IS GREED REWARDED? DEVELOPING HEURISTICS FOR GREEDY INVESTORS USING UPPER PARTIAL MOMENTS

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ARTICLE INFO	ABSTRACT
	Rules of thumb play an important role in making investment decisions. This study gives the rule of a thumb/heuristic known as "Pleonexia rule" based on the trait of greed of an investor. The heuristic in the paper is developed using the Upper partial moment (UPM) ratio, which is based on upside risk only, non-restrictive to normal distribution and risk-taking and risk-neutral investors can be accommodated. Portfolios are formed by using the monthly prices taken from Pakistan Stock Exchange for the period from Dec 1999 to June 2018. Two staged methodology is proposed for the development and empirical testing of the Pleonexia rule. At first stage forecasted the probabilities to know whether it is possible to develop such type of rule or not. At second stage the Pleonexia rule is developed and tested by using the probabilities. The results reveal that on average there are above 90% chances that the investors get minimum returns or gains by meeting the benchmark which is PSX-100 index. Moreover, greed is not rewarded because there is less probability of getting gains higher than the optimal level. These results are better for the developing countries like Pakistan.

1.   INTRODUCTION

In finance, there are three important decisions which every firm should take during its operations that are investment decisions, financing decisions and dividend decisions. Investment decisions are related to the capital budgeting and working capital management decisions (Virlics, 2013). Financing decisions are related to the determination of capital structure of the firm (Hsu & Hsu, 2011) and dividend decisions are related whether the firm has paid dividends to the shareholders or not (DeAngelo, DeAngelo, & Stulz, 2006). Among these important decisions, investment decisions are equally important for individuals as well as for firms (Alkaraan & Northcott, 2013). Thus, people invest to earn a return from savings due to their deferred consumption(Ghysels, Plazzi, & Valkanov, 2016).

Investment is defined as a current commitment of the dollars for a period in order to derive future payments. The investment decision making by an individual involves two important factors return and risk. Usually individuals prefer high returns with low risk because the perception of risk differs from individual to individual[1](Etkin, Ivanova, MacGregor, & Serota, 2014). The perception of risk differs because of the factors that are age, education, self-efficacy, and personality (Commodari, 2017). Therefore risk is an important factor and its difficult for individual to take with the same velocity (Zapien, 2017). So one of the major objectives of investment is to increase the money or wealth in

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[1] Also see: Mohd Noor, Ismail, and Mohd. Shafiai (2018).

future (Obamuyi, 2013). As simple as it sounds, investment is not merely the process of investing the funds and then waiting them to increase in value like a piece of cake.

In the life of an individual, literacy plays an important role in making any decision. For financial decision making, financial literacy is important. It is observed that if the individuals are financially literate, they make better decisions especially saving and investment decisions as compared to the financially illiterate individuals (Hamilton, Shobe, Murphy-Erby, & Christy, 2012) . Now a days many countries offer financial education at school level (Solomon, Nhete, & Sithole, 2018). In a country like Pakistan where literacy rate is 58 percent and financial literacy is about 26 percent (Demirguc-Kunt, Klapper, Singer, & Van Oudheusden, 2015). It is very difficult for how investors to make investment decisions accurately. Under these situations, there are two ways available for investors; (a) either they hire financial managers or specialized agents to make investment decisions or (b) they use rules of thumb.

Rules of thumb play a crucial part in making money related choices by the investors or speculators. Financial literature provides the proof of using heuristics or rules of thumb by most of the successful investors in making different financial decisions including investment decisions (Bogle, 1999; Buffett & Cunningham, 2001). This study applies the pleonexia rule by addressing the issue that if investors want to get higher returns or gains in future, they forecast the predicted probabilities of getting more gains/profits. As the word Pleonexia means 'greed'. This rule of thumb teaches the investors; do not be greedy even if the prevailing trend in the market is bullish. Because in developing countries like Pakistan there is always uncertainty, so it is better for the investors to keep calm and follow the original strategy to get better profits or gains in future. The pleonexia rule help the investors to check either they get the returns higher than the market or not. This rule is based on the premises that the investors have tendency to show greedy behavior to achieve more and more gains in their investment.

The pleonexia rule is developed by using the concept of Random walk hypothesis (Fama, 1965) and Efficient market hypothesis (Malkiel & Fama, 1970). According to these hypotheses, "The investors are unable to beat the market even if there are rising trends in the market because in the long run the prices are again adjusted back to the previous position". The major reason of not beating the market is that the change in the prices is randomly in nature and they are not following any path. The theory is also proposed by Kendall (1953) by giving the example that the movement of prices is same as the flipping of coin. This makes the investors unable to get the abnormal returns in the financial market. A number of studies have supported the random walk theory/hypothesis like (Chitenderu, Maredza, & Sibanda, 2014; Marulkar & Faniband, 2017).

Performance measures are used for the application of pleonexia rule in the stock market. The main advantages of using a performance measures are that it gives two dimensional analyses by incorporating both risk and return. There are about 101 performance measures available in financial literature (Cogneau & Hübner, 2009). But in this study, we have proposed a new performance measure known as 'Upper Partial Moment (UPM) Ratio' by using the partial moments. Previously, Shafique, Ayub, and Zakaria (2019) uses Sharpe ratio as performance measure.

