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Irrational Behaviour in Financial Decision-Making

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ABSTRACT

The goal of the research questions is analysing empirically if there is any irrational behaviour in decision-making and if human behaviour is not always rational using not consistent logic in problem solving or decision-making. The researcher will analysis the behaviour of the investor during bearish and bullish market to find behaviour inconsistency, that according to the researcher, could be due to the asymmetric anchor effect, asymmetric herd behaviour, asymmetric disposition effect and asymmetric, loss aversion, recency bias, frame bias.

Key words: herd behaviour, decision making, disposition effect, asymmetric behaviour, anchor bias, disposition effect, level-K strategy, recency bias, loss aversion, prospect theory, disposition effect, recency bias, frame bias, irrational behaviour or inconsistent logic in decision making and problem solving.

INTRODUCTION

The goals of the research are to investigate any irrational behaviour or inconsistent logic in financial decision making and problem solving and if is confirmed the herd behaviour bias, anchor bias, recency bias, disposition effect, level-K strategy. A lot of research question have been written symmetrically respect to the acquisition price, so considering the upward and downward trend, with the goal to analyse potential asymmetric behaviour of the investor linked to the gain and loss.

Research Questions

For each research question is present a table to represent the sample's answer.

The table shows the number of the sample that has participated and is showed the percentage's answer type. The survey has been conducted with a web-based survey thorough Likert-type survey using closing question. Is present a statistical result table that contain the standard deviation, average score, Z-score, p-value and the result of the test if the null hypothesis is rejected or not.

The research question is analysing if there is any irrational behaviour in decision-making.

a) Null Hypothesis (Ho): the economic agent and human behaviour is always rational using consistent logic in problem solving or decision-making process.
b) Alternative Hypothesis (H1): the economic agent and human behaviour is not always rational using not consistent logic in problem solving or decision-making process

The goal of the research questions is empirically to analyse if there is any irrational behaviour in decision-making and if human behaviour is not always rational using not consistent logic in problem solving or decision making. The researcher will analysis the behaviour of the investor during bearish and bullish market trying to find behaviour inconsistency, that according to the researcher could be due to the asymmetric anchor effect, asymmetric herd behaviour, asymmetric disposition effect and asymmetric loss aversion.

PRESENTATION OF RESULTS

Below is analysed the sub-question number 1 relative to the research question.

1. Assuming that you have bought the equity stock a 100 USD, and the stock value

go up to 120 USD (+20%) after 1 week, are you willing to sell the stock?

a) Null Hypothesis (7-20Ho): you are not willing to sell the stock.
b) Alternative Hypothesis (7-20H_1). you are willing to sell the stock.

To understand the rational of the question 1 and 2 they need to be analysed together. The goal of both question is to analysis any potential not coherent behaviour of the investor given the same exit price, but with different historical performance. For this reason, the null and alternative hypothesis of question 1 are being set up with the goal to be analysed conjointly with the following question 2. The alternative hypothesis has been set as according to the disposition effect, that the when the stock has increase in value, the investors should be willing to sell it quickly.

The following tables show the answer and statistic result of the empirical research question.

Table 1 Answer Choices Sub-Question 1

Answer Choices	Responses %	Responses
Strongly disagree	3,67%	4
Disagree	24,77%	27
Neither agree nor disagree	37,61%	41
Agree	30,28%	33
Strongly agree	3,67%	4
Total	100%	415

Table 2 Statistical Results Sub-Question 1

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,28	p value	Reject null hypothesis? If p-value < 10%
0,92	3,1	1,135	No	12,82%	No

Z-score is lesser than the one-side Z-score critical value 1.28 for 90% confidence level and the p-value is higher of .10 significance level, the evidence fails to reject the null hypothesis.

The empirical research supports the null hypothesis that the investors are not willing to sell the stock.

According to the researcher if the investors are not willing to sell the stock with good performance, this is a proof of herd behaviour preference during a bullish market or could be explained by the rational Level-K thinking, where the rational investor attribute future "buy" strategy to the other players and so is rational to continue to follow the market. So due to the fact that 20% in 1 week is quite good performance and according to the disposition effect the investors should sell the stock, but the empiric test show that the investors keep the stock. The same experiment has been done with 95% confidence interval and 105 USD selling price and the result are the same, the investors do not sell the stock.

According to the researcher view the reason why the agents keep the stock in case of bullish market, could be linked to the herd behaviour instinct or could be also that the investors act as level-k thinking and beauty contest strategy continuing to expect uptrend market. If the stock has good capital gain and the market trend is upward the investor could prefer to follow the market.

