# Are investors rational, irrational or normal?

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## ARTICLE INFO

## ABSTRACT

The nature of investor's rationality vs. irrationality debate drawn attention of thousands of academic papers, hundreds of conferences, roundtables discussion leading to two ends: the classical theorist i.e. the proponents of efficient market hypothesis (EMH) and the behaviorist. From Fisher's (1906) Nature of Capital & Income to Ross (1977); investor's rationality has been considered as the principal assumption in the development of theoretical finance. Unfortunately though, various studies have shown repeated form of investor's irrationality and incompetence in their decision process. Even the very proponents of EMH, Fama (1965) has later on in 1993 advocated the lack of market efficiency! Indeed the story of black Monday in the USA to the global financial tsunami (2007-2012) has put the proponents of EMH into the cluelessness. While, the behaviorists argument that the financial markets can be best understood by studying the psychology is also subject to criticism that there will be no existence of standard models to study agent's behavior in the market! Therefore, this study aims at finding out the true scenarios of investor's behavior by working on 200 individual investors in Dhaka Stock Exchange (DSE). Investors' response to different questions relating to fundamental assumption of "rationality' or 'presence of irrationality." The result shows a complete absence of the assumption of rationality or irrationality in number of critical issues. Therefore, the idea of EMH or mere psychologically driven behavioral finance should become less acknowledgeable in understanding the agents of financial market i.e. the investors. Rather a combination of these two may give more insight in understanding the investor's behavior in the financial market.

## 1.0    Introduction

Much of the economic and financial theories are based on the notion that, market participants acts rationally and considers all available information in the decision-making process. Rationality means two things. *First,* when agents receive new information, they update their belief correctly, as described by *Bayers' law*[1]. *Second,* given their belief, agents make choices that are normatively acceptable, which is consistent with *Savage's notion* of *Subjective Expected Utility* (SEU)[2]. In fact, most of the standard finance theories and propositions including the arbitrage principles of Miller and Modigliani (1958), the portfolio principle of Markowtiz (1952), the capital assets pricing theory of Sharpe (1954), Lintner (1965), Mossin (1966), efficient market hypothesis of Fama (1970), the option-pricing theory of Black and Myron (1973), agency theory of Jensen & Meckling (1976) and arbitrage

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[1] Thomas Bayers (1702-1761), a British mathematician, provided a theorem for conditional probability under statistical dependence where belief can be updated with the arrival new information.

[2] L. J Savage (1948) along with M. Friedman tried to develop the concept of subjective approach to assign probabilities intruded by Frank Ramsey (1926) in his book *'The Foundation of Mathematics and Other Logical Essays'.* L. J Savage pointed out that two rational people faced with the same evidence could easily come up with quite different subjective probabilities for the same event both of which are normative.

pricing model of Ross (1976) assumes that financial markets and its participants as a whole demonstrate rational behaviour and make wealth-maximizing decisions advocating the efficient market hypothesis (EMH). EMH has been originally defined by Fama (1965) as

……*a market where there are large numbers of rational profit maximizer actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants……..the competition will cause the full effect of new information on intrinsic values to be reflected "instantaneously" in actual price to eliminate opportunities of abnormal return…….*"

However number of researchers including, Kahnemen et al. (1979), Joseph Stiglitz (1980), Malkiel (1995), Leinweber (1997), Carhart (1997), Hirshleifer et al. (2003), etc. have documented numerous examples of irrational behavior. Their findings reveal, 'repeated patterns of irrationality, inconsistency, and incompetence in the manner human being arrives at a decision and make choices under uncertainty.' Therefore, many researchers believe that, the human flaws are consistent, predictable. Thus, the basis of EMH as described by Fama (1965) becomes weak and less acknowledging day by day. With these findings in mind, this empirical study tries to find out whether, investors[3] particularly in DSE exhibit rationality or irrationality in the way they take investment or disinvestment decisions. The overall findings reveal a lot of doubts about the nature of investor's homogeneous expectations[4] in the market vis-à-vis rationality assumptions as well as cast doubt regarding a purely behavioural pattern of decision making even though their decision yields profit from emerging market like DSE.

## 2.0    Review of evidences of investor's irrationality across markets

One of the fundamental aspects of defining investors as rational or irrational has never been questioned. For example, when Peter (1999), defines 'irrationality' as the evidences of repeated patterns of inconsistency and incompetence to assess market information in the ways human beings arrive at decision and choice when faced with uncertainty question needs to be raised why it should be called as irrationality? Even though competence of investors in assessing market information, making consistent decision, controlling greed and regret factors of human psychology, etc. becomes more important in the test of investors rationality or irrationality under condition of uncertainty why we have only these two options? Is this true that incompetence and inconsistency is the way to define irrationality or is it true that if we cannot process information quickly in the market condition, then it is a lack of rationality? Thus, the crucial issue is how to judge investors rationality considering the aforementioned cases? According to Edwin J. Elton, et al. (2004) in most cases, the best indicator is to look at the stock market index because inconsistent and irrational market movements can be the best proxy of investor's irrationality. The reason is very simple. When market moves inconsistently devoid of any economic reasoning, it indicates investors are investing or disinvesting inconsistently and incompetently. But again is this is enough to designate the investors as irrational?

In reality evidences of mathematical form of market or investors rationality as cited by EMH with lot many non-sense assumptions are rare and therefore as per mathematical definition of rationality, the portrayal of irrationality are numerous. Rozeff & Kinney (1976) suggested that, January stock return where higher than any other months which violate the normality assumption of EMH in US markets. Haugen et al. (1996) concluded that the January effect is, perhaps the best-known example of anomalous behavior in security markets throughout the world including UK, Australia, Germany, French, etc. which does not use Dec. 31 as the tax year-end. Gibbons & Hess (1981) discovered "Monday effect." It seems that the market has developed a long pattern of irrationality without any economic reasoning behind that. Both of these findings were inconsistent with a weak form of market efficiency. In June 1978, a special issue of *Journal of Financial Economics* published a number of different form of "market anomalies" observed so far. All of these anomalies indicate market's vis-à-vis investor's irrationality.