UPM ratio is a better measure of performance as compared to performance measures based on standard deviation like Sharpe ratio. Sharpe ratio is restrictive to normal distribution, risk-averse investor and captures both upside and downside risk. The pleonexia rule is related to the greed of an investor and to capture this behaviour, only upside risk is important. Furthermore, investors can be risk-taking, risk averse, or even risk-neutral; UPM ratio accommodates all the three types of investors. In case of stock returns are not following normal distribution, UPM ratio is flexible to address any type of distribution function.

In UPM ratio, risk is defined by using the upper partial moments. Bawa (1975) introduced upper and lower partial moments. Upper partial moments are meant to capture reward (Gilli & Schumann, 2009). The Lower Partial Moment (LPM) handles all below target observations while the Upper Partial Moment (UPM)[2] handles all above target observations. The beauty of partial moments is that they allow for different targets to be calculated with variations in degrees. Further, they are highly configurable to multiple constraints and do not require any distributional assumptions (Ang & Chua, 1979).

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[2] Upper partial moments are also used as the measure of reward and considers as the stop loss moments.

The rest of the paper is organized as follows. Section 2 explains data and methodology. Section 3 provides results along with their discussion. Section 4 concludes the paper.

2. DATA AND METHODOLOGY

Pleonexia rule is formed and tested by using the two staged methodology. At the first stage forecasting of probabilities at each level of benchmark are checked. In the second stage of methodology, pleonexia rule is developed and its validity is examined by applying it in Pakistan stock exchange. For this purpose, monthly data for stock prices are collected from Pakistan stock exchange (PSX) from December 1999 to June 2018. For the benchmark, monthly data of PSX 100 index is also collected for the same time. Three months T-bills rate after converting into monthly basis are used as a risk free rate. Stock returns are calculated by using the stock prices.

Portfolios are formed for forecasting and estimating probabilities. Six types of portfolios are formed by using the three categories that are growth, risk and value. These three categories are again split into two sub-categories as high and low by using the methodology of Fama and French (1996). Again, these portfolios are divided into deciles so there are ten portfolios from each category of stock. In this study, new performance measure is proposed known as 'UPM ratio' to develop pleonexia rule. The formula used for UPM ratio is:

$$\text{UPM Ratio} = \frac{\overline{R}_p - R_F}{\sigma_{UPM}} \dots\dots\dots\dots\dots\dots\dots (1)$$

Where; $\overline{R}_p$ is Portfolio expected return, R_f is Risk Free Rate and σ_{UPM} is standard deviation based on upper partial moments of portfolio **'p'**.

For estimation and analysis purposes, panels are formed because panels are better than time series as panel data is more informative (Hsiao, 2014) and gives efficient and reliable results and has greater capacity for capturing the complexity of human behaviors (Baltagi, 2008). Panel data also deal with the omitted variable bias which helps to get consistent estimators (Wooldridge, 1995). Following steps are discussed under stage one of methodology.

2.1. Stage 1: Checking MFE by applying t-statistics

Every investor wants to earn profits or gains from the investment if there are favorable conditions in the market and investor experiences upward moments in the financial market. Pleonexia rule is used to help the investors that how many chances are there to get gains up to or higher than the benchmark.

1. Benchmark selection

Benchmarking is important when one wants to compare the performance of portfolio with the performance of other portfolio by using the same indicators. So the selection of right benchmark for the assessment of portfolio performance is crucial for the investor. In this study, PSX 100 index is used for the evaluation of performance, either the performance of portfolio is up to the benchmark or above the benchmark.[3]

2. Identification of rise as compared to benchmark

As we all know, investors invest for the sake of profits or gains. For this purpose, the investors observe upward moments in the market and determine the performance of portfolio that either the performance of portfolio is up to the market index which is benchmark or above the benchmark. If the performance of the portfolio beats the market index then there is a need to check at which level it beats the benchmark either at first, second and third level of benchmark. Ordinal variable is introduced to measure the performance, if the performance is up to the benchmark; it takes the value of 0. Similarly, it takes the value of 1, 2 or 3 for first, second and third level of benchmark above the specified benchmark, respectively.

3. Calculating actual and estimated probabilities by using ordered logistics panel regression
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[3]Sipra (2006) and Mahmud and Mirza (2011) also use KSE 100 index to determine the performance of mutual funds.

Actual and estimated predicted probabilities are calculated by using the alphas and betas which are estimated through the ordered logistics panel regression at each level of performance. First cumulative probabilities are calculated by using the following formula:

$$P_i = \frac{e^{z_i}}{1+e^{z_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where.
P_i indicates i^{th} case probability of the event
Z_i indicates the ith case value for the explanatory variable
The value Z_i indicates odd ratio which is computed as follows:

$$Z_{i=}\alpha_i + \sum_{i=1} \beta_i\, x_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where.
X_i Indicates X no of predictor for the ith case,
β_i Indicates ith beta coefficient that are category-invariant.
α_i Indicates intercepts of the ith case which are category-specific and satisfy the constraints.

