. These are low EPS (both equal and value weighted), small and medium EPS (both equal and value weighted), big and low EPS (both equal and value weighted), small and low EPS value weighted portfolios.

The coefficients on SMB and HML also do not unambiguously reflect the pricing of risk associated with small size and high book-to-market value firms.

A multivariate joint test of all categories of portfolios falling in particular ranking criteria with similar portfolio weights using the test statistic developed by Gibbons et al. (1989) fails to reject the null hypothesis that the market prices risk associated with small size and high book-to-market value firms. The result of this test however, has to be interpreted carefully as the outcome of the test is sensitive to the number of portfolios as well as the choice of asset sets.

In the chapter on behavioral principles in stock market we undertook an empirical validation of our model. The presence of inertia in the stock price series is ascertained by undertaking a 't' test on the coefficients of the two lagged variables adding up to 1. Under the condition when no distributional assumptions are made about the returns series, an asymptotic test like wald test would be more appropriate. We, therefore, undertook a wald test of the null hypothesis of presence of inertia. The results of both the 't' test and 'wald' test show that the null is not accepted in 10 out of 32 sample companies, namely, Bluestar, Finolex, Jain, Mphasis, MTNL, NIIT, Satyam, TataElxsi, Wipro and Zensar.

An in-sample forecasting of the two models viz. Fama and French and the behavioral inertia model, formulated using rational and behavioral approaches respectively, also supported our argument for incorporating behavioral biases in investor's behavior.

The OLS exercise gave us consistent estimates, but had poor small sample properties. The estimates are biased because of the inclusions of lagged-dependent variables and the presence of error in the measurement of beta variable. Specifically, the coefficients for the lagged dependent variable are upwardly biased. The presence of error in the measurement of the variables lnbeta and lnbeta neg causes biases in not only the coefficients of these variables but also in the coefficients of $\ln P_{t-1}$ and $\ln P_{t-2}$. The direction of the bias can be ascertained only after looking at the value of the coefficients of lnbeta, lnbeta neg, and the covariance between the explanatory variables. Thus, a priori, the direction of the bias cannot be inferred and hence the reliability of the test statistics cannot be established. Further, the wald test is an asymptotic test and suffers from size distortion in finite samples.

In order to overcome the above limitation, we employed the bootstrap test (Chapter 5) to evaluate our model. The Breusch- Godfrey serial correlation test that we undertook in the OLS framework fails to detect any serial correlation. A bootstrap approach to this test also gave us the same result. Using the technique of recursive bootstrap, we estimated regression of $\ln P_t$ on all the explanatory variables and the lag of residuals. A χ^2 test of the coefficients of the two lag residual terms being equal to zero was undertaken. The result of such a test showed that except for three companies, namely, TataElxsi, Wipro and Zensar, the null hypothesis of no serial correlation was not rejected in any of the other companies at 5% level of significance. At 1% the absence of serial correlation was accepted for all the companies. We next undertook the bootstrap test of behavioral inertia model. Because of the presence of lagged dependent variables we again used the technique of recursive bootstrap and estimated the distribution of the wald test statistic. The p value associated with the test is obtained as the number of bootstrap samples in which wald statistic is greater than the statistic obtained in the original sample. The results of the bootstrap test showed that for only two companies the p values were low enough to reject the null hypothesis of presence of inertia, evaluated at 1% level of significance.

The conclusions of this study, therefore, are:

1. The present study shows bounded rationality of the investors. A behavioral model seems to give a better description of the stock market behavior than a model based on the assumption of perfect rationality

2. For a majority of a sample companies the price movements seems to have been generated by the craze surrounding internet stocks rather than the economic fundamentals of the firms.

3. For the few that did not support the presence of inertia in investor behavior, an examination of the company history revealed that this period was marked by issue of ADRs, major national and international collaborations and high rating of their performance by various agencies. These conveyed information on the future prospects of the firm which were orthogonal to those obtained from the past performance of the firm. The market therefore viewed these stocks favorably and therefore their market prices were driven away from their existing prices.

4. Finally the over-rejection of the null using asymptotic tests seems to suggest the need for bootstrapping the test statistics in small samples. The study also indicates bootstrap as a useful technique for drawing inferences in models with lagged dependent variables and estimated variables.

Thus, the behavioral inertia model developed by us got strong support when evaluated in the bootstrap framework. While the simple linear form of our model does not completely identify nor restrict all potential causes it however provides a dynamic structure that explains how changes in the economic environment affects stock price series.