Furthermore, the most-unexpected blow to EMH came from financial economists, when Stiglitz & Grossman (1980) attacked the basic assumption of rational market. They argued that if relevant information were reflected in market prices, market agents would have no incentive to acquire information on which price are based. This reasoning comes to be known as *Grossman-Stieglitz paradox*. Stieglitz continued the argument in his subsequent works & eventually earned Nobel Prize in 2001. The empirical research, off course, did not stop there. De Bondt & Thaler (1985) in their study showed that stock market tends to over-react to bad news than that of good news. Kahnemen et al. (1979) found that contrary to expected utility (EU) theory, a person tends to place different weights on gains and losses and places different ranges of probability on those expected outcomes. They found

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[3] The word 'investors' has been used to mean individual investors not the institutional investors unless otherwise mentioned.
[4] Homogeneous expectation has been widely cited as a key assumption of market efficiency or perfect capital market by a numerous academicians including  Miller and Modigliani (1958), Markowtiz (1952), Sharpe (1954), Lintner (1965), Mossin (1966) and Black (1972), Fama (1970), Black and Myron (1973), Jensen & Meckling (1976) and Ross (1977). Can investors form same expectation for lust of making money by investing more in stock market, when everyone believes that market is not undervalued? EMH don't acknowledge this, but behavioral finance does acknowledge this as cited by Kahnemen et al. (1979).

individuals are much more distressed by prospective loses than they are happy with equivalent gains. It has also been found that, faced with sure gain, most investors are risk-averse, but faced with a sure loss; most investors are risk-takers. This is simply a contradiction with rational market assumption. Shiller (1997)[5] found that, at the peak of the Japanese market, 14% Japanese investors expected a crash, but after market did crash, 32% responded that they had expected a crash as well. This result indicates people tend to be more optimistic when market goes up, but becomes more pessimistic when market actually goes down. Accordingly, Robert G. Hagstorm (1999)[6] pointed that *'.......Graham's conviction rested on certain assumption. First, he believed that the market frequently mispriced securities. This mispricing was most often caused by human emotions of fear and greed. At the height of optimism, greed moved stocks beyond their intrinsic value, creating an overpriced market. At other times, fear moved prices below intrinsic value, creating an undervalued market......."*

Leinweber (1997) comes up with most worrying findings for advocates of market rationality. His research found that historically the single best predictor of the S&P 500 stocks index was the butter production in Bangladesh. Barry Miller (1998)[7] the ex-President of SEC of USA pointed that; *'.......the lesson to learn from this finding is that, a formula that happens to fit the data of the past won't necessarily have predictive value. However as these types of results are coming not by chance, but through the use of strict mathematical model that assumes stock market participants are rational, we must be serious about the assumption we make. Because it is the investors who are human and have greed that follows a stupid process, especially when lust for money and temptation is there.'*

Hirshleifer et al. (2003) working with 26 countries data for the period of 1982-1997, concluded that enough sunshine in every single country in the sample is a single most predictor of a positive stock return in each of the markets. After controlling sunshine, it has been found that rain and snowfall are uncorrelated with the return. More recently in the backdrop the current global financial crisis in a rather unruly fashion using functional magnetic resonance imaging (fMRI), Burke, et al. (2010) documented that like other species, humans are sensitive to the decisions and actions of conspecifics, and generating herd behavior of being influenced by others buying decision in the stock creating market bubbles as well as bank runs. Hui-Chu Shu (2010) in his recent study have also documented that investors mood has a positive correlation with security prices especially equity and bill prices arguing that investors mood is a vital factor in equilibrium assets prices and return. Bailey et al. (2011) working with US discount brokerage investors have suggested that there exists behavioral bias in a mutual fund and concludes that amongst the investors trend chasing appears related to behavioral biases, rather than to rationally inferring managerial skill from past performance and factor analysis suggests that these investors conform to stereotypes that can be characterized as Gambler, Smart, Overconfident, Narrow Framer, and Mature. Klaus & Marcet (2011) stated that market agents are 'internally rational,' i.e., maximize discounted expected utility under uncertainty given dynamically consistent subjective beliefs about the future, but agents may not be 'externally rational,' i.e., may not know the true stochastic process for payoff relevant variables.

The assumption of rational market neither fits in the case of the stock market of Bangladesh. Several tests have been performed to find, whether share market reacts properly with the announcement of relevant information. Ahsan et al. (2003) has conducted one of such study on listed securities in DSE by developing following null hypothesis that *"there is no significant difference in share price increase and decrease before and after the announcement of earning."* The test has been conducted at 5% significance level and their finding concluded that, there is a relationship between the share prices and earning announcements, even though the magnitude of change in share price is extremely unrealistic. But, due to extremely unrealistic nature of share price movement, they finally concluded that market behavior was abnormal to establish the findings. Shahjahan et al. (1998) conducted another study after the stock market crash during 1996 (the window of analysis was the period of 1994-1996) and concluded that, even after a substantial amount of dividend declaration, somewhere between 100% to 200%, post earning actual share price movement is very insignificant that is almost .01%, - 05%. Thus, the result could not establish the conclusion of market efficiency because it violates the M-M proposition-I regarding the dividend irrelevance.

Probably a big test of market rationality is the following two tables showing relationship between market index and growth in GDP from two countries. One is Bangladesh, home of one of the most inefficient market and another one is USA, home of one of the most efficient market.

[5] Shiller (1997) "Bull & Bears" Wall Street Journal (June 13, 1997).
[6] Robert G. Hagstorm (1999) "The Warren Buffett Way" source: www.investorhome.com/phychology.
[7] Barry Miller (1998) "What's the stock market Got to do with the Butter Production in Bangladesh" published in Money Magazine.

| Table 01: Comparison between GDP growth rate in Bangladesh and DSE index Growth rate | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | … | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| DSE ASPI (%) | 259.6 | -64 | -30 | -8.4 | 45.4 | 1.5 | … | 96.3 | -35 | -20 | 144.8 | 32.1 | 64 |
| GDP Growth (%) | 4.3 | 4.5 | 4.65 | 4.7 | 4.5 | 4.4 | …. | 6.2 | 6.1 | 6.1 | 5.4 | 5.7 | 5.5 |
| Source: Dhaka Stock Exchange and Bangladesh Bank | | | | | | | | | | | | | |

| Table 02: Comparison US GDP growth rate and DJIA Index Growth rate | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | 1890-1900 | 1900-1910 | 1910-1920 | 1920-1930 | 1930-1940 | 1940-1950 | 1950-1960 | 1960-1970 | 1970-1980 | 1980-1990 | 1990-2000 | 2000-2010 |
| DJIA End. (%) | 6.67 | 2.5 | 34.2 | 463.6 | -88.7 | 388.6 | 50.3 | 60.12 | 14.46 | 4.03 | 414.5 | 58.24 |
| US GDP (%) | 32.1 | 22.4 | 22.2 | 17.23 | 35.67 | 27.39 | 31.4 | 24.22 | 22.68 | 33.12 | 32.5 | 16.3 |
| Source: SEC of USA and Federal Reserve System | | | | | | | | | | | | |

Therefore, the question is when we are considering human, financial behavior in particular should we not take the most accurate view of human and its nature? Generally it is understood that man is the most-favored creation of almighty God (for the time being sorry for the atheist). The western world has failed to realize the true essence of the human being. Indeed a man is essentially composed of both heart and mind. Heart is responsible for some inconsistent decisions as measured by different sets of reaction of same events with changing circumstances and mind is responsible for guiding these inconsistencies in a broader consistent track in a longer period of time, As-Sadr (1959). Therefore, all the findings of financial market study could not even produce consistent discovery in concluding unique human characteristics.