Individual probabilities are calculated by taking the difference between the cumulative probabilities. Once the alpha and betas are calculated, these values are used in the following equation for UPM ratio:

$$GAINS_{it} = \alpha_i + \beta_i(UPM_{it}) + \mu_{it} \ldots\ldots\ldots\ldots\ldots (4)$$

Where; $GAINS_{it}$ is i^{th} gains at time t, UPM_{it} is UPM ratio of ith case for time t and β_{it} is beta coefficient at time t.

5. Forecasting Analysis
Before developing rule of thumb, it is very important to check whether it is possible to develop it or not. In this study, mean forecasting error (MFE) is used to check the validity of forecast and statistical significance of MFE is examined using the t-statistics. MFE is computed by using the following formula:

$$MFE = \frac{\sum_{i=1}^{n} e_i}{n} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where, e is Error and n is Number of observations.

2.2 Stage 2: Development of Pleonexia rule and its testing

1. Development of Pleonexia rule

Fluctuations in the stock market are important for the investors as they make different strategies in different circumstances. Every investor has its own way of evaluating the performance of investment, but it is observed that most of the investors are risk averse and wants to get more gains in a particular time. To make the strategy of getting more gains, a rule of thumb is proposed called 'Pleonexia rule. Pleonexia is a "Greek word" which means "greed". This rule helps the individuals to make investment strategy for getting higher gains in the financial market by avoiding the greed. In this rule of thumb, investors have to calculate probability of getting higher returns at a specified benchmark. If the value of probability of performance is suitable for the investors, they may proceed their investment in a specific portfolio otherwise they may change their investing strategy.

2. Testing of Pleonexia Rule

According to Pleonexia rule, once investors get returns up to the benchmark, they should keep calm without changing their original strategy because if the investors abruptly change their investing strategy, they may suffer losses in the long run. By sticking to their original strategy, one will get better performance of portfolio in future. By using pleonexia rule, investors also decide time horizon for assessing the performance of portfolio as they can get better or worse performance in this time horizon. One month time period is used in this study.

3. Selection of thresholds other than benchmark for pleonexia rule

The performance of portfolio may beat the market that is PSX 100 Index. Now the question arises, how much it beats the benchmark. For this purpose, another three thresholds are introduced above the original benchmark. These thresholds are made based on quantile. First threshold level above the benchmark is represented by value of second quantile. The second and third threshold level above the benchmark is represented by the value of third and fourth quantile respectively. Now there are total four threshold levels. One is benchmark and other three are above the benchmark. In pleonexia rule, the performance of portfolios is linked with the threshold levels.

Table 1. Benchmarks Indicating Better Performance / Gains in Pleonexia Rule

	Threshold levels	Categories of greed
Gains /Performance	Third level above the benchmark	Voracity
	Second level above the benchmark	Need more
	First level above the benchmark	Healthy appetite
	Benchmark	Optimal level

Table 1 shows the threshold level along with the categories of greed. It is observed that investors have better chances of getting gains at lower level of thresholds

4. Computing probabilities by using the ordered panel logistic regression

Probabilities are calculated by using the ordered panel logistics regression for different time periods i.e., 2001-2002, 2003-2005, 2006-2008, 2009-2012, 2013-2018 and 2001-2018.

5. Testing of Pleonexia rule against the cutoff point

Cutoff point is used for the evaluation and acceptance of pleonexia rule. This means that either the investor is better off by using this rule of thumb or not. The cutoff point used in this study is 50%. If an investor has 50% or more than 50% probability of getting performance up to any benchmark level, then it means that investors are better off by using the pleonexia rule otherwise the investor may change his investment strategy and do not follow the pleonexia rule.

3. RESULTS AND DISCUSSION

3.1 Graphical portrayal of Stock portfolio's performance versus Market index performance

Figures 1 to 6 shows the movement of stock performance based on UPM ratio against the benchmark for the period of 2002 to 2018. Horizontal axis shows the time and vertical axis shows the performance of stock market index. Figure 1 shows the UPM ratio of high growth stocks against the performance of market index based on UPM ratio. The performance of high growth stocks aligns with the performance of market index from 2002 to 2009. After 2009 the performance of high growth stocks is little bit higher than the performance of PSX 100 index, which continued till 2013. This means that after financial crisis, the market starts recovering and getting gains as investors are investing in high growth stocks relative to the market index. From 2014 to 2018 the performance of high growth stocks again same as the performance of market index.
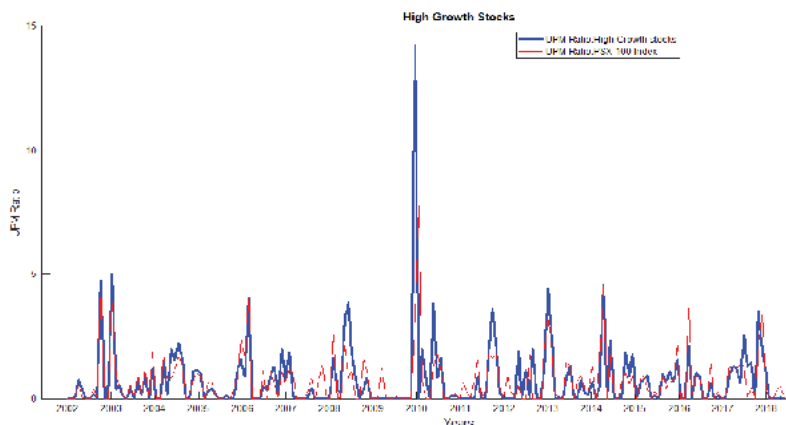
Fig 1. Graphical representation of UPM Ratio of High Growth Stocks against PSX-100 UPM Ratio

