

GAMBLER'S FALLACY AND BEHAVIORAL FINANCE IN THE FINANCIAL MARKETS (A CASE STUDY OF LAHORE STOCK EXCHANGE)

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ABSTRACT

This research thesis work begins by introducing 'behavioral finance' and how its theories are in stark disparity with that of conventional financial theories that have been experienced for decades. Since its inception in 1970s behavioral finance has tried to explain and justify the existence of a number of market anomalies by incorporating behavioral characteristics of financial decision making that may not for all time appear significant to the trader/ dealer. It highlights one aspect of behavioral finance that can be seen in the financial market as called: Gambler's Fallacy, due to the very nature of the behavioral aspect it refers to. The study not only primarily focuses upon the stock and shares' market price but also throws light on the way how trading of these devices/ gadgets/ instruments is affected by gambler's fallacy. Therefore sample population for this thesis has been selected from Lahore Stock Exchange, Pakistan. The method of research has been purely through questionnaire and the sample was taken from the Lahore Stock Exchange from people with no specialized financial knowledge. This thesis report intends to bridge that gap of knowledge by finding out the degree to which misleading notions of gambler which is also called gambler's fallacy exists and has a vital impact on the decisions of investors in Pakistan.

INTRODUCTION

This research is important because financial decisions are ideally assumed to be free of all emotional and psychological interference and all investors are assumed to be rational "wealth maximizers". However, real market trends paint a different picture; especially in a country like Pakistan, where stock market crashes are not unheard of and where markets are way too volatile as compared to most of the international markets. Where on one hand it is true that all investors have some level of financial knowledge that they apply before making an investment decision, on the other hand the fact that they don't always make rational decisions in their own interest cannot be overlooked.

Behavioral Finance can be best described as that field of finance that proposes psychology and human emotion-based theories to explain certain investment anomalies that is seen in real life. It basically assumes that the characteristics of market participants and their emotions influence the investor's financial decisions and thus the market outcomes. Gambler's fallacy is referred to "Monte-

Carlo fallacy or the Maturity of Chances fallacy" and is studied under behavioral finance. It is the conviction that if divergences/deviations from probable behaviour are experiential in recurring independent tests of some unsystematic procedure then these divergences/deviations are likely to be evened out by contrary deviations in the future.

Gambler's Fallacy mainly revolves around the illogical concept of any investor that believes that some one event (example **X**) that is in reality inherently independent of any other event (Example **Y**) may be affected by the other event i.e. even though in reality; logically and rationally **X** does not affect the outcome or occurrence of **Y**. Gambler's fallacy states that people illogical amuse that they do. This illogical approach often comes into play because a similarity between random processes is wrongly interpreted by an investor as a predictive relationship between them. For example two square dice are similar in shape and represent the same probability of reaching the same number of outcomes (i.e. infinite) but they do not influence each other's outcome. If you throw a red dice and get a '6' there is no guarantee that another red dice will also show

a '6' just because it is red. But when someone wrongly assumes that it will since the last red dice did too; the behavior may be described as Gambler's fallacy. It is believed, incorrectly, that if a flipped coin has come up heads three times in a row it is more likely come up tails next time. Similarly, just because a stock or market has gone up or down for a while doesn't mean it is more likely to go the other way soon.

Gambler's Fallacy can be in any of the following forms; Run of good Luck, Law of Averages, Law of Averages or Exhausted Its Luck, Run of Bad Luck. No matter what type of gambler's fallacy is taken into account, all versions of gambler's fallacy are based on the same fundamental mistake of the failure to understand statistical independence. When the fact that two events are statistically independent, when the occurrence of first event has no statistical effect on the occurrence of the second event is somehow overlooked or not understood. Gambler's fallacy exists in one or more of its forms mentioned above. It is reasonable to assume that every gambling "system" is based on the fallacy that the probability of something happening in a person's mind would change irrationally.