## 3.0    Research objectives and research methodology

The broader objective of this study is to find out whether the assumption of investor's rationality or irrationality is a myth or a reality under condition of uncertainty. More specifically, this paper tries to find out whether investors in DSE have shown rational behaviour in making investment and disinvestment decision during 1996-1997 and 2008-09 bullish stock market conditions as well as during the period of subsequent downfall or crash. Whether these behaviours were different in different period or the differentiation in behaviours were consistent or inconsistent? To achieve the aforementioned objective, answer to several questions has been researched. These includes: (1) how the investors generally took buy or sell decisions i. e. what were the factors they have considered for investing in DSE during different market conditions ( such as normal, boom and crash)?, (2) what were the factors those contributed to the speculative market bubble?, (3) whether different type of investors (in respect of age, income level, proportion of investment in the stock market, education level etc.) have exhibited homogeneous or heterogeneous behaviour in the way they view these questions? (5) whether standard finance or behavioural finance provides more alluring guidelines in understanding investors behaviour in DSE and if the answers of these questions go against or rest in line with the standard finance theories and propositions?

To answer these above questions, a questionnaire has been developed by addressing the issues of investor's rationality discussed in different standard finance models. This has set the ground for testing investor's rationality in case of DSE. The questionnaire has been surveyed randomly to ensure more representativeness. All the respondents surveyed are individual investors. Out of some 250 respondents 200 respondents have been selected and the others have been left out as incomplete information has been provided by the respondents. The data has been processed by using SPSS 17™ to run some non-parametric tests necessary to answer the above questions. As a major endeavour to test investor's rationality or irrationality some hypothesis have been developed and tested. This has also provided a utility to confirm the validity of these answers. It may be mentioned that the window of analysis has primarily been the period of 1996-2008, even though it is stressed to till to-date in some necessary cases.

H1:    Tendency to investment in bull market condition is independent of investor's wealth endowment.
H2:    There is no association between short term speculative gains as a form of return and investor's wealth endowment.
H3:    Declining trend in the stock market is independent of decline in earning and profitability forecast of securities.
H4:    There is no association between market performance and heard behaviours.

H5:     Investment in stable and lower expected return securities is independent of recent past stock market crash.

Apart from testing these null hypotheses, other non-parametric tests and descriptive statistics have been considered to understand the status of investor's rationality in DSE.

## 4.0   Data and investor's general profile

For the purpose of this empirical study investors profile has been categorized into different basic variables including age category, year of investment in the stock market, investor's occupation, investor's education level, investor's income level. At first a brief and perceptive description of each of the variables has been presented below.

### 4.01    Age category of the investors

The descriptive statistics regarding the investor's general profiles shows that, the highest 33% of the individual investors were from age category of 35-55 years, 30% of the investors were within 25- 35 years age category and 16% were from 0-25 years as well as 55 – 65 years. Only 5% of the investors are aged more than 65 years. From age class of 25 – 65 years account 79% of the investors. According to Reilly and Brown's (2000) investors' life cycle paradigm the age range of 25-65 provides a healthy mix of investors from accumulation to spending phase for the study. During the period of 35-50 individuals are at their consolidation and spending phase and have another 15-20 years of life horizon. Thus, they invest their fund in risky but profitable sectors, especially equity markets. Investors above 51 are at their spending and gifting phase and are more likely to invest in less risky securities like t-bills to have safe but steady return and to avoid potential capital loss, Reilly and Brown's (2000). Surely, a third world country's capital market is not the best option for that. However, the result of descriptive statistics shows that, investors of spending phase demonstrate a risk loving attitude, which is contrary to the findings of Reilly and Brown (2000) in case of US markets. The mean of assigned age value is 2.64 which are close to median and mode value of 3. This is a sign of even selection of investors for the study as confirmed by the Skewness of -0.246.

### 4.02    Year of investment

Looking at the investors first year of investment it is interesting to find that the highest 19.5% of the investors have entered into the market in 1996 i.e. before the crash of 1997. The second highest of 17% investors have invested for the first time after the formation of the current government and another 15% of the investors have invested for the first time in the market after the formation of another government back in 2001. During the year of 2009, a total of 9.5% investors have entered in the market. The two years caretaker government rule has also attracted huge investors accounting almost 7% of the investors. These finding reveals that the formation of the new government gives hopes to the investors regarding the success and growth in market value. The worst years in terms of investment in the market has been from 2004-2006 as characterized by political turbulence and violence and unrest. Similarly, the period of 1998 has been another gloomy period in terms of attracting new investment, which has also been characterized as a year of political repression, strike, violence, etc. The mean initial investment year is 2002. Interestingly the year of 1996, 2002-2003, and 2008-2010 has been characterized by bullish market conditions. Therefore, these probably indicate that, there have been more opportunistic investors who actually tried to capitalize from the booming market condition.

### 4.03    Investor's occupation

The descriptive statistics shows that, 24% of the investors are teacher and other professional like layer, journalist, doctors, etc., however, 21% of the investors are from others category mostly like students and unemployed i.e., not in formal jobs. Amongst another category, 19.5% are from businessman while around 16% are engaged private corporations. Interestingly around 12% investors cited investment profession as their primary occupation, which is an encouraging sign in the overall context of them market. The descriptive statistics also shows that the mean value for investor's occupation is 3.73, which is above the median value of 3. However, the skewness of .018 indicates that selection of investors for the research has been fairly even, not only in terms of their age category but also in terms of their occupation.