Figure 2 show that UPM ratio of low growth stocks against the performance of market index based on UPM ratio. The performance of low growth stocks continuously fluctuated from 2002 to 2018. From mid-2002 to the start of 2005 the performance of low growth stocks is higher than the market index, as the Pakistan stock market outperform during the period of 2002, therefore, the investors can get gains when they invest in low growth stocks. From 2006 to mid of 2008, the performance of low growth stocks is aligned with the performance of market index, this is due to the global financial crisis of 2007-2008. The investors of low growth stocks are unable to beat the market. After 2008 till 2013 the performance of low growth stocks portfolio is a bit better than the market index, which are the reforms in the Pakistan capital market in 2012. Again 2013 till 2018, the performance of low growth stocks is with the performance of market index.
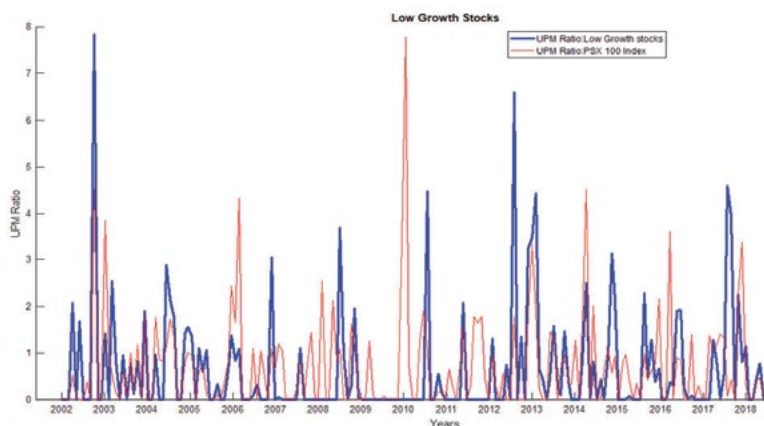

Fig 2. Graphical representation of UPM Ratio of Low Growth Stock against PSX-100 UPM Ratio

Figure 3 shows the UPM ratio of high risk stocks against the performance of market index based on UPM ratio. The performance of high risk stocks portfolio aligns and somehow better in mid2008 with the performance of PSE 100 index from 2002 to 2012. From 2013 till 2018, the performance of high risk stocks portfolio again align with the performance of PSX 100 index. This means that the investors of high risk stock portfolios are unable to beat the market.
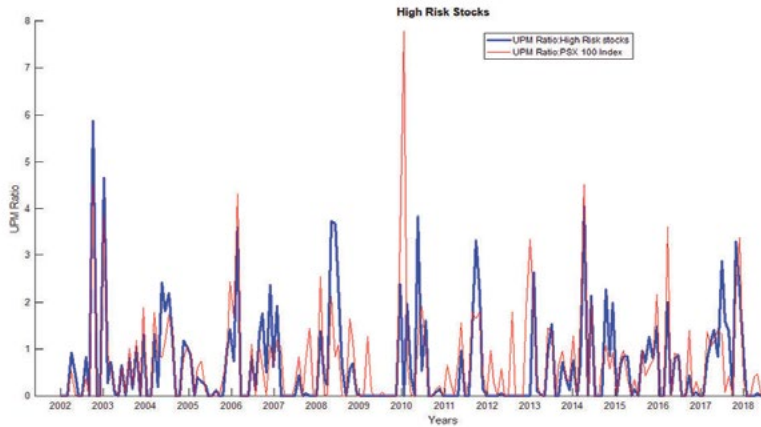
Fig 3. Graphical representation of UPM Ratio of High Risk Stocks against   PSX-100 UPM Ratio

Figure 4 shows the UPM ratio of low risk stocks portfolio against the performance of market index based on UPM ratio. The performance of low risk stocks shows better performance during 2004-2005, 2006-2007, 2011-2013 then mid 2017 compared to the PSX 100 index. This better stock's performance is due to the better performance of market in 2002. The performance of low risk stocks portfolio is same with the performance of market index in the time period of 2002, 2003, 2008,2009, 2010, 2014 till 2018.
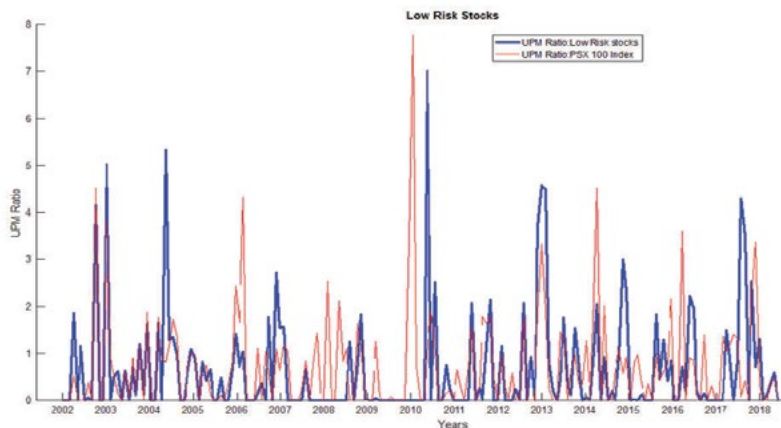