According to Shefrin and Statman (1985) the disposition effect refers to investors' reluctance to sell assets that have lost value and greater likelihood of selling assets that have made gains. This phenomenon has been explained by prospect theory (loss aversion), regret avoidance and mental accounting. The empirical test does not confirm the disposition effect during a bullish market, because in theory we should expect that the investor materializes the gain selling the stock, but the empirical result show that the investor continues to keep the stock. Therefore, in the researcher view this could any case be explained by the herd behaviour bias and level-k thinking due to the fact the market is upward trend and the investor continue to follow it. Indeed, the main phenomenon used to explain the disposition effect (loss aversion and regret bias) are both phenomenon that are experienced by the investor during a bearish market and not a bullish market. So, in

theory the behaviour bias explanation supports more the disposition effect during the bearish market than the bullish market.

Below is analysed the sub-question number 2 relative to the research question.

2. Assuming that you have bought the equity stock a 100 USD and the stock value dropped to 90 USD (-10%) and then stock value reached 120 USD (+ 33%), after one week. Are you willing to sell the stock?

a) Null Hypothesis (2Ho): the human behaviour is always rational using consistent logic in problem solving and decision-making process: rational economic behaviour. You are not willing to sell the stock.
b) Alternative Hypothesis ($2H_1$): the human behaviour is not always rational using not consistent logic in problem solving and decision-making process: irrational economic behaviour. You are willing to sell the stock.

The reason behind this research question is to analyse if after a downside market, the investor change behaviour a parity of exit stock price level of the previous question.

The logic to have a research question similar to the question 1 is to find any potential different behaviour or inconsistent logic with the same exit value 120 USD. Due to the fact that in the previous question the investors do not sell the stock for a value of 120 USD, so we should expect constant logic in the decision making, for this reason in the alternative hypothesis has been introduces also the concept of not consistent logic or irrational. So, the researcher wants to prove the human behaviour is not always rational using not consistent logic in problem solving or decision-making process, maybe a recovery after a downside market changes the emotion of the investor and consequently change his choice under decision making. The irrationality of the alternative hypothesis has been set as selling behaviour for the same 120 USD value of the stock, the same value of the previous question.

The following figure and tables show the answer and statistic result of the empirical research question.

Table 3 Answer Choices Sub-Question 2

Answer Choices	Responses %	Responses
Strongly disagree	3,67%	4
Disagree	20,18%	22
Neither agree nor disagree	36,70%	40
Agree	30,28%	33
Strongly agree	9,17%	10
Total	100%	415

Table 4 Statistical Results Sub-Question 2

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,28	p value	Reject null hypothesis? If p-value < 10%
0,99	3,2	2,109	Yes	1,75%	Yes

Z-score is higher than the one-side Z-score critical value 1.28 for 90% confidence level and the p-value is less of .10 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour. The investor is willing to sell the stock after a downside market trend at same price level (120 USD) that in the previous research question was refused to sell it.

The research shows human inconsistence in behaviour and logic, the investor after a recovery from a downside market is now willing to sell the stock at same price level that in the previous question was refused, maybe linked to different emotion associated to the same exit price, after having been experienced a recently downward trend (new anchor bias and recency bias that overweight the last event).

Furthermore, the research proof that after a recovery from a downside market, is confirmed the disposition effect and there is no herd behaviour after a recovery from a downside market.

According to the researcher view maybe the investor overweight the recent information of the stock loss (90 USD), as a sort of

framing or anchor bias that led the investor to change behaviour and so decide now to sell at a price level of 120 USD. In other words, the explanation could be that the investor overweight the emotional fear of a bear market linked to the recent information that become a "new" anchor bias (90 USD) and he start to estimate more probable the negative downside market event, so increase the subjective probability of the bear market event and consequently the probability of lose money and this brings the investor to sell more quickly to get the gain, instead of to face the risk that the market could go down again (recency bias-information bear market). So, due the recency bias, the 90 USD become the "new anchor" level or "last information anchor" that he uses to compare the potential gain of the exit (+33%), instead of to use the acquisition price 100 USD (+20%) as reference or original anchor. So, the negative event (bear market), become the new anchor bias for the decision making of potential equity exit.

This is a proof of emotional bias due the emotional feeling after a loss, the mind is focus only to short run due recency bias and "new anchor", (+33%; 90 USD vs 120 USD) and do not analyse that the exit price value is 120 USD, the same of the previous question where the investor refused to sell.

We can also find in the investor's behaviour a sort of framing effect, because, in the research question, the value of 120 USD has been highlighted as an increase of the +33% value respect to the previous value 90 USD. In both questions 1 and 2 the stock value has reached 120 USD after 1 week, but with different stock historical price's path, so the way is presented the performance could let the economic agent to have frame bias and lead a different opposite decision making.