PURPOSE OF THE STUDY

This research attempts to focus on whether or not the gambler's fallacy overshadows investor's financial decisions while they make them, or their financial decisions are completely separated from the behavioral aspects due to their sound knowledge and understanding of the financial markets and the way they work.

RESEARCH HYPOTHESIS

The hypothesis to be tested in this research is:

Gamblers fallacy affects investor's expectations while investing in stock market.

METHODOLOGY

The research aims at studying the influence of investors' expectations by the behavioral attribute of Gambler's Fallacy. In order to determine the relationship between expectations and Gambler's Fallacy surveys were conducted through questionnaires. The survey consisted of a questionnaire which aimed at unveiling the affect of Gambler's Fallacy on investor decisions that eventually lead to the current market price of stocks. The questions were phrased in such a way that the subject did

not know that he/she is being tested for the Gambler's Fallacy to avoid bias in their answers. This is important to deduce if the investor is a victim of Gambler's Fallacy or not. All questions in the questionnaire are close ended questions so that the results are easy to comprehend and focus on the objective of the research. The sample is the investors of the Stock Market of Lahore only. The sample size is 40 investors who trade at LSE at different points in time.

SCOPE OF THE STUDY

Though Pakistan is a country with an unstable political environment that reflects to some level in the unstable economy and thus inevitably a relatively unstable stock market, however, the level of instability in the stock markets surpasses by all standards the level of instability in the economy of the country. While the economy is no doubt growing and flourishing with every passing year and generally different sectors of the economy seem to be doing well; the stock market is still unstable. This instability cannot be attributed alone to the economy as a whole or the political crisis; it is for these reasons that I decided to carry out a research in order to gain an insight into the average non-specialized investor's (who makes up most of the total investors in Pakistan) decision making process. In special, due to several hindrances and limitations, scope of the study is confined to gambler's fallacy in Lahore Stock Exchange and therefore, hypothesis is also tested on the sample of 40 investors taken from Lahore Stock Exchange.

LIMITATIONS

The study is limited to Lahore Stock Exchange Pakistan only. Further studies can be carried out by considering other Stock markets in the country. Another very important limitation is investors' hesitation because investors were found very much reluctant to provide any sort of information.

LITERATURE REVIEW

William A. Branch and George W. Evans (2006): This study suggests a model of bounded rationality to overcome hindrance of Standard Rational Expectations (RE) to understand different prominent pragmatic regularities and observes long-run excess returns. It explains alternative theoretical foundations for the empirical findings and takes into account things beyond rational expectations and devises behavioral or through which these anomalies might arise (e.g., Barberis, Shleifer, and

Vishny (1998), Hong and Stein (1999), Hong, Stein, and Yu (2005), and Lansing (2006). Previous models taking a behavioral perspective that give understanding of empirical puzzles: overreaction, gambler's fallacy, undue probability changes, to 'news' about dividends, excess trading, long-run predictability, and volatile long-run excess returns. Stock returns in many countries are positively correlated in short term and negatively correlated over long run which is interpreted as evidence that there is initially under reaction to news and later overreaction over time.

Jeff Dominitz Charles F. Manski (2005) focus on the more primary problem faced by economists working on behavioral finance: the measuring and interpreting of expectations of equity returns. Measuring expectations is a specifically challenging task since there are no formal models through which they can be measured. The paper tests how behavioral aspects unintentionally influence the expectations of traders while they trade and thus result in anomalies in the market as traders start trading based on those irrationally changed expectations.

Robert J Shiller (2002) focuses on the same lines, but on a broader perspective. He traces the market trends from the efficient market theory to behavioral finance and the many traits identified in the field such as gambler's fallacy, over confidence and over reactions. He begins by tracing the historical background of the efficient markets theory which reached the height of its dominance in the 1970s but successive identification of unexplainable anomalies in the market coupled with excessively volatile returns reaching all time highs and all time lows for no apparently rational reason led financial analysts and economists to study more deeply into the decision making process of investors who seem to be making decisions that don't always work for their own benefit and defy simple investor logic in the 1980s.