Fig 4. Graphical representation of UPM Ratio of Low Risk Stocks against PSX-100 UPM Ratio

Figure 5 shows the UPM ratio of high value stocks portfolio against the performance of market index based on UPM ratio. The performance of high value stocks shows better performance during 2004-2005,2007-2009,2010,2012,2013,2015 and 2017 compared to the PSX 100 index. The betterment in the performance of high value stocks portfolio against the market portfolio is due to the better market conditions in 2002 and introduction of reforms of the Pakistani capital market in 2012. The performance of High value stocks portfolio is same with the performance of market index during 2002, 2003, 2006,2011, 2014 and 2018.
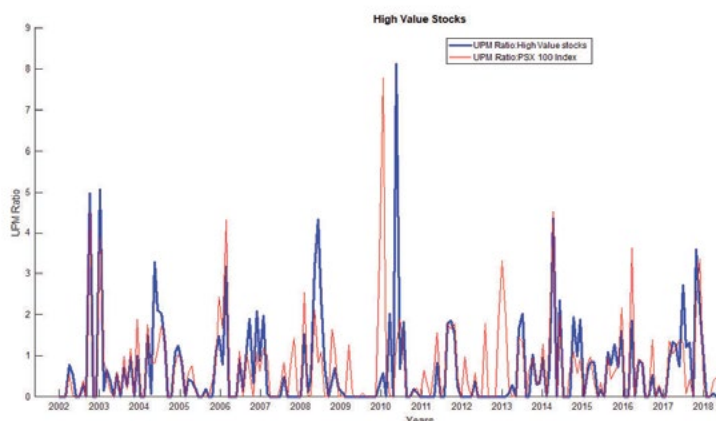
Fig 5. Graphical representation of UPM Ratio of high value stocks against PSX-100 UPM Ratio

Figure 6 show the UPM ratio of low value stocks against the performance of market index based on UPM ratio. The performance of low value stocks shows better performance during 2003-2005, 2009, 2012-2013 and 2015-2018. In other time periods, the performance of low value stocks portfolio are either same or less than the market index.
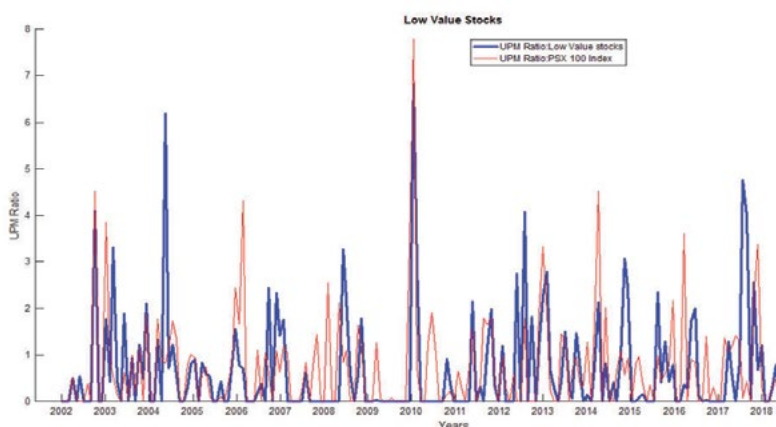

Fig 6. Graphical representation of UPM Ratio of Low Value Stocks against   PSX-100 UPM Ratio

Graphical representation shows some common trends for all stock portfolios which are based on growth, risk and value factors e.g., after 2002 when Pakistan stock market outperformed, the performance of portfolios shows better performance. Similarly, after the financial crisis, the recovery starts mid of 2008, then in 2012 and 2013the portfolio stocks show better performance compared to PSX 100 index. After graphical representation of all the stocks, it is concluded that, at some point of time the performance of stocks portfolio beat the performance of PSX-100 which is a benchmark. So, it is possible to develop, apply and test the Pleonexia rule.

3.2 Results of t-Statistics of Mean Forecasting error

Table 2 shows the results of t-statistics of mean forecasting error of all the categories of stock portfolios. Before estimating the t- statistics the mean forecasting error at each level of performance that are performance at benchmark, performance at second level of benchmark, performance at third level of benchmark and performance at fourth level of benchmark are calculated. For this purpose, first actual and estimated values are calculated. If the difference of actual and estimated values is zero or close to zero, this means that the forecast is accurate by using the mean

forecasting error method. To determine the statistical significance of MFE, t-statistics is used. The result shows that the calculated t-values are less than the tabulated t-values which are 2.32, 1.65 and 1.28 at 1%,5% and 10% level of significance, respectively. Thus, we accept the null hypothesis and conclude the forecast is accurate.