In the researcher's view could be linked to the "new" anchor effect of 90 USD, the potential loss is still recent in the mind of the investor and for this reason the investor now is willing to sell it. The recent information of the loss is overweight, so event of loss in the investor's mind is now weighted with high probability that could occur again and so prefer to materialize the capital gain and decide to sell the stock.

For example, suppose you have a car, and your car is stolen. Assuming that after one week the car is found and is probable that you will be happy even if your wealth condition is identical as it was before the theft, but your happiness now derives from the comparison with one previous negative state, so the positive event following a negative event is overweighted.

You try rejoicing for a positive event after the negative, even if, in the car example, there is no increase in wealth. Maybe similar emotional bias could lead the investor to sell more quickly after a bear market.

The research confirms asymmetric behaviour or not constant logic due to the fact that in the previous question the investors do not sell at same price level, so this experiment is a proof human behaviour is not always rational using not consistent logic in problem solving or decision-making process. The result confirms the main point of the research question that could be an irrational behaviour or inconsistent logic in decision-making.

Below is analysed the sub-question number 3 relative to the research question.

3. Assuming that you have bought the equity stock a 100 USD and the stock value dropped to 80 USD (-20%) after 1 week, are you willing to sell the stock and suffer the loss?

a) Null Hypothesis (3Ho): the human behaviour is always rational using consistent logic in problem solving or decision-making process: rational economic behaviour. You are willing to sell the stock.
b) Alternative Hypothesis ($3H_1$): the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour. You are not willing to sell the stock.

The sub-question 3 has been done with the aim to analyse any asymmetric behaviour

between loss (-20%) and gain (+20%) and need to be interpretated and analysed together with the sub-questions 1 and 2. According to the disposition effect due to loss aversion the investor should keep the losing stock, in line with the alternative hypothesis that the researcher wants to confirms that the investor, in case of loss, is not willing to sell the stock that has negative performance. Whitin the alternative hypothesis has been added the concept that the human behaviour is not always rational, because if there was not existing the loss aversion bias, the most rational thing to do is to cut the loss and sell the stock, instead of to become risk seeking.

Loss aversion refers to people's preferences to avoid losing compared to gaining the equivalent amount: losses loom larger than gains (Kahneman and Tversky, 1979).

The following tables show the answer and statistic result of the empirical research question.

Table 5 Answer Choices Sub-Question 3

Answer Choices	Responses %	Responses
Strongly disagree	11,01%	12
Disagree	25,69%	28
Neither agree nor disagree	34,86%	38
Agree	24,77%	27
Strongly agree	3,67%	4
Total	100%	415

Table 6 Statistical Results Sub-Question 3

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score < - 1,28	p value	Reject null hypothesis? If p-value < 10%
1,04	2,8	-2,008	Yes	2,23%	Yes

Z-score is lesser than the one-side Z-score critical value -1.28 for 90% confidence level and the p-value is less of .10 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the human behaviour is not always rational using not consistent logic in problem solving or decision-making process (irrational economic behaviour) and investor are not willing to sell the stock and keep holding stock that are losing value in line with the disposition effect, loss aversion and regret bias.

The research question confirms disposition effect, keep asset that have lost value.

Nevertheless, the confirmation of the existence of the disposition effect, in my personal view, confirm the no existence of the herd behaviour during a bear market, due to the fact that the investor weight more the loss and regret than other potential bias such as herd behaviour.

The emotional value of the loss and regret led the agent acting irrationally do not selling the stock and cut the loss, but instead prefer to keep the asset with the hope that in the future the asset will recovery the value, this behaviour could be relative rational under the Level-K-Value theory (Di Toro, 2022).

To avoid loss, the agent prefers to bear the risk that the stock will continue to deteriorate the value, so becoming a risk seeking.

The researcher has also noted that the result is also a bit illogic, because if the market goes down for example of -20% it means that the investors are selling (sell herd behaviour), and this is contradictor with the result's test where in average the investor do not sell, the test is supposed to capture the average behaviour of the population a certain level of confidence.

Maybe the logic explanation could be that the –20% of the marker is linked to only a few big investors that are selling large share position and so is not the reflection of the herd behaviour or that the price decrease is linked to the low liquidity of the stock, so also small amount of share sale could reduce the price, while the majority of the investor hold the stock in line with the test.

Below is analysed the sub-question number 4 relative to the research question.

4. You hold a share in a company that is worth 100 USD today, after a month the value of the share goes down to 95 USD? You have lost 5 USD in absolute terms. Do you feel sad for the loss?

a) Null Hypothesis (4Ho): investor do not feel sad for the loss.
b) Alternative Hypothesis (4H1): investor feel sad for the loss.

For this is the alternative hypothesis that the researcher wants to proof is the sadness associated with the loss, but also to find any potential asymmetric emotional behaviour from the actual question and the research question number 6.