### 4.04    Investor's education level

In terms of investor's education level, it has been found that around 38% of the investors has completed their graduation or degree level while 19% of the investors has completed a master's degree, 29.5% of the investors are from higher secondary level to degree level. In the context of the literacy level rate in Bangladesh, which is

43.1%[8], the level of investors' academic qualification is above national average. This may cast doubt whether the data is representative of the population set. In fact, what is important here is the symmetry of data and representation of investors in the stock market not the representativeness of the entire population in the country. The descriptive statistics shows that the mean value for investor's education is 2.32, which is close to the median value of 3. This also means data selection is symmetric which is also confirmed by the measures of skewness which is -.166, well below absolute 1 value to justify the argument.

| Table 03: Summary descriptive statistics about the attributes of respondents | | | | | | |
|---|---|---|---|---|---|---|
| Respondent's Attributes | Mean | Median | Mode | St Dev. | Skewness | Kurtosis |
| Age Category | 2.98 | 3 | 3 | 0.9791 | -0.231 | -0.23 |
| Investor's Occupation | 3.26 | 3 | 4 | 0.9648 | -0.413 | -0.307 |
| Investor's Education Level | 2.3 | 2 | 2 | 1.1649 | -0.056 | -0.14 |
| Yearly Income Level | 3.5 | 3 | 3 | 0.9948 | 0.907 | 0.695 |
| Proportion of Investment in Stock Market | 2.64 | 3 | 2 | 0.9847 | -0.008 | -1.042 |
| Year of First Stock Market Investment | 1993 | 1993 | 1996 | 2.1422 | -0.137 | -1.256 |
| Year of last Stock Market Investment | 2004 | 2004 | 2005 | 1.2094 | -2.105 | 5.79 |

## 4.05    Investor's income level

Perhaps one of the most important investor's profile variables in this research is investor's income level. It has been observed that investors were generally reluctant to answer this field honestly, which a behavioural phenomenon common among universal set of investors. From an investor's responses it has been found that exactly almost 30% of the investors have yearly income level of US$ 8500-17000, 22% investors have income level of US$ 5500-8500. Around 16% of the investors have acknowledged that their income level is more than US$ 35000. However, investor's distribution in terms of income level is approximately normal as the measures of skewness, which is .907.

Therefore, in terms of the general profile of the investors, it can be concluded that the selection of investors for the study has been symmetric. That means a variant cross section of investors has been considered to conclude the behavioural pattern of the investors.

## 5.0    Analysis and findings of investor's behavioural patterns

To know how the investors have actually behaved and have taken investment decision, several questions have been asked. Prior to presenting elaborate analysis and findings, some general but interesting observations regarding behavioural patterns of the investors have been presented. Later in this section, some detailed and rigorous testing results have been provided which seriously question the ideas of market or investor's rationality or even investor's irrationality.

## 5.01    Investment choices

As this analysis includes stock market investors only, the question has been asked to know investors other preferred sectors of investment. The analysis reveals that, investor's alternative investment choice includes among others *savings accounts, term deposit, govt. certificates, real estate, etc.*

Alongside the investment in the stock market, 98% said that they would prefer savings accounts, 46% said that they would prefer fixed deposit accounts, 34% responded that they would prefer investment in government notes, bonds and certificates, 20% replied for investment in real estate and only 14% has responded to invest in other formal and informal sectors. Therefore, it can be deduced that investment in commercial banks savings accounts and fixed deposit account is a supplementary investment option to stock market investment. Thus with condition of *ceteris paribus* any change in interest rates in various banks deposit accounts may not directly exert influence on the investment in the stock market in terms of volume, depth and breadth of trading as these investment alternatives have been found to be supplementary investment options.

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[8] Accessed from https://www.cia.gov/library/publications/the-world-factbook/print/bg.html on 12/02/2011.

| Table 04:  Descriptive statistics of alternative investment Choices along stock market investment. | | | |
|---|---|---|---|
| Investment Sectors | F | Percentage | Mean* |
| Investment in Other Sector | 11 | 14% | 0.14 |
| Investment in Real Estate | 14 | 20% | 0.2 |
| Investment in Government Sponsored Certificates like savings and Defense Savings certificate | 22 | 34% | 0.34 |
| Investment in Commercial Bank's Fixed Deposit Account | 31 | 46% | 0.46 |
| Investment in Commercial Banks Savings Account | 60 | 98% | 0.98 |
| Investment in Stock Markets | 62 | 100% | 1 |
| Total responses | 200 | | |

*Mean has been calculated from the value assigned for individual investment options.*

To test, whether there were any relation between various other forms of investment options including bank's savings account, banks fixed deposit account investment and investment in govt. certificates along with stock market investment, Pearson two-tailed correlation has been generated. The result shows that the investment in the stock market has a very low level of the negative relation with investment in commercial bank savings accounts and investment in fixed deposit accounts where the coefficient correlation is  ($\rho$ = -.02) and ($\rho$ = -.155) respectively.  However, the degree of significance is more than the critical value of .05. Therefore, coefficient correlation is not statistically significant, which affirms the earlier result of descriptive statistics. Thus, the assumption of investors "*rationality*" cannot be concluded as investors investing in the stock market should  have shown high degree negative correlation to investment in both commercial bank saving and  fixed deposit accounts which are theoretically significant for validating general form of investors' rationality.

## 5.02    Proportion of stock market investment

It has been found that the investors have invested in a different proportion (to their total investment) in the stock market. The analysis shows that 34.5% of the investors have invested between 10-25% of their total investment in the stock market, 32.5% invested between 26-50% of their inevitable fund in the stock market, while the lowest only 14% investors have invested between 51%-75% of their investment in the stock market. This shows that the investors have somehow taken huge amount of risk in investing their money in the market. Mean of proportionate investment in the stock market is 2.41 where the value range is from 1 to 4.

| Table 06: Independent sample test: Levene's test for equality of variance & measures of association | | | | | | |
|---|---|---|---|---|---|---|
| Independent Samples Test | Levene's Test for Equality of Variances | | t-test for Equality of Means | | Sig. (2-tailed) | Measures of Association | |
| | F | Sig. | t | D.F. | | Eta Value | Eta Squared |
| Proportion of Investment in Stock Market-Equal variance assumed | 54 | 0 | -4.287 | 6 | 0.005 | 0.355 | 0.126 |
| Proportion of Investment in Stock Market-Equal variance not assumed | | | -5.715 | 4 | 0.005 | | |

To see whether wealthy investors invest a greater proportion of their inevitable fund in the stock market; the independent-Samples Levene test to compares means for two groups of cases has been performed (Table: 05). The t-test for equality of means has a sig. (2-tailed) of exactly .005 i.e., less than .05, and Levene's test for equality of variance produce a sig. of .000, which is also lower than .05. Thus, we accept the result of 'equal variance not assumed' and conclude that there is no association between wealthy investors investing at a higher proportion of their total investment in the stock market compared to that of a small investors. Alternatively, the idea that small investors tend to invest less in the stock market has not been established. The eta squared value of .126 (usually used for this type of non-linear data) indicates null hypothesis 01 is rejected.