Table 2. Statistical significance of mean forecasting error by using the t-Statistics

Portfolios	Benchmark	First level above the benchmark	Second level above the benchmark	Third level above the benchmark
High Growth	0.3791	-0.1135	1.1762	-0.4307
Low Growth	1.1840	-0.7491	-1.1929	0.3943
High Risk	1.1556	1.7161	-1.8226	-1.7989
Low Risk	1.6818	-1.2984	-0.6819	-0.5766
High Value	1.4347	-1.7542	-0.4629	0.2794
Low Value	1.5205	-0.1329	-0.7380	-0.0177

3.3 Calculating probabilities by using UPM Ratio as Performance measure

Several performance measures are used for the evaluation of performance of portfolio. In this study, we have proposed UPM ratio to evaluate the performance of all categories of stock portfolios. Tables B1 to B6 gives the results of pleonexia rule in terms of predicted probabilities. Predicted probabilities are estimated for different time periods i.e. 2001-2002, 2003-2005, 2006-2008, 2009-2012, 2013-2018 and 2001-2018. Since mean forecasting error is statistically insignificance, we can apply pleonexia rule.

Different benchmark levels are introduced in this rule of thumb. First threshold is original benchmark which is based on PSX 100 index and known as optimal level. Other three thresholds are above the original benchmark and are known as second, third and fourth levels. Level of healthy appetite is achieved when the performance of portfolio is achieved by beating the second threshold. Similarly, the level of need more and voracity is achieved by beating the third and fourth level of thresholds, respectively. Basically, the investors want to get higher returns by beating the benchmark and considering the upward moments in the market. 50% cut off point is used for pleonexia rule. If the predicted probability is higher than the cut off point for any portfolio performance, investors should be better to follow the pleonexia rule. If the predicted probability is less than the specified cut off point then it is better for the investors, not to use pleonexia rule.

Table 3 gives the results of high growth stocks portfolio. For the period 2001-2002, investors are achieving the optimal level with predicted probability of 97.657%. The predicted probability of achieving healthy appetite, need more and level of voracity are 2.210%, 0.132% and 0.00%, respectively. For the years 2003-2005, the investors can beat the benchmark and are achieving the healthy appetite level. Other two levels i.e., need more and voracity are unbeaten by the investors and show the predicted probability of 36.31% and 0.912%, respectively. Likewise, for the years 2006-2008, 2009-2012, 2013-2018 and 2001-2018 have the predicted probability of 71.19%, 89.14%, 70.91% and 99.98% of getting gains up to the benchmark, respectively. The predicted probability of achieving returns above the original benchmark for period 2006-2008, 2009-2012, 2013-2018 and 2001-2018 are 27.91%, 9.33%, 28.99% and 0.001%, respectively, thus achieving the level of healthy appetite. The predicted probability of achieving third and fourth levels i.e., need more and voracity in the years of 2006-2008, 2009-2012, 2013-2018 and 2001-2018 are 0.6525%. 0.237%, 1.059% and 0.496%,0.074% and 0.009%,0.00% and 0.00%, respectively.

Table 3. Pleonexia Rule for UPM Ratio of High Growth Stocks Portfolio

Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Pleonexia rule		
			Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	97.657%	2.210%	0.132%	0.000%
2003-2005	0.61710	0.001%	62.771%	36.317%	0.912%
2006-2008	0.18817	71.197%	27.914%	0.652%	0.237%
2009-2012	0.02758	89.141%	9.331%	1.059%	0.469%
2013-2018	0.34285	70.918%	28.999%	0.074%	0.009%
2001-2018	0.00962	99.999%	0.001%	0.000%	0.000%

Table 4 gives the results of pleonexia rule for UPM ratio for low growth stocks portfolio. In 2001-2002, the investors are achieving returns up to the market, which is a benchmark in this study, with predicted probability of 90.64% thus achieving the optimal level. Other three benchmarks i.e., healthy appetite, need more and voracity have the probability of 9.9197%, 0.095% and 0.065%, respectively. For the years 2003-2005, the investors are enough lucky to beat the benchmark with the predicted probability of 89.88% and get the gains up to the level of healthy appetite. The probability of getting gains up to the level of need more and voracity is 8.823% and 0.513%, respectively. For the years 2006-2008, the investors get the optimal level with probability of 87.95%. The predicted probability of achieving gains by beating the second, third and fourth levels are 12.42%, 0.030% and 0.089%, respectively. For the years 2009-2012, the probability of getting optimal level is 99.94%. The predicted probability of beating and getting gains up to the second, third and fourth level are 0.050%, 0.001% and 0001%, respectively. The predicted probability of getting optimal level is 63.056%. The probability of getting healthy appetite, need more and voracity level are 36.926%, 0.018% and 0.001%, respectively. Similarly, for the years 2001-2018, the predicted probability of getting optimal level is 100% and investors are unable to beat the other three benchmarks. Overall, in all time spans the investors are earning returns up to the benchmark except in 2003-2005, the investors can achieve the returns above the market, thereby achieving the healthy appetite.