The question 4 should be analysed together with the following sub-question 5-6-7. The goal of the researcher is to find any asymmetric behaviour due to the inconsistence between gain and loss, so to prove loss aversion. In this research question has been not used numerical value for the answer, that could prove the difference in weight's value between loss and gain. Nevertheless, has been used emotional parameter like happiness and sadness status linked to the gain and loss, with the goal to find inconsistence of emotion between the loss and gain of the same absolute value (in this case 5 USD).

The following tables show the answer and statistic result of the empirical research question.

Table 7 Answer Choices Sub-Question 4

Answer Choices	Responses %	Responses
Strongly disagree	7,71%	32
Disagree	25,30%	105
Neither agree nor disagree	35,90%	149
Agree	26,27%	109
Strongly agree	4,82%	20
Total	100%	415

Table 8 Statistical Results Sub-Question 4

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
1,01	3	0	No	50,00%	No

Z-score is lesser than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is higher of .05 significance level, we fail to reject the null hypothesis. The empirical research supports the null hypothesis that the investors are no sad for the lost.

The result is inconsistent with loss aversion theory and inconsistent with later on question 5, where the gain of 5 USD makes the investor happy. The research finding is asymmetric respect to the loss aversion, because the gain it looks more important (happy) than loss (happy instead of sadness).

According to the loss aversion theory, the loss gives more pain than happiness for equivalent gain.

Because if the investors feel pleasure happiness for the gain of 5 USD, according to theory should feel more pain for the loss of 5 USD than for the gain of 5 USD.

The answer shows not sadness for the loss of 5 USD, it means or neutrality or implicitly happiness. Instead, the following sub-questions 5 will show happiness for the interviewer for a gain of the same amount (5 USD). The answer is a proof of the human irrationally of the behaviour or inconsistency in the emotion between gain and loss of 5 USD. Nevertheless, according to the loss aversion theory, we should expect at least sadness sentiment linked to the loss of 5 USD, that in theory should be assessed by the human with more severity than equal amount of the gain.

According to this empirical test the result looks opposite to the loss aversion theory, because happiness is feeling for a gain of 5 USD, but no sadness is feeling for the loss of the equal amount, when according to theory the loss should be also more weighted than the gain.

This irrational no sadness feeling associated to the loss, could be explained that, as showed in the previous test, during a bear market the investors keep holding the stock and the reason of this is to be hoping a later recovery, so is not sad because believe in the later recovery.

Or could be also linked to the subjective interpretation of sadness, so in the investor's mind the word sad are associated to more tough event than lose 5 USD. Nevertheless, is inconsistent with the later on research

finding of feel happiness to gain 5 USD, is like to find opposite result than loss aversion theory, because is like more important (happy) 5 USD than loss same amount (5 USD).

Below is analysed the sub-question number 5 relative to the research question.

5. You hold a share of a company that is worth 100 USD, after a month the value of the share go up to 105 USD you have gain 5 USD in absolute value. You feel happy for the increase in value of your investment?

a) Null Hypothesis (Ho): investor feel not happy for the gain.
b) Alternative Hypothesis (H_1): investor feel happy for the gain.

The reason behind this research question is to analyse any asymmetric result between loss and gain of the same amount.

The following tables show the answer and statistic result of the empirical research question.

Table 9 Answer Choices Sub-Question 5

Answer Choices	Responses %	Responses
Strongly disagree	1,93%	8
Disagree	3,86%	16
Neither agree nor disagree	24,82%	103
Agree	51,57%	214
Strongly agree	17,83%	74
Total	100%	415

Table 10 Statistical Results Sub-Question 5

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
0,84	3,8	19,401	Yes	0,00%	Yes

Z-score is higher than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is less of .05 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the investors feel happy for the gain.

The investor is happy for the increase in value of the stock, but conversely for the same decrease of the price was not sad in the previous question. Showing asymmetric behaviour for a gain and loss. Also, if in this case the asymmetric behaviour is not in line with the loss aversion, because gain 5 USD brings happiness more than sadness (or irrational happiness or neutrality) associated to the potential loss of the same amount.

Below is analysed the sub-question number 6 relative to the research question.

6. Today you buy a share of a company that is worth 100 USD, after two weeks the value of the share goes down to 90 USD and you have lost 10 USD in absolute terms, but later after 2 weeks the value of the share increases to 95 USD, so the stock has recently increased by 5 USD in absolute terms. Are you happy for the recent recovery of the share's price and the increase in value of 5 USD?

a) Null Hypothesis (6Ho): Investors are not happy for the recent increase in value
b) of 5 USD.
c) Alternative Hypothesis ($6H_1$): Investors are happy for the recent increase in value of 5 USD.