Kent Daniel, David Hirshleifer, Avanidhar Subrahmanyam (1998) analyzed the impact of following two important psychological biases of investors on their investment decisions:

- (i) Investor overconfidence about the precision of private information Overconfidence implies negative long-lag autocorrelations, excess volatility when managerial actions are correlated with stock mis-pricing, public-event-based return predictability.

- (ii) Biased self-attribution, which causes asymmetric shifts in investors' confidence as a function of their investment outcomes.

Biased self-attribution adds positive short-lag autocorrelations ("momentum"), short-run earnings "drift," but negative correlation between future returns and long-term past stock market and accounting performance.

While Canner, Mankiw and Weil (1997) try to explain the puzzle by relaxing the rigid assumptions of the CAPM, the authors follow another idea: Learning from Benartzi and Thaler (2000) about investors' immature diversification strategies, the paper find evidence that Asset Allocation Puzzle can be explained by a new behavioral portfolio model. To verify the findings questionnaires were distributed among several investment consultants who gave information about their market expectations. These expectations were heavily influenced by the behavioral aspects such as gambler's fallacy and over confidence. The study also examines the losses that are undertaken by the investors due to these behavioral aspects. Investors despite sound investment knowledge tend to hold on to stocks that are going into loss simply because they've held on to the stocks for a long time and the stock had been performing well previously and the downward trend is observed only recently and vice versa for investors who tend to get rid of stocks that seem to be doing well in the recent past.

Jim Loy (1996) conducted one such study to explain at length the concept of gambler's fallacy. He presents the readers with a number of options to choose from, for example, he presents average people with a simple scenario; someone has just flipped 7 "heads" in a row. Then asks people what is the next flip likely to show? A) "Head" b) "Tail" c) "Head" and "Tail" are equally likely. From the answers collected he then explains why people who had chosen option "A" and people who choose option "B" were both representing a form of gambler's fallacy. The person who choose option "A" represented the form of gambler's fallacy where someone assumes that since the coin showed "head" so many times before it will show heads again; in other words the probability of a "head" in his/her head changed and he/she assumed the likelihood of a "head" increased just because the last 7 times showed "heads". Similarly the person who chooses option "B" is also representing a form of gambler's fallacy; the form that alters the probability of something happening in a person's mind for no rational

reason. The person assumed that since the last 7 times showed a “head” the 8th flip would land on a “tail” simply because there had been too many times that “head” was shown. The right answer however, is option “C” because no matter how many times the fair coin is flipped; the probability of a “head” or a “tail” remains the same because all these events are independent in themselves from each other.

Clotfelter and Cook (1991, 1993) find evidence of the gambler’s fallacy in analysis of data from the Maryland lottery’s “Pick 3” numbers game.

In the Maryland lottery, the payout to all numbers is equal at \$250 on a winning fifty-cent bet, so the gambler’s fallacy betting strategy costs bettors nothing. This article looks at the importance of the gambler’s fallacy in the New Jersey lottery’s three-digit numbers game, a pari-mutual game where a lower amount of total wagering on a number increases the payout to that number. Results indicate that the gambler’s fallacy exists among bettors in New Jersey, although to a lesser extent than among those in Maryland.

Gary P. Brinson, L. Randolph Hood and Gilbert L. Beebower, (1986) analyzed Corporate financial policy implications along with many other untested implications come under the study of this theory. A study was conducted of large pension funds over a decade by Brinson & Randolph to establish academic proof of the undeniable benefits of Asset Allocation which shows that approximately 94% variability of a fund’s investment return is caused by it as well as Stock selection and Market Timing accounted for only 4% and 2% of Portfolio returns respectively. This study had significant impact on Wall Street and initially was to discredit the findings. After all, the findings suggested that only 6% of a portfolio’s returns could be attributed to skills that Wall Street firms prided themselves on – Stock Selection and Timing. But here question arises doesn’t their huge research departments, and their related costs burdened on Investors, added any value/returns beyond what an Investor could attain through passive Index Fund Investing? Therefore to establish Asset Allocation strategy, one must have a better understanding of the returns/ risks of Assets classes historically. We can conclude better understanding of potential futures returns of these classes by using the benefits of historical returns of different asset classes.

