

Loss Aversion, Prospect theory, and Stock Investing