The question 5 and 6 has been wrote asymmetric respect to the bear and bull market and the reason behind this research question is to analyse if there is any asymmetric behaviour between relative recovery (90 to 95 USD) and relative loss (-5%, 95 vs 100 USD) and the relative loss (110 vs 105 USD) but with still relative gain (+5%, 105 vs 100 USD). According to the researcher view this asymmetric behaviour could be explained by the new anchor bias or last information anchor effect and recency bias, overweight last information.

The following tables show the answer and statistic result of the empirical research question.

Table 11 Answer Choices Sub-Question 6

Answer Choices	Responses %	Responses
Strongly disagree	1,93%	8
Disagree	6,99%	29
Neither agree nor disagree	37,11%	154
Agree	42,89%	178
Strongly agree	11,08%	46
Total	100%	415

Table 12 Statistical Results Sub-Question 6

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
0,85	3,5	11,983	Yes	0,00%	Yes

Z-score is higher than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is less of .05 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the investor is happy for the recent recovery (relative recovery) of the share's price and the increase in value also if the new price level (95 USD) corresponds a relative loss, if compared with the acquisition price (100 USD).

This empirical test show that in decision making the last information is overweighted (90 USD) and consequently the last information become the "new anchor level" or due to the recency bias the "last information anchor" (90 USD), different of the previous acquisition anchor level (100 USD).

So, when the stock get the level 95 USD is compared with the new anchor level and the investor is feeling happy for the increase in the value of the stock and the recent recovery of 5 USD.

This empirical test is a proof that a relative gain or recovery is always a positive phenomenon, also if the increase in value is only relative to the last price information or new anchor level (90 USD), but the gain is not in absolutely terms, because the stock is reaching (95 USD) a lower-level respect to the acquisition price (100 USD), so the stock has still negative performance.

The research result show that a positive event, relative gain or recovery, it is emotional weighed more, if is occur after a negative event. Indeed, in the next question we will see that the increase in value of 5 USD respect to the acquisition price do not bring the same happiness, if the absolute gain has happened after a negative event (relative loss of 5 USD). The research result shows that a negative event or relative loss (-5 USD, 105 vs 110), it is emotional weighed more, if is occur after a positive event (110 vs 100 USD, +10%), even if the stock has gain value (105 USD) and has positive performance respect to the acquisition price (100 USD).

Below is analysed the sub-question number 7 relative to the research question.

7. Today you buy a share in a company that is worth 100 USD, after two weeks the value of the share goes up to 110 USD and you have earned 10 USD, but later after 2 weeks the value of the share decreases to 105 USD, the stock has recently decreased by 5 USD in absolute term. Are you felling sad for the decrease in the value of the stock and the recent loss of 5 USD?

a) Null Hypothesis (7Ho): the human behaviour is always rational using consistent logic in problem solving or decision-making process: rational economic behaviour. Investors do not feel sad for the recent loss.
b) Alternative Hypothesis ($7H_1$): the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour. Investors feel sad for the recent loss.

Both questions 6 and 7 are written symmetrically, with the same logic, so they are asymmetric respect to the acquisition price 100 USD, with the goal to analyse potential asymmetric behaviour of the investor linked to the gain or loss. According to the researcher view this asymmetric behaviour could be explained by the new anchor bias or last information anchor effect and overweight last information bias (recency bias).

The following tables show the answer and statistic result of the empirical research question.

Table 13 Answer Choices Sub-Question 7

Answer Choices	Responses %	Responses
Strongly disagree	3,86%	16
Disagree	20,72%	86
Neither agree nor disagree	40,48%	168
Agree	29,64%	123
Strongly agree	5,30%	22
Total	100%	415

Table 14 Statistical Results Sub-Question 7

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
0,93	3,15	3,286	Yes	0,00%	Yes

Z-score is higher than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is less of .05 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour and investors feel sad for the recent loss.

Despite the recent relative loss, the investor should be happy due to the increase of 5% (105 USD) value and should have a constant behaviour as showed in research question number 5, where the investor is happy, when the stock price reached 105 USD with 5% positive performance. So, in the researcher view the fact that the investor feels sad for the same price level of 105 USD, showing not constant behaviour or emotion for the same price level, is a prove of existence of anchor bias or overweight the last information. Therefore, the investor compares the 105 USD with the last price 110 USD (new anchor) and he felt sad for the relative loss, even if the stock has positive performance in absolute terms respect to the acquisition price (100 USD). While in the research question number 5 there is not a new anchor effect or last information effect, hence the investors compare 105 USD with the original anchor and acquisition price (100 USD).