Robert Merton (1973) showed how to generalize the capital asset pricing model (CAPM) to a

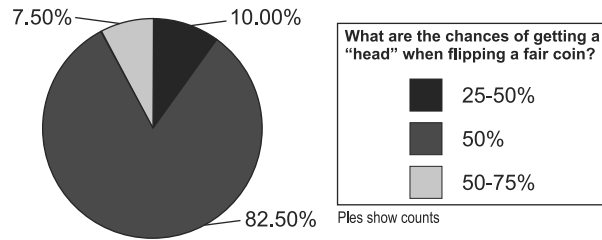
comprehensive inter-temporal general equilibrium model. While Robert Lucas (1978) published “Asset Prices in an Exchange Economy”, which showed that in a rational expectations general equilibrium rational asset prices may have a forecastable element that is related to the forecast-ability of consumption. Douglas Breeden (1979) published his theory of “consumption betas, where a stock’s beta (which measures the sensitivity of its return compared to some index) was determined by the correlation of the stock’s return with per capita consumption. These were exciting theoretical advances at the time. Burton Malkiel (1973) wrote his 2 acclaimed book *A Random Walk Down Wall Street* In 1973, which conveyed this excitement to a wider audience.

Nicholas Barberis and Richard Thaler (1973) argue that some financial phenomena can plausibly be understood using models in which some agents are not fully rational. The field has two building blocks: limits to arbitrage, which argues that it can be difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see. The article discusses these two topics, and then presents a number of behavioral finance applications: to the aggregate stock market, to the cross-section of average returns, to individual trading behavior, and to corporate finance. The author closes by assessing progress in the field and speculating about its future course.

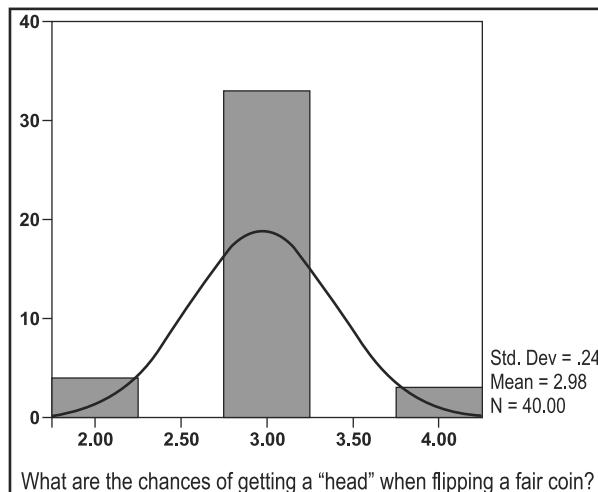
RESULTS

The results show that Gambler’s Fallacy exists in one form or another among investors in the Lahore Stock Exchange. They make their investing decisions based on a wrongly assumed probability of a trend either ending or continuing. A number of factors support this conclusion, which are shown in the analysis of the results herein. It was seen that investors in Pakistan make biased decisions because of the existence of gambler’s fallacy. The first control question was a general one. It gave the investors a hypothetical situation and was used to determine the general psyche of the investors by testing whether or not they were in fact victims of gambler’s fallacy. When provided with historical information (recent or otherwise) they were asked to predict what the chances of a fair coin were to land on a “Head” or a “Tail”. This question was asked because fundamentally all investors make certain assumptions and predications before investing in a stock

i.e. they predict that the stock's price will either remain the same or go up in which case they will either be avoiding potential losses or gaining from the investment.



