

Chapter – VI

SUMMARY AND CONCLUSIONS

6.1. Overview:

This thesis attempted to analyse the implications of behavioural biases in explaining Indian capital market upheavals. To achieve our target market has been studied in the backdrop of heterogeneity in expectation and evolutionary learning. The present approach departs from the existing paradigm of market economics where some agents are rational and others are not. Individual agents are overwhelmed by the complexity of the informational environment; they are all categorized as bounded rational, and therefore use simple rules of forecasting return and risk assessment. Two typical types of trader in the market have been distinguished on the basis of their expectation formation. Traders of the first type are the fundamentalists or the ‘smart money traders’. They believe that prices of speculative assets return back to its fundamental value and it follows random movements. However, there may be a deviation of actual prices from fundamental value, but mean reversion dynamics of the market is posited to bring the prices in line. The traders in the second category are the chartists or technical analysts. These traders believe that, asset prices can be predicted by simple technical trading rules based on patterns, trends or cycles. Risk is assessed by both type of traders in terms of variance of actual price from expectations. In this respect the behaviour of investors in the market is modeled in terms of ‘loss aversion’. That is, their decisions in the market are assumed to be ‘reference dependent’. In this heterogeneous set up prices are determined by an adaptive belief which is generating out of evolutionary force resulting from trading between these groups. The importance of one group of traders over others is context specific and conditional upon deviation of actual price from fundamental. Socio psychological underpinnings of human decision under uncertainty suitably explain conditions making the decisions context specific. The model predicts for two potential solutions in the asset price dynamics. If fundamentalists can set aside cognitive bounds and other associated socio psychological biases in information processing, dominate in the market in terms of both numbers and wealth and thereby normative solution in price is restored. On the contrary if socio psychological constraints take over rationality, fundamentalists constantly loss their evolutionary fitness, technical traders start to dominate and ultimately a bubble (either positive or negative) grows. The dominance

of a particular trader type driven by their socio psychological impact in decision making thus can be identified with patterns of price movements. Prices are expected to be driven by “coexistence of attractors”; switch irregularly between phases of low volatilities and high volatilities. More categorically small change in prices due to random news are reinforced and become larger and larger due to trend following trading rules, irregularly change its direction and switch to phases of small price changes. To reach the objective of the study we have tried to capture these patterns in price movements in Indian equity market which can be taken as an explanatory device to model investor's behaviour towards upheavals.

Specifically we have applied two sophisticated tools on the daily return data of price changes over the period from 1.7.1997 to 30.8.2013. Extreme Value theory has been applied to daily data on price changes to identify and measure the existence of extreme movements in Indian equity market. The presence of extreme movements points towards the role of behavioural biases in uncertainty whereby price itself feeds it back for further changes. Apart from this, Generalised Auto Regressive Conditional Heteroskedastic i.e. GARCH(1,1) model has been applied to capture more specifically “coexistence of attractors” in speculative behaviour of Indian investors whereby, phases of extreme changes in prices cluster together and irregularly switches towards phases of small changes.

6.2. Summary of findings:

Preliminary investigations using some common statistical tools exhibited leptokurtic patterns in daily return distribution with the presence of fat tail in Indian market. Q-Q graph of the daily return data has been plotted against the Normal Distribution. Empirical concave departure from normal distribution more prominently indicates the presence of heavier tailed distribution. However central part of the distribution aligns well with the normal distribution. But outside this area the curve in the tail indicates departure from normality i.e. a stronger concentration around mean, more probability mass in the tails of the distribution and thinner shoulders. These indicate towards the presence of extreme movements in Indian market that constitute fat tail with a leptokurtic distributional pattern. These findings

are however in consonance with observed phenomenon of asset markets around the world, which cannot be captured under the dictum of rational expectations. Presence of more probability mass in the tails of the distribution may be taken as a confirmation of price to price channel in bubble formation and its subsequent crashes. More sophisticated techniques of Extreme Value Theory have been applied to capture more objectively the pattern of daily return distribution. The finding suggests that forty two percentages of negative returns and forty percentage of positive return may be treated as extreme in the Indian market. Altogether approximately forty two percentage of total observation falls in the extreme region either positive or negative. Presence of extreme movements in prices points towards the existence of price to price feedback whereby movements in prices tend to justify further movements.

Generalised Auto Regressive Conditional Heteroskedastic (GARCH (1,1)) model has been applied to the time series of daily return data on BSE Sensex. Presence of large GARCH lag coefficient indicates shocks to the conditional variance take a long time to die out, thus volatility is persistent. Large value of GARCH lag coefficient with low values of GARCH error coefficient indicates larger conditional variances to cluster together. This result points to similar inferences for the low values also. This findings, however, points towards presence of coexistence of attractors speculative belief formation whereby market prices either settle down to the locally stable fundamental steady state or fluctuate in a regular pattern around the fundamental steady state price.

6.3. Concluding remarks:

Our findings in the Indian equity market sharply confirm the patterns of price changes predicted under heterogeneous market model. These empirical findings point towards the similar behavioural patterns of Indian investors' as hypothesized in the heterogeneous framework. Our findings suggest Indian investors as bounded rational, face cognitive limitations in processing all available information and are prone to use heuristic simplifications in forming expectations and risk assessment. Their decision

in the market seems to be context specific. Adaptive belief over the suitability of using a particular trading rule is weighted by its evolutionary fitness in the context of price movements. Prices but not the information takes over as a predominant consideration in decision making. It induces investors to develop an evolutionary psychological subtle urge in deriving information by looking at the action of others. Regret avoidance, cognitive dissonance, myopic loss aversion, reputational externalities, wishful thinking, social comparison, leaning to the wind effect etc. may be associated here as potential traits of market behaviour causing arbitragers and fundamentalists often to lose evolutionary confidences in taking corrective actions. Changes in prices being the predominant consideration in decision making ,generates commonality in thinking ,which ultimately vitiates the rationality assumptions of ‘independence of opinion’, ‘perfect relation between risk and returns’, ‘full reflection of information’ through prices and its ‘random movements’. Thereby, the findings suggest, investors in Indian market are dominated highly by the psychological whims of the moment. Evolutionary fitness in using the technical trading rules are geared up intuitively, a self fulfilling prophecy is evolved in their mind in favour of price to price channel, and makes arbitrage operation increasingly vulnerable and bubble grows. Moreover, the presence of volatility clustering also points towards a ‘*coexistence of attractors*’ in Indian investors’ behaviour. In some occasions they develop evolutionary belief in favour of fundamental steady state which is irregularly interchanged with phases of large price changes exhibiting price to price feedback in generating market upheavals. Speculative dynamic in Indian market thus can be model to swing their sentiments irregularly either in favour of fundamentalists or technicalists.

Our findings in Indian market throw considerable challenges to the proponents of rationality driven theories of market efficiency. It questions the basic underpinnings of independence of opinion, perfect relation between risk and return, full disclosures of information through prices ensuring optimal allocation of resources .This ultimately questions the central theme of modern financial economics whereby market is posited to be taken as the most powerful device to take care of all ills and the thing that a good governance can do is not to interfere in the market. Some economists often suggest not to indulge non- equilibrium theory – it is a temporal

phenomenon and market will take care of it, hence the theory may be ignored. Undeniably theory of Power law appeases non equilibrium theory. But, if we cast aside the entire literatures on behavioural finance and its recent advancements, we would be failing to analyze some frequently observed phenomenon of the market where there is no equilibrium based solution.