This empirical test show that in decision making the last information is overweighted due to the recency bias (110 USD) and consequently the last information become the "new anchor level" (110 USD), different of the previous acquisition anchor level (100 USD). Hence, the "new anchor level" is used by the decision maker to judge is investment. Thus, when the stock gets the level 105 USD and is compared with the new anchor level (110 USD), the investor is feeling sad for the decrease in the value of the stock and the recent loss of 5 USD.

Hence, because the return is positive respect to the acquisition price, the investor should be happy for the absolute gain and positive performance (100 vs 105?) but instead the investors anchors is judgment to the last price information, called the new anchor (110 USD), and for this consider the actual level of 105 USD as decrease in price value and no as a gain in absolute terms respect to the acquisition price. The new anchor bias let overweight negative event that occur after a positive event, due to emotional factor associated with a decrease in value (105 USD) occurred after an increase value (110 USD).

Below is analysed the sub-question number 8 relative to the research question.

8. Assuming that we have invested in Equity share and our yearly expected return is 10% and at the end of the year we achieved a 3% return while the market has achieved a 1% return. Are you happy with the investment made?

a) Null Hypothesis (8Ho): the human behaviour is always rational using consistent logic in problem solving or decision-making process: rational economic behaviour. Investors are not happy with the investment made.
b) Alternative Hypothesis ($8H_1$): the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour. Investors are happy with the investment made.

The research question 8 and 9 has been written symmetric respect to the expected return +10%, with symmetric negative and positive performance of the market (-9% vs +9%) and investor (-7% vs +7%). The goal is to find any potential asymmetric behaviour of the investor, based on his worst and better performance respected to the expected performance's target.

The following tables show the answer and statistic result of the empirical research question.

Table 15 Answer Choices Sub-Question 8

Answer Choices	Responses %	Responses
Strongly disagree	3,61%	15
Disagree	9,64%	40
Neither agree nor disagree	33,73%	140
Agree	41,93%	174
Strongly agree	11,08%	46
Total	100%	415

Table 16 Statistical Results Sub-Question 8

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
0,94	3,5	10,836	Yes	0,00%	Yes

Z-score is higher than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is less of .05 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the investors are happy with the investment made, even if the expected return is 10% and the investor has achieved a 3% return while the market has achieved a 1%.

The result shows that if the performance is less than the expected return, the investor use the market's performance as new anchor bias, instead of to use the expected return as anchor. Hence, the new anchor is the market performance 1%, instead of the stock's expected return (+10%).

In this example we cannot speak about loss aversion, because the performance is still positive, but we can introduce the concept of relative loss respect to the expected return.

Hence, if the performance is less than the expectation, the investor anchors his performance to the market 's performance.

In the researcher view the anchor bias to the market could be explained as a human reluctance to admit relative loss respect to the expected return or poor performance. Maybe because the market has done worse performance, the investors look the market to feel better and to mitigate the displeasure of not be able to reach the target expectation return, so an emotional factor could be factorized in the change of anchor from the expected return to the market return. Practically knowing that the market has done worse, eases our regret for not reaching the expected return.

Instead, as we will see in the next research question, in case the stock's performance is better of the expectation return, the investors do not look at the market, showing asymmetric behaviour, and confirm the alternative research question hypothesis, that the human behaviour is not always rational using consistent logic in problem solving or decision-making process.

Below is analysed the sub-question number 9 relative to the research question.

9. Assuming that we have invested in Equity share and our yearly expected return is 10% and at the end of the year we achieved a 17% return while the market has achieved a return of 19%. Are you happy with the investment made?

a) Null Hypothesis (9Ho): the human behaviour is always rational using consistent logic in problem solving or decision-making process: rational economic behaviour. Investors are not happy with the investment made.
b) Alternative Hypothesis ($9H_1$): the human behaviour is not always rational using not consistent logic in problem solving or decision-making process: irrational economic behaviour. Investors are happy with the investment made.

The reason behind this research question is to find any potential asymmetric behaviour of the investor linked to his worst and better performance respected to the target return. Both questions 8 and 9 are written symmetrically respect to the expected return (+10%).

For example, for the stock's return has been assumed a loss of -7% for the question 8 and a gain of +7% for the question 9, to analyse potential asymmetric behaviour of the investor.

The following tables show the answer and statistic result of the empirical research question.

Table 17 Answer Choices Sub-Question 9

Answer Choices	Responses %	Responses
Strongly disagree	0,96%	4
Disagree	5,30%	22
Neither agree nor disagree	29,40%	122
Agree	46,27%	192
Strongly agree	18,07%	75
Total	100%	415

Table 18 Statistical Results Sub-Question 9

Standard Deviation	Average Score	Z -score value	Reject null hypothesis? If Z score > 1,645	p value	Reject null hypothesis? If p-value < 5%
0,84	3,8	19,401	Yes	0,00%	Yes

Z-score is higher than the one-side Z-score critical value 1.645 for 95% confidence level and the p-value is less of .05 significance level, the null hypothesis is rejected. The empirical research supports the alternative hypothesis that the investors are happy with the investment made.