## 5.03    Forms of return expectation

The question has been asked regarding how investors differed in terms of their expectation of future return. Only 17% of the investors cited only dividend or only capital gain as their expected form of future return. 43% of the

investors cited both dividend and capital gain as their expected form of future return, while 40% acknowledged short-term capital gain as their expected form of future return. Amazing, this is! How could the market be able to grow steadily in the long run if the investors do not invest for long-term capital gain or continued dividend yield? Naturally, if funds invested are taken away from the market within a short span of time, just after making substantial capital gain (loss) due to movement in market index; the market will lose its long term appeal to investors. The question may arise, whether such an attitude of the investors toward market was the reason for volatile market movements? The answer might not be easy. However, if most investors invest for short term capital gain, a purely speculative market, rather than a stable and matured stock market should appear in reality.

To test whether there was any association between wealth endowment and expected form of investment return, i.e. whether wealthy investors primarily invest for capital gain & dividend, mean test has been applied. It has been found that, as we move from lower income group investors to higher income group of investors, the mean value has sliced down from .667 to .333, indicating that the wealthiest investors do not primarily invest for long-term capital gain and dividend. A straight explanation of this result could be that they do primarily invest for short-term capital gain i.e. profiting from speculative market bubble. It has been also revealed that lower income group investor also invest primarily for short-term capital gain which has been found to be very common among investors in bullish market condition. Therefore, both the null hypothesis no. of 02 and 03 is rejected. This means that, the idea of wealthy investors being risk averse has not been found in the case of DSE i.e. during the widow of analysis, the wealthy investors did not try to protect their actual investment; rather, they looked for abnormal speculative gain. In fact, it is the middle-income group of investors who invested for capital gain and dividend. Alternatively, their investment in the stock market remained for a long period of time and gave the market some level of much-needed stability.

## 5.04    Investment & disinvestment behaviour before & after the crash

To test whether an individual investor's investment behaviour differed before and after the crash, an independent sample test has been conducted. It has been found that there had been a very low level of negative correlation (-.101) between new investment made by the investors before and after the crash. Mean new investment before the crash has been found to be higher than the mean disinvestment after the crash. This further reinforces the previous conclusion that most of the investors have tried to profit from the market bubble. Once the investors have seen that market is crumbling downward they just tried to withdraw the investment from the market, resulting an intense sell pressure and pushing the market down beyond its intrinsic value level. A further analysis also reveals that investor's new investment decision during the boom period exhibited a significant difference with that of crash period. The two-tailed paired sample test has a significance level of .002 which is lower than the standardized value of .05. This has also been confirmed by the confidence interval for the mean difference as it does not contain a zero value (Table: 06).

| Table 06: Paired Samples Test for Test Association between the Paired Variables | | | | | |
|---|---|---|---|---|---|
| Pairs and the Related Variables | Paired Differences (Mean) | 95% Confidence Interval of the Difference | | T | Sig. (2-tailed) |
| | | Lower | Upper | | |
| New Investment in Boom Period - New Investment after crash | 596770 | 239272.36 | 954267.64 | 3.36 | 0.002 |
| Dis-investment in Boom Period - Dis-investment after crash | 512219.98 | 214608.98 | 809830.97 | 3.46 | 0.001 |

Moreover, investors disinvestment decision before and after the crash also exhibited significant differences as well. This has been shown by the two-tailed paired sample test which has a significance level of .001 which is lower than the standardized value of .05. This has also been confirmed by the confidence interval for the mean difference as it does not contain zero value. Now what caused the difference is a matter of further investigation. However, is it easy to reject the influence of investor's psychology (greed, frustration, heard behaviour etc.) in augmenting the true reason for such result?

To see whether investors became cautious to avoid further loss after the crash and thus, whether investment decision after the crash has become more rational, a non-parametric test was conducted. The result showed that, almost 10% of the sample investors invested immediately after the crash, with ideas that the market will surely rebound. Thus, the lack of investor's confidence in the market as well as the presence of fear of regret amongst the investors cannot be absolutely assumed. These are contrary findings of behavioural finance or a finding that seconds the findings of efficient market hypothesis.

Again, when asked how they would have further avid such loss in future, invest in stable but low earning firms has been cited as the most suitable options with a mean value of 1.47 and the next best options has been cited as invest in firms with consistent price increase with a mean value of 1.52. Furthermore options like investment in consistent earnings record invest in large size firms; investment in higher P/E ratio firms, etc. has been prioritized over investment in small size firms, investment in uncertain but higher earning firms, multinational firm's stock. Therefore, null hypothesis no.05 cannot be rejected i.e. it is not necessarily true that, investors are not careful and following the findings consistent with EMH. It is therefore not wondering that Graham's conviction is not always reality for a universal set of investors including investors in DSE!

## 5.05    Receiving investment counselling

There were some 195 brokerage firms of which 72 firms were active, who offered round the clock counselling to the investors[6]. To see whether investors consulted these brokerage houses, who were considered to be professional consultants, it has been found that 40.5% applied their own judgment where only 20.5% consulted with professional investment consultant i.e. brokerage firm to take investment decision. The second best investment counselling of 26% has been received by the investors form the friends or peer groups who has investment in the market. This seems quite interesting when we consider that only 18% of the investors have just heard about financial models to take investment decision in financial markets, and asked about whether at any point of investment decision investors apply investment decision, 92% said no and only 8% responded with yes. What about those who knows that there are models to take investment decision? Only 6% of them somehow think about the idea of CAPM or APT!! Now, in a market where 405% apply their own judgment and 82% has never heard about the existence of financial market investment model related to stock picking, market risk measuring, return forecasting, and so on and so forth, how could investors (*who were assumed to be rational under EMH*) invest in such a risky option, without consulting to a brokerage firms? In fact, these except 20.5% all other investors rely on intuition and self-reference criteria or judgment. Therefore, we can conclude that investors are not fully rational as assumed by EMH. The *touchy- feel syndrome*[7] may answer this dilemma! One point to note that, the basis of designating investors as not-irrational is the fact that, they do not follow the basic finance paradigm of investment models. Therefore, as per the EMH criteria, these investors are not rational. However, calling them irrational is not an option here as well!