Table 4. Pleonexia Rule for UPM Ratio of Low Growth Stocks Portfolio

Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Pleonexia rule		
			Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	90.645%	9.197%	0.095%	0.063%
2003-2005	0.61710	0.781%	89.883%	8.823%	0.513%
2006-2008	0.18817	87.454%	12.427%	0.030%	0.089%
2009-2012	0.02758	99.948%	0.050%	0.001%	0.001%
2013-2018	0.34285	63.056%	36.926%	0.018%	0.001%
2001-2018	0.00962	100.000%	0.000%	0.000%	0.000%

Table 5 gives the results of pleonexia rule for UPM ratio of high risk stocks portfolio. For the years 2001-2002 the predicted probability of getting the gains up to the optimal level, healthy appetite, need more and voracity is 91.69%, 7.829%, 0.414% and 0.061%, respectively. This means that the investors can get gains up to the benchmark. For the years 2003-2005 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and

voracity is 3.768%, 65.573%, 19.98% and 10.678%, respectively. This means that the investors can get gains up to the second level of benchmark that is healthy appetite. For the years 2006-2008 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 71.837%, 27.86%, 0.293% and 0.009% respectively. This means that the investors can get gains up to the benchmark. For the years 2009-2012 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 94.628%, 4.901%, 0.376% and 0.095%, respectively. This means that the investors can get gains up to the benchmark. For the period 2013-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 89.455%, 10.393%, 0.119% and 0.032%, respectively. This means that the investors can get gains up to the benchmark. During 2001-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.785%, 0.215%, 0.000% and 0.000%, respectively.

Table 5. Pleonexia Rule for UPM Sharpe Ratio of High Risk Stocks Portfolio

Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Pleonexia rule		
			Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	91.696%	7.829%	0.414%	0.061%
2003-2005	0.61710	3.768%	65.573%	19.981%	10.678%
2006-2008	0.18817	71.837%	27.861%	0.293%	0.009%
2009-2012	0.02758	94.628%	4.901%	0.376%	0.095%
2013-2018	0.34285	89.455%	10.393%	0.119%	0.032%
2001-2018	0.00962	99.785%	0.215%	0.000%	0.000%

Table 6 gives the results of pleonexia rule for UPM ratio of low risk stocks portfolio. For the period 2001-2002 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 100%, 0.000%, 0.000% and 0.000%, respectively. This means that the investors can get gains up to the benchmark. For the years 2003-2005 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 3.768%, 56.916%, 39.435% and 0.214%, respectively. This means that the investors can get gains up to the second level of benchmark that is healthy appetite. For the period 2006-2008the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 95.327%, 3.395%, 1.057% and 0.221%, respectively. For the years 2009-2012 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.732%, 0.153%, 0.098% and 0.017%, respectively. This means that the investors can get gains up to the benchmark. During 2013-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 83.160%, 14.84%, 1.786% and 0.213%, respectively. This means that the investors can get gains up to the benchmark. For the period 2001-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 100%, 0.000%, 0.000% and 0.000% respectively.

Table 6. Pleonexia Rule for UPM Ratio of Low Risk Stocks Portfolio

Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Pleonexia rule		
			Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	100.000%	0.000%	0.000%	0.000%
2003-2005	0.61710	3.434%	56.916%	39.435%	0.214%
2006-2008	0.18817	95.327%	3.395%	1.057%	0.221%
2009-2012	0.02758	99.732%	0.153%	0.098%	0.017%
2013-2018	0.34285	83.160%	14.842%	1.786%	0.213%

| 2001-2018 | 0.00962 | 100.000% | 0.000% | 0.000% | 0.000% |

Table 7 gives the results of pleonexia rule for UPM ratio of High Value Stocks Portfolio. For year 2001-2002 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 95.146%, 4.837%, 0.008% and 0.009% respectively. This means that the investors can get gains up to the benchmark. For year 2003-2005 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 4.600%, 69.273%, 23.721% and 2.407% respectively. This means that the investors can get gains up to the second level of benchmark that is healthy appetite. For year 2006-2008the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 79.373%, 20.186%, 0.409% and 0.032% respectively. This means that the investors can get gains up to the benchmark. For year 2009-2012 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.821%, 0.176%, 0.002% and 0.001% respectively. This means that the investors can get gains up to the benchmark. For year 2013-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 76.056%, 23.903%, 0.037% and 0.004% respectively. This means that the investors can get gains up to the benchmark. For year 2001-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.656%, 0.344%, 0.001% and 0.000% respectively.