The result show that if the investor performance is better than the expected return there is no market anchor bias, so if the market has done better than our result is not an issue. The test proves that if the investor's performance is better of the expected return, the investors do not show market's anchor bias, so do not benchmark is performance to the market, maybe because this time is happy to have done a better performance of the expected return, so he does not care of the market's performance.

The research questions show that if there is a relative loss respect to the expected return, the investors use the market due the worst performance as anchor, as a benchmark and so the investor fell happy despite the loss. Conversely, when the performance is higher than the expected return, the investors do not use the market as benchmark, because the market has better performance, but nevertheless investor feel happy because his performance is higher than the expected return (10%). This is a prove of asymmetric behaviour of the investor with the symmetric loss (-7%) and gain (+7%) respect to the expected return.

Indeed, the two-research question are equal in terms of relative loss and gain respect to the expected return. The economic agent in the first test is relatively losing 7% and he feels happy and in the second test he gains 7% relatively more and is happy too. It is irrational to feel happiness or have the same emotion in both opposite event of a loss or gain, maybe the explanation could be that in the event of a relative loss the economic agent anchors his performance to the market. Hence, the investor takes the market as a reference and therefore by performing a better performance than the market he feels happy, despite the negative result respect to the expected return. Let's look at what others have done could be interpreted as a psychological bias in order do not to admit the relative loss or low performance. A similarity concept is present in economics for the concept of relative poverty, where the subjective wealth is compared with the average income of the area or region, so the subjective poverty is assessed relative to the other average income, so we look the status of other to assess our status, like above we look to the market to assess our investment' performance.

SUMMARY OF RESULTS

The research questions have proven that human behaviour is not always rational, using not consistent logic in problem solving or decision making.

The sub-question number 1 supports the null hypothesis that the investors are not willing to sell the stock with good performance. We could conclude that the investor during the bullish market follow the market due to the herd instinct behaviour or could means that the investors act as level-k thinking and beauty contest strategy too, expecting that all other players will continue the "buy" strategy. The empirical result no confirms the disposition effect during a bullish market.

The sub-question number 2 shows human inconsistence in behaviour and logic, the

investor after a recovery from a downside market is now willing to sell the stock at same price level that in the previous question was refused, maybe linked to different emotion now associated to the same exit price, after having been experienced a recently downward trend the behaviour could be explained by the new anchor bias and recency bias.

Hence, the researcher has introduced the concept of "new anchor" level or "last information anchor" to explain that the investor uses the "new anchor" level to compare the potential gai of the exit, instead of to use the acquisition price as reference or anchor. Therefore, due to the recency bias, the recent negative event of the bear market, become the new anchor for future decision making of potential equity exit.

This is a proof of emotional bias due the emotional feeling after a loss, the mind is focus only to short run "new anchor". Furthermore, after a price recovery from a downside market, is confirmed the disposition effect, after having recent experienced bearish market the investor sells quickly the asset. There is no herd behaviour after a recovery from a downside market and due to the negative information (recent bear market) there is an overweight emotional fear that the downside market could happen again, pushing the investor to sell.

The sub-question number 3 has confirmed that the investor is willing keep holding stock that are losing value in line with the disposition effect, loss aversion and regret bias.

Nevertheless, the confirmation of the existence of the disposition effect during a bear market, in my personal view, confirm the no existence of the herd behaviour during a bear market, due to the fact that the investor weight more the loss aversion and regret bias than other potential bias such as herd instinct behaviour.

During a bearish market, so market is losing value, the empirical test show that there is no herd behaviour because due to the loss the investor prefers to keep the asset to avoid to materialize the loss. This behaviour could be explained by the Level-K-Value.

The sub-question number 4 show that the investors are no feel sad for the loss. The result is inconsistent with loss aversion theory and inconsistent with the next question 5, where the gain of the same amount makes the investor happy. The research finding is asymmetric respect to the loss aversion and to feel no sadness losing money it means, indirectly, irrational neutrality or happiness linked to the loss.

The answer is a proof of the human irrationally of the behaviour or inconsistency in the emotion feel between gain and loss with the same amount.

This irrational no sadness feeling associated to the loss, could be explained because the investor believes in the later recovery or could be also linked to the subjective interpretation of the word sadness.

The sub-question number 5 show that the investor is happy for the increase in value of the stock, but conversely for the same decrease of the price was not sad in the previous question.