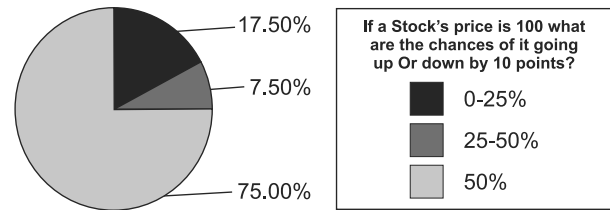
As can be seen 82.60 per cent of the investors gave an unbiased answer stating that a fair coin had a 50-50 percent chance of landing on a "Head" or a "Tail". This goes on to show that provided the investors are given no historical trends or data (recent or otherwise) they will be rational in making predictions 82.60 times and the probability of the event happening will remain what it actually is i.e. 50 percent.



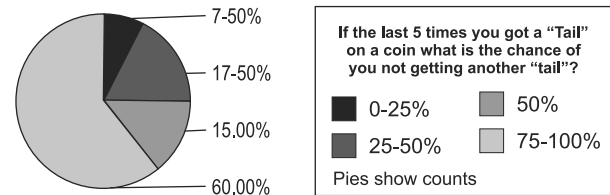
The Normal Curve and Histogram above also shows the distribution of results above clearly showing the mean to stand at 2.98 and the standard deviation at 0.42. Dismissing the possibility of the existence of gambler's fallacy in the investor's mind without any relevant past data availability.

The next closed question was based on a situation related more closely to the investor's environment. It can be seen that almost 73% said that there is a 50-50 chances that the price may go up or may go down. This is when they aren't given any additional information about the stock and so this proves that they are not biased in making their decisions. And there are no chances of a probability of something happening in their minds if they have no his-

torical trend to mentally compare their decisions to.



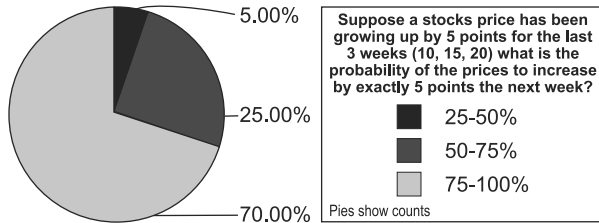
The third question was designed to test for a form of Gamblers Fallacy which results when the investor wrongly assuming that a 'trend' exists because a series of random events happen in such a manner that they 'seem' non-random and connected. This form of Gamblers Fallacy usually results when the mind identifies a pattern of some sort that it assumes is correct.



The above chart clearly shows that gambler's fallacy exists in the investors as 60 percent of them said that 75.10 percent chance of getting another "Tail" existed. While 17.50 per cent of them assumed that 25.50 percent chance of there not being another "Tail" existed. This shows that while majority of the investors are victims of gamblers fallacy that exists because investors assume that a random event will occur just because it has been occurring in the past consistently, over 17 per cent are victims of the type of gamblers fallacy (referred to as "run of luck") which exists because investors assume that a certain event will NOT occur simply because is has been occurring "too many" times in the recent past. In both the cases the investors fail to see that the actual probability of getting a "Tail" or a "Head" remain the same.

Another question designed is more relevant to the environment that investors work is presented investors with another hypothetical situation where they were asked to predict what a particular stock's price would be given recent historical data trend. The question asked was: Suppose a stocks price has been growing up by 5 points for the last 3 weeks (10, 15, and 20) what is the probability of the prices to increase by exactly 5 points the next week? As can be seen by the pie chart given below gamblers fallacy does exist in the investors while they trade. 70 per cent of the investors predicted that just be-

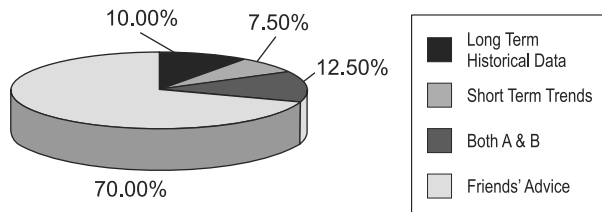
cause the stock's price has been going up by 5 points each week it will continue to go up by 5 points the next week too. As explained above this is a form of gambler's fallacy where investors mistake a random series of events as a non-random pattern.