Table 7. Pleonexia Rule for UPM Ratio of High Value Stocks Portfolio

			Pleonexia rule		
Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	95.146%	4.837%	0.008%	0.009%
2003-2005	0.61710	4.600%	69.273%	23.721%	2.407%
2006-2008	0.18817	79.373%	20.186%	0.409%	0.032%
2009-2012	0.02758	99.821%	0.176%	0.002%	0.001%
2013-2018	0.34285	76.056%	23.903%	0.037%	0.004%
2001-2018	0.00962	99.656%	0.344%	0.001%	0.000%

Table 8 give the results of pleonexia rule for UPM ratio of Low Value Stocks Portfolio. For year 2001-2002 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.476%, 0.524%, 0.00% and 0.000% respectively. This means that the investors can get gains up to the benchmark. For year 2003-2005 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 3.319%, 75.942%, 18.014% and 2.725% respectively. This means that the investors can get gains up to the second level of benchmark that is healthy appetite. For year 2006-2008 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 99.440%, 0.556%, 0.004% and 0.001% respectively. This means that the investors can get gains up to the benchmark. For year 2009-2012 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 98.241%, 0.1550%, 0.154% and 0.054% respectively. This means that the investors can get gains up to the benchmark. For year 2013-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 72.275%, 27.711%, 0.013% and 0.002% respectively. This means that the investors can get gains up to the benchmark. For year 2001-2018 the predicted probability of getting gains up to the optimal level, healthy appetite, need more and voracity is 97.536%, 2.423%, 0.035% and 0.005% respectively.

Table 8. Pleonexia   Rule for UPM Ratio of Low Value Stocks Portfolio

Year	UPM ratio (PSX 100 index)	Optimal level (Benchmark)	Pleonexia rule		
			Healthy appetite (2nd quartile above the benchmark)	Need more (3rd quartile above the benchmark)	Voracity (4th quartile above the benchmark)
2001-2002	0.00282	99.476%	0.524%	0.000%	0.000%
2003-2005	0.61710	3.319%	75.942%	18.014%	2.725%
2006-2008	0.18817	99.440%	0.556%	0.004%	0.001%
2009-2012	0.02758	98.241%	1.550%	0.154%	0.054%
2013-2018	0.34285	72.275%	27.711%	0.013%	0.002%
2001-2018	0.00962	97.536%	2.423%	0.035%	0.005%

According to the results, the investors cannot beat the market in all time periods except 2003-2005. This means that the investors get minimum returns up to the benchmark by beating the cutoff point of 50%. In the years 2003-2005, the investors get the gains by beating the benchmark at second level that is healthy appetite. Furthermore, it is also observed that the predicted probability of getting more gains decreases as the investors move towards the upper benchmarks. The reason behind achieving the gains at second level is economic development in the country during 2004-2005. The predicted probability of getting more gains by beating second, third and fourth level of benchmark is less than the specified cut off point which is 50% for all the categories of stock portfolios in all time spans.

4. CONCLUSION

There are three types of investors in the financial markets based on risk tolerance i.e., risk averse, risk seekers and risk neutral. All investors whether they are risk seeker, risk averse or risk neutral, they want to get high gains or profits from their investments. To fulfill the main objective of investment, the investors balance their risk and return by choosing best allocation of assets or resources. However, it needs financial literacy but in a country like Pakistan, financial literacy is very low which about 26% is. Under these situations, how an individual can make better investment decisions. The best option available for the investors is to use of rules of thumb. Which are simple and easy to use and helps investors for quick decision making?

This study proposes and applies a financial heuristic known as "Pleonexia rule". This rule teaches the investors how to make investment decision when the investor wants to earn high returns by considering the upward moments in the market. It is observed that when there are favorable conditions in the market and there are chances for the investors to get higher returns, they show greedy behavior and want to get more and more return. The emotion of greed involved in any decision is not a better decision for the investors. The pleonexia rule is applied to the Pakistan stock exchange and signifies the importance of investing strategies for the investors that when the investor should buy, hold, or sell the stock. The important lesson given by the pleonexia rule is that investor must keep calm when the prices of stock goes up and stick to their original investment strategy (don't be panic to buy more stocks) because if the investors change their original strategy it may be harmful for them in the long run.

Pleonexia rule is formed by using the performance measure that is UPM ratio. There are three categories of portfolios used for the evaluation of performance that is growth, risk and value stocks portfolio. The results show that investors can get the returns up to the benchmark for all types of stock portfolios, which implies that the performance of the portfolios is at optimal level. However, in 2003-2005 the performance of all stock portfolios is beating the benchmark; thus, investors are achieving the healthy appetite during this period. The reason for getting more performance is that the Pakistan stock exchange outperformed in 2002. The probability of achieving third (need more) and fourth level (voracity) of benchmark is less than the specified cutoff point which is 50%. The overall results from 2001-2018 indicates that there are less chances for the investors for getting higher performance for all types of stock portfolios for all time periods. Furthermore, the results also guide the investors to forecast the future trends in the market that either they can get the profits or not by beating the market. Thus, this study concludes that *"Greed is not rewarded in the market like Pakistan"*.

5. IMPLICATIONS AND CALL FOR FUTURE RESEARCH

Financial literacy plays an important role in financial decision making. This study also highlights this aspect and gives recommendations to government and policy makers for improvement in financial literacy of an individual investor. For the improvement in financial literacy, the management must need to create awareness by arranging awareness plans, seminars and discussions regarding the emotions and speculations to prevent the unfavorable investment outcomes. Furthermore, the study recommends that the fund managers/brokers use pleonexia rule for initial screening of the stocks in making investments and achieving better outcomes.

In this study, we choose Pakistan stock exchange for the application of pleonexia rule by using six categories of stocks portfolio. Further research may include other categories of stocks portfolio like portfolios based on size, momentum etc. This rule of thumb may be used by taking other financial decisions like retirement planning, etc.

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