Showing asymmetric and different behaviour for a gain and loss. Even if in this case the asymmetric behaviour is not in line with the loss aversion theory, because 5 USD gain brings more happiness to the investor than sadness (or even irrational happiness or neutrality associated the loss) associated to loss of the same amount, a sort of asymmetric behaviour respect to the loss aversion theory.

The empirical research number 6 show that the investor is happy for the recent recovery (relative recovery) of the share's price and the increase in value, even if the new price level corresponds an absolute loss, if compared with the acquisition price. This empirical test show that in decision making the last information is overweighted and consequently, the last information become the "new anchor level" or "last information anchor" different from the previous acquisition anchor level (acquisition price).

The research result show that a positive event, even if is only a partial recovery or

gain, it is emotionally weighted more, if has been occurred after a negative event.

The sub-question number 7 supports the alternative hypothesis that the human behaviour is not always rational using not consistent logic in problem solving or decision-making process. This empirical test show that in decision making the last information is overweighted and consequently the last information become the "new anchor level" or "last information anchor", different of the previous acquisition anchor level.

Indeed, because in the research question the return is positive respect to the acquisition price, the investor should be happy for the absolute gain and positive performance, but instead the investors anchor their judgment to the last price information, called the "new anchor level", and for this consider the actual price level as decrease in value and no as a gain in absolute terms respect to the acquisition price. Hence, due to the new anchor bias, the investor overweight negative event that occur after a positive event and the empirical research confirm no constant behaviour or emotion felled for the price level, indeed for the question 5 with a price level of 105 USD the investor was feeling happy, now with same price level he felt sad.

The sub-question number 8 shows that if the investment performance is less than the expected return, the investor uses the market's performance as new anchor bias, instead of to use the expected return as anchor, maybe to mitigate is loss feeling look at the market that has done worst.

The sub-question number 9 proves that if the investor's performance is better of the expected return, the investors do not show market's anchor bias, maybe the explanation could be an emotional bias linked to the happiness to have overperforming respect to the expected return.

The empirical research has highlighted several irrational behaviour or logic inconsistence, for example when the performance is less than the expected the investor benchmark his result with the market, instead if the performance is higher than the expected return, he changes behaviour and do not benchmark his return with the market return.

Another bias that is considered in the behaviour finance's theory is the recency bias, where people tend to overweight the recent event. According to Murdock (1962) the recency effect has been demonstrated investigated how the ordering of words in a list affects our ability to remember them.

The research confirms the recency effect the investor overweight last information during the decision making and this emotional bias lead to the investor to change his referring price, from the "original" anchor to the "new anchor" or "last information" anchor.

According to the action-effect (Kahneman & Tversky, 1982) people regret actions leading to negative outcomes more than they do inactions leading to the same negative outcomes. The research has confirmed regret bias and loss aversion during the investment process. Indeed, regret bias is present during the bearish market and together with loss aversion lead the investor to keep holding the losing stock.

The research finding is that Level-K beauty contest strategy could apply together with the herd instinct behaviour when the market is uptrend, instead when the investor is losing money due to the loss aversion and regret bias, the investors keep the stock in line with the disposition theory. Conversely, with bearish market the investor behaviour is not following any herd due to the emotional effect associated to the loss, but could follow a Level-K-Value, where the emotional factor brings the decision maker to predict a change in strategy of the other investors and a consequent predicting a reversal price that could explain the rationale behind to keep holding losing stock.

The loss aversion is one of one of the main points used to explain the disposition effect.

The disposition effect is the tendency of investors to sell assets that have increased in value, while keeping assets that have

dropped in value. The research finding confirms the disposition effect during a bearish market (loss aversion), but conversely do not confirm the disposition effect for a bull market trend (no selling asset that have increased in value).
Nevertheless, for a bull market after a recovery from a downside market, the research confirms the disposition effect too.
To summarize the empirical research has showed the following behavioural bias:

- Loss aversion and regret bias during the bearish market,
- no herd behaviour during a bearish market,
- disposition effect with bearish market,
- no selling asset during bear market,
- Level-K- Value with bearish market,
- herd behaviour during a bullish market,
- potential Level-K thinking during a bullish market,
- no confirmation of the disposition effect during a bullish market (no selling asset), but after a recovery from a downside market, is confirmed the disposition effect for the bullish market, the investor sells quickly after a recovery from bear market,
- overweight the recent information (recency bias), so last price information become the "new" anchor bias,
- no sadness if the investor is losing money, showing irrational happiness for the loss or neutrality and consequently asymmetric behaviour respect to the one expected by the loss aversion,
- if the performance is worse than the expected return, the investor use market as "new" anchor bias.
- if the performance is better than the expected return, the investor does no use market as "new" anchor bias.
- irrational behaviour or inconsistent logic in decision making and problem solving
- reluctance to admit loss,
- asymmetric behaviour.

Conflict of Interest: None

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