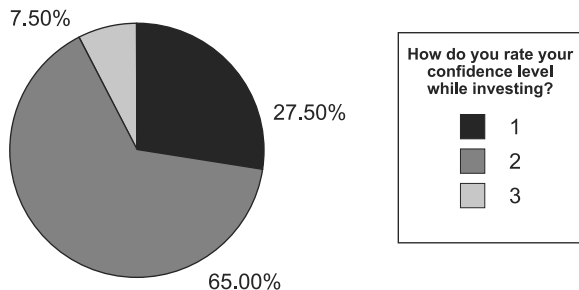
Another question in the survey was designed to find out if the investors were a victim of gamblers fallacy because of their tendency to pay more attention to what people and friends have to say or was it totally dependent on their individual perception of something happening.

As can be seen below, 70 percent of the investors take friend's advice seriously while investing in the stocks, while only 12.5 per cent of the investors actually take into account long term historical data as well as short term trends when investing into the stock market. This can provide us with an insight into why the stock markets here locally are as volatile as they are.

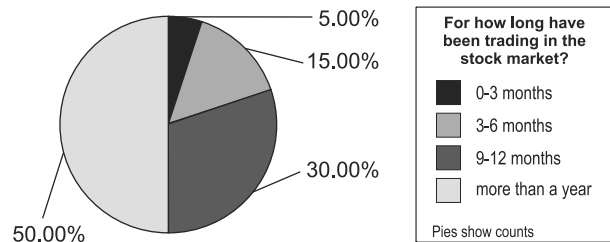
When investing in a stock you look at:



To test the investor's confidence level, results show that investors were quite confident about the information that they had and so they based their decisions on that which resulted in biased decisions. Confidence level thus contributed to gamblers fallacy in investors while they made their investing decisions.



To check whether longer periods of time spent trading in the stock market led to investors eventually getting rid of the gamblers fallacy or not, a question was designed. Since we assume that a rational investor would eventually look into why he is losing so much with his investments there is a greater chance of people making more informed and rational investments with time. However as can be seen by the pie chart given below, investors did not learn from their mistakes and most of them have been investing in the stocks for a year or more and are still a victim of gamblers fallacy.



Question No.	Mean	Conclusion
Q 3	4.1500	Gamblers Fallacy exists
Q 4	3.8750	Gamblers Fallacy exists
Q 5	3.2000	Gamblers Fallacy exists
Q 6	4.0500	Gamblers Fallacy exists
Q 7	1.8000	Gamblers Fallacy doesn't exist
Q 8	3.9250	Gamblers Fallacy exists
Q 9	4.6000	Gamblers Fallacy exists
Q 10	1.2750	Gamblers Fallacy exists

Thus we accept the hypothesis that gamblers fallacy does exist and affect investor's expectations in stock market.

CONCLUSION

Behavioral Finance remains an area of study that still requires a lot of input. Whereas a number of studies have been done in Pakistan, still has a long way to go before its investors can start looking into behavioral aspects of investing. The main aim of this paper is to get a better insight into the workings of the investors in the Lahore Stock Market and to be able to determine to some extent why the local stock markets here are as volatile and unpredictable as they are.

The results found that Gambler fallacy is one

of the factors that have contributed towards the irrational decision making by the investors in Lahore. There are several types of gamblers fallacy that are seen in the investors of Lahore. This attribute of behavior has forced investors to make biased decisions. Therefore the hypothesis i.e. investors expectations are affected by gamblers fallacy while investing in stocks is proven which adversely affect the outcome of the investing decisions.

Hence Investors will need to make a conscious effort to make sure that their investing decisions are not bias and that they make rational decisions based on calculated facts and not loose assumptions. Only then can the stock market be more stable collectively.

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