| Table 07: Descriptive statistics about market frictions in DSE | | | | | |
|---|---|---|---|---|---|
| Questions | Responses (%) | | Mean | Std. | Skewness |
| Do you believe that everyone in the market has the same expectation? | Yes | 18.50% | 1.815 | 0.38927 | -1.635 |
| | No | 81.50% | | | |
| Any trading cost in the market? | Yes | 100% | 1 | 0 | N/A |
| | No | 0.00% | | | |
| Stock Market Gambling? | Yes | 94.50% | 1.055 | 0.228 | 3.933 |
| | No | 5.50% | | | |
| Do you believe syndicated price manipulation exist in the market? | Yes | 91.00% | 1.15 | 0.498 | 3.234 |
| | No | 9.00% | | | |
| Do you believe derivatives contract will increase price manipulation activities? | Definitely | 90.50% | 1.075 | 0.299 | 4.317 |
| | Not Necessarily | 8.50% | | | |
| | Cannot say | 1.00% | | | |
| Do you believe that stock market does not have a relationship with a real sector? | Strongly Agree | 44.50% | 1.965 | 1.281 | 3.019 |
| | Somewhat Agree | 32.50% | | | |
| | Neutral | 12.00% | | | |
| | Disagree | 7.00% | | | |
| | Strongly Disagree | 4.00% | | | |

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[6] This information has been collected from Mr. Saiful Islam, Managing Director of Equity Partners Ltd., an active brokerage firm providing full-service brokerage facilities.

[7] Touchy-feely syndrome is a tendency of human to overvalue things they have actually touched or selected personally. Arnold S. Wood of Martingale Assets Management (2001) has argued this investors value their own touch i.e. they prefer to have a security if chosen personally and become bigheaded of its gain and tends to show less painful reaction of its loss. Source: www.investorshome.com/psychology.

| | | | | | |
|---|---|---|---|---|---|
| Do you consider overall market to be? | Bullish | 67.00% | 1.44 | 0.685 | 1.263 |
| | Bearish | 22.00% | | | |
| | Properly priced | 11.00% | | | |
| Do you believe that stock market does help in the real economic development? | No | 84.50% | 1.09 | 0.391 | 4.395 |
| | Yes | 7.00% | | | |
| | Do not Know | 8.50% | | | |
| If you are asked to invest will you invest in a bearish condition? | Yes | 0.00% | 1 | 1 | N/A |
| | No | 100% | | | |
| If you are asked to disinvest in market with start of bullish period- would you? | Yes | 8.00% | 1.97 | 2 | 0.171 |
| | No | 92.00% | | | |

## 5.06    Reasons for a major crash of 1997 and subsequent crash of both 2001 & 2008

To find out the reasons responsible for market crash, several variables have been identified. These include decline of earning & profitability, stories in news media, analysts forecast, loss of confidence of the investors in the market, and heard behavior, etc. Reasons like decline in earning and profitability is quite consistent with the earlier findings like Misir et al. (2005) as well as with standard finance paradigm. However, factors like herd behavior is simply nonsense in the market as per standard finance paradigm. Amongst the respondents, 38% suggested that heard behavior was the reasons for market decline, while 26% viewed media influence, 16% responded loss of investors' confidence in the market, while 12% said decline in earning & profitability were the major reasons for the crash. Therefore, null hypothesis no. 04 can be rejected to conclude that, there is a strong association between heard behavior and market performance. Is there any explanation of such findings to those who promotes a universal view of investor's rationality?

## 5.07    Presence of frictions in the market

To assess whether there exists frictions in the market investors were asked sever questions of variant nature including homogeneous expectation, transaction cost, nature of the impact of the stock market on economy, etc. In responses to the question related to the *existence homogeneous expectation*, 81.5% of the investor's response no compared to 18.5% of the yes response. At this point, one simple question may be asked. If there is homogeneous expectation regarding price amongst the buyer and seller how come the market process will work out? Why someone will buy a stock when s/he thinks in consistency with the seller i.e. forming homogeneous expectation? More specifically the buyer will think why shall I buy a stock when someone having same information is selling the stock? Surely if he sells it for profit, why I should buy it considering the fact that he has the same information that I have? Surely what he knows I am not aware of that! Surely there is something! Therefore with homogeneous expectation there should not be any trading. Rather uneven expectation in terms of price based on asymmetric information is the main reason of trading. That is exactly what the study has found it the analysis. Therefore, the idea of investor's rationality is not true that in a rational market all individual will have the same expectation.  Similarly answering to another question of whether there is any transaction cost, 100% of the investors have said yes. This is a friction in the market which is contrary to EMH vis-à-vis rationality.

Scores of studies including, Ingraham (2007), Westerhoff (2004) has suggested that stock market is pure gambling or nothing short of gambling. Therefore, we have simply asked a question whether stock market is a gambling business. The answer was amazing! 94% of the responded with a yes answer compared to only 6% saying no. Without much of statistical maneuver this result sets a question why do rational individual or irrational individual takes the course of gambling? The question is if there is a chance to win or lose, whether a rational or irrational will move forward to invest?  In response to the presence of syndicates to manipulate the price in the market, 91% said that they believe that in the market there exists syndicates who controls, manipulates price of stock in the market despite the presence of regulatory authorities. In response to a question of whether the introduction of derivatives will increase price manipulation by the syndicates, they 90.5% has said yes compared to 8.5% saying no. When asked about the condition of the present market, 67% percent has responded that overall market is bullish, and 22% said that the market is overall bearish and only 11% have said that market is properly priced. Interestingly the study has tried to find whether the market prices the stocks properly according to CAPM? Only 7 stocks out of total 243 actively trading stocks have found to be properly price, which is less than 6% of the stocks available in the market. In response to a question of whether, investor believes that stock market does help in the real economic development, 84.5% have said that they don't believe stock market helps economic

development since the money traded in the market does not go the company for real investment or production. This is consistent with their response that almost 77% of the investors have suggested that they do not believe that there exists any real relationship between stock market performances and the overall economic performance or vice-versa. This is consistent with many findings like Binswanger (2009), Jeong-Ryeol (2003),  Darrat, and Mukherjee (1986),  Balke et al. (2001), Carlson & Sargent (1997), Heaton et al. (2000), and Kopcke (1997), etc.

These findings suggest that, the individual investors do not always make investment decision that can be supported by the rationality assumptions of EMH nor these findings suggest that they are fully irrational that they are only psychology of sentiments and mood.

## 5.08     Blaming for loss and crediting for gain

A question was asked regarding whom the investors blame if they suffer any loss. The first group to blame is the media and the second group to blame is the brokerage firm through which they trade. Interestingly the overall market condition or company's earnings record or even market syndicates were not blamed at that level. This is simply rational saga of behavior. To test whether investors of different wealth category is unanimous in their response regarding which to blame for, Kruskal Wallis test has been conducted (Table: 08).

| Table 08: Blaming for loss and crediting for gain | | | | | |
|---|---|---|---|---|---|
| Blame for loss [d.f. = 3] | | | Credit for gain [d.f. = 3] | | |
| Factors | Chi-Square | Asymp. Sig. | Factors | Chi-Square | Asymp. Sig. |
| Broker | 5.12 | 0.163 | Own judgment | 5.502 | 0.139 |
| Media | 5.376 | 0.146 | My fortune | 2.024 | 0.568 |
| My fortune / judgment | 2.333 | 0.506 | My intuition | 4.112 | 0.25 |
| Market Syndicate | 5.152 | 0.161 | Broker | 5.152 | 0.161 |
| Company's performance | 4.814 | 0.186 | Company's performance | 4.814 | 0.186 |
| Overall market condition | 1.139 | 0.768 | Market condition | 0.244 | 0.97 |
| Overall economic condition | 1.057 | 0.787 | Economic condition | 1.057 | 0.787 |
| * Results from Kruskal Wallis Test. ** Grouping Variable: Income level | | | | | |

The result accepts the null hypothesis i.e. there is no significant difference amongst the investors with different wealth endowment. In every single case, the significance level was more than acceptable .05. Therefore, even though they answered earlier that there is no homogeneous expectation about price, however, there is homogeneity regarding blaming someone for their loss especially the broker or the media.

This is in line with EMH assumption of homogeneous expectations. However, as our earlier case shows that 40.5% of the investors do take investment decision by their own judgment compared to 20.5% taking broker's suggestion, then they should blame themselves rather than broker or media. This is in line with the idea of behavioral bias and contrary to EMH assumption of rationality. Contrary to this reality, when asked about whom to credit if there is a gain most of them has opted their own judgment as the primary factors along with their fortune and intuitions while, market conditions has been moderately picked up by investors. However, the broker and economic condition is amongst the lowest in the choice. The Kruskal Wallis test for homogeneity suggests that the investors have expressed homogeneous expectation regarding all the factors in crediting for gain since the significance level is more than acceptable level of .05

## 5.09     Normal time buy decision

To see how the investors behaved in making investment decision under normal market conditions, descriptive statistics has been applied. It has been found that, recent performance of the stock, recent performance of the market along with dividend expectation has been considered as the most important parameters amongst different types of investors grouped by wealth endowment. Interestingly company's earnings record, beta of the stock, company's sales growth has been found to be the least important factors to influence the normal time buy decisions.

The Kruskal Wallis result shows that these findings are unanimous across different category of investors grouped by wealth endowment, different occupation level, different age category as well as different education level. This has proved that investors are unanimous or holds homogeneous expectation. However, the factors which they credit most should not be the factors according to EMH. It seems everyone wants to gain when there is the smell

of honey and wants to escape when there are bees on sight. To test whether, different investor's provided different responses regarding the reasons for investing in a normal market; the Kruskal-Wallis non parametric test has been conducted. It was found that, investors in different category had provided a similar response regarding the most important factors i.e. recent performance of the stock, to affect the investment decision in a normal market condition (Table 9).

| Table 09: Returns from NPar test for the measures of associations regarding normal time buy decision. | | | | | | | | |
|---|---|---|---|---|---|---|---|
| Factors | Wealth endowment [df=4] | | Occupation [df =5] | | Age Category [df =4] | | Education [df=3] | |
| | Chi-Square | Sig. | Chi-Square | Sig. | Chi-Square | Sig. | Chi-Square | Sig. |
| Company's earnings record | 3.695 | .449 | 4.737 | .449 | 4.248 | .373 | 2.965 | .397 |
| Company's sales growth | 1.918 | .751 | 1.578 | .904 | 1.481 | .830 | 1.302 | .729 |
| Book value of the share | 6.423 | .170 | 3.523 | .620 | 1.367 | .850 | 1.602 | .659 |
| Recent performance of shares | 6.113 | .191 | 2.087 | .837 | 4.251 | .373 | 3.818 | .282 |
| Recent performance of market | 5.653 | .227 | 1.980 | .852 | 4.003 | .406 | 2.840 | .417 |
| Recent performance of economy | 3.502 | .478 | 3.123 | .681 | 1.436 | .838 | 2.933 | .402 |
| Possibility of dividend | 5.149 | .272 | 3.572 | .613 | 3.214 | .523 | 1.892 | .595 |
| Possibility of bonus shares | 5.217 | .266 | 6.512 | .260 | 2.348 | .672 | 2.694 | .441 |
| Possibility of right issue | 6.564 | .161 | 5.380 | .371 | .625 | .960 | 3.691 | .297 |
| Beta of the stock | 1.828 | .767 | 14.528 | .013 | 2.696 | .610 | 5.003 | .172 |
| Price earnings ratio | 5.383 | .250 | 4.077 | .538 | 2.406 | .662 | 1.005 | .800 |
| Other reasons | 2.126 | .713 | 12.119 | .033 | 4.016 | .404 | .407 | .939 |

\* Results from Kruskal Wallis Test
\*\* Grouping Variable: Age Category, Investor's Occupation, Investor's Education Level, and Investor's Income Level.

Therefore, it can be concluded that, the test of investor's rationality in terms of homogeneous expectation may have some ground in a stable and normal market conditions.

## 5.10    Factor affecting boom-time buying decision

To test the factors those contributed the boom-time buying decision (in reference to the period of 1996-1997, 2000, 2008-9) descriptive statistics and Kruskal-Wallis test has been conducted by categorizing the investors under different test variable categories. The summary result has been presented in the table no. 10. Generally, a buy pressure in the stock market securities will push the market to upward direction resulting a bullish market and vice-versa. From fundamental analysis point of view, a stock market shows a strong sign of being bullish for several reasons including growth forecast in gross domestic product (GDP), increase in corporate sales, shifts in the term structure of interest rate, increased forecast in earning per share, earning and dividend signaling, etc. (Frank et al., 2000). A study on S&P 500[9] found that almost 36% variability of the stock market return can be explained by a change in the GDP forecast.

Graham et al. (1962) has argued that undervalued securities can help to boaster the market as one of the implications of EMH is that, market can instantaneously adjust information in the price. If the stock prices are undervalued and therefore the market is undervalued, most of the investors will try to gain from this undervalued market, increasing a buy pressure, hence market will automatically adjust the price. Graham et al. (1962) however argued that the speed of adjustment will be different in the case of different markets. With these finding in mind from the previous study, an analysis of DSE investors revealed some interesting findings. Whether these findings go hand to hand with market or investor's rationality will remain as a big question.

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[9] This finding has been revealed by several large investment firms including Goldman, Sachs, and Company, Merrill Lynch etc. Wall street journal has published this finding where over 50 economists have worked for 6 month periods. The estimates of stock market predictors included among others are various interest rates, GDP, inflation, exchange rate of USD against Japanese Yen.

| Factors | Wealth endowment [df=4] | | Occupation [df =5] | | Age Category [df =4] | | Education [df=3] | |
|---|---|---|---|---|---|---|---|---|
| | Chi-Square | Sig. | Chi-Square | Sig. | Chi-Square | Sig. | Chi-Square | Sig. |
| Media influence | 4.304 | .230 | 2.087 | .837 | 3.995 | .407 | 2.079 | .556 |
| Market was undervalued | .644 | .886 | 3.123 | .681 | 1.436 | .838 | 2.933 | .402 |
| Wanted to gain from the bull market | 1.709 | .635 | 1.940 | .857 | 4.888 | .299 | 1.611 | .657 |
| I thought market will remain bull for a reasonable period | 3.010 | .390 | 4.136 | .530 | 3.910 | .418 | 2.112 | .549 |
| I thought market to keep rising | 4.861 | .182 | 6.512 | .260 | 2.348 | .672 | 2.694 | .441 |
| I thought market to fall but not crash | 5.929 | .115 | 5.380 | .371 | .625 | .960 | 3.691 | .297 |
| Company's earnings record | 1.382 | .710 | 1.391 | .925 | 1.425 | .840 | 1.094 | .779 |
| Company's sales growth | 1.770 | .621 | 14.528 | .013 | 2.696 | .610 | 5.003 | .172 |
| Recent performance of stock | 2.734 | .434 | 4.077 | .538 | 2.406 | .662 | 1.005 | .800 |
| Stock beta | 4.686 | .196 | 3.876 | .567 | 1.656 | .799 | 1.925 | .588 |
| Price earnings ratio | 3.549 | .314 | 4.737 | .449 | 4.248 | .373 | 2.965 | .397 |
| Other Factors | 2.505 | .474 | 13.150 | .022 | 4.358 | .360 | .838 | .840 |

Table 10: Returns from NPar test for the measures of associations regarding boom time buy decision.

* Kruskal Wallis Test ** Grouping Variable: Age Category, Investor's Occupation, Investor's Education Level, and Investor's Income Level.

Most investors cited that media influence, desire to gain from the bull market as the most important factors contributing the investment decision during the period. Moreover, investor's optimism that the market will remain bull for a reasonable period, recent performance of the stock. P/E ratios have been categorized as the second layer of factors contributing to the investment decision process. Interestingly, investors rated the perception of undervalued market, stock beta; company's earnings record, etc. as the least important factor in their investment decision during the bullish market condition. Moreover, an attempt has been undertaken to unearth the degree of consensus among different categories of investors with regard to their views on causes/factors affecting bull time buying decision. This finding reveals that investors have formed homogeneous expectation for a reason not supported by market rationality, which had been the key assumption of EMH. Their homogeneous expectation and the reason for trading is not the belief of undervalued market. This was very strange. These findings clearly contradict Graham et al. (1968) findings even within a compromise context of rational and behavioral finance models.

Honestly, if investors do believe that the stock price is not undervalued why they bought such a large volume of securities as experienced during several boom periods? The answer has been a desire to gain form short term speculative investment whose ultimate reality is a foreseeable crash of huge magnitude. This is greed indeed! Not rationality! And it is present in human. So investor forming homogeneous expectation is not a guarantee that the market is rational.

## 6.0    Conclusion

It is rational to assume that investors are normal human being they have a mind as well as heart. They have greed, frustration, anger. Again they have a brain to calculate and take consideration of all of these behavioral sentiments as well as certain key rational attributes in terms of risk-tolerance. However, when the test of investor's rationality is conducted within the frame of key assumptions like homogeneous expectation, information efficiency etc., the orthodoxical meaning of rationality does not always hold true. The fundamental reason for that can be in the discovery of the answer to the question of why investors decision process has to align with EMH models of investment i.e. APT (arbitrage pricing model), CAPM (capital assets pricing model), and Markowitz model, etc. when its assumptions are not absolutely real? Again without assuming that human has a brain to think and act rationally is it psychology only to explain human behavior?

From the evidences of investor's realism across markets around the world including DSE, it is time to understand that, the human who trades in the market is not something, whose ration can neither be mathematically modeled nor can be modeled by simply considering that they act with their feelings without giving any head to their brain.

Both of these are of paramount importance in understanding long term behavior even though in a short term one may outweighs the other. It is therefore time to challenge the both the conventional models of EMH as well as the emerging model of behavioral finance which purely explains things with psychological factors. May be a compromise between behavioral aspects with aspects of individual's rationality (not market rationality) can produce broad based acceptable finance paradigm where investors will be assumed and observed as 'normal' and there would be no need to call investors as either mathematically rational or irrational. However, to do that job a painstaking task may be required and maybe we need to say goodbye to security pricing models based on EMH. Should the academicians have any problem if that new model understanding human, financial behavior provides better insight evenly though out normal, bullish and bearish market conditions? It would be unjust if advocates of EMH or pure behaviorist would not receive that pain!

## 7.0    Future research directions

It is unfortunate that not even after such a big bubbles in DSE; the real reason(s) for such bubble has not been adequately researched. So far whatever the attempted has been made to uncover the real stories, most of them concluded that sloppy market regulations, investor's inadequate knowledge, etc. are the real causes for such outcome. One of the interesting similarities amongst them is that, none of the works tried to question whether the model of investor's rationality and its assumptions are valid or not. Rather almost all of those works tried to align the investors with rationality assumptions i.e. to conform to EMH. This paper provides a wider basis to further support the development a new frontier of finance paradigm i.e. behavioral finance, which combines the rationality with greed, frustration, regret and some other physiological factors in explaining investment behavior of the investors. From the findings of the paper a number of new areas of future research have been suggested:

1.  A comprehensive research can be undertaken to reject the notion of efficient market model and develop a new model for understanding market behavior, with a compromise between assumptions of market efficiency and investors psychology.
2.  A clinical study can be conducted to understand the effect of *fear of regret* among the investors who may cause a rapid decline in the stock market.
3.  "Whether bull time buy decision is a sign of irrationality?" can be another interesting are of works.
4.  Investors tend to overvalue a winning decision, and convey it to others as a success. A research can be undertaken to know whether a success story of one investor help others to follow i.e. whether *crowd and conventional strategy* work in our market?
5.  "Do stock market participants have long the memory i.e. recalling their earlier success or failure for making new investment decision?" can be an interesting area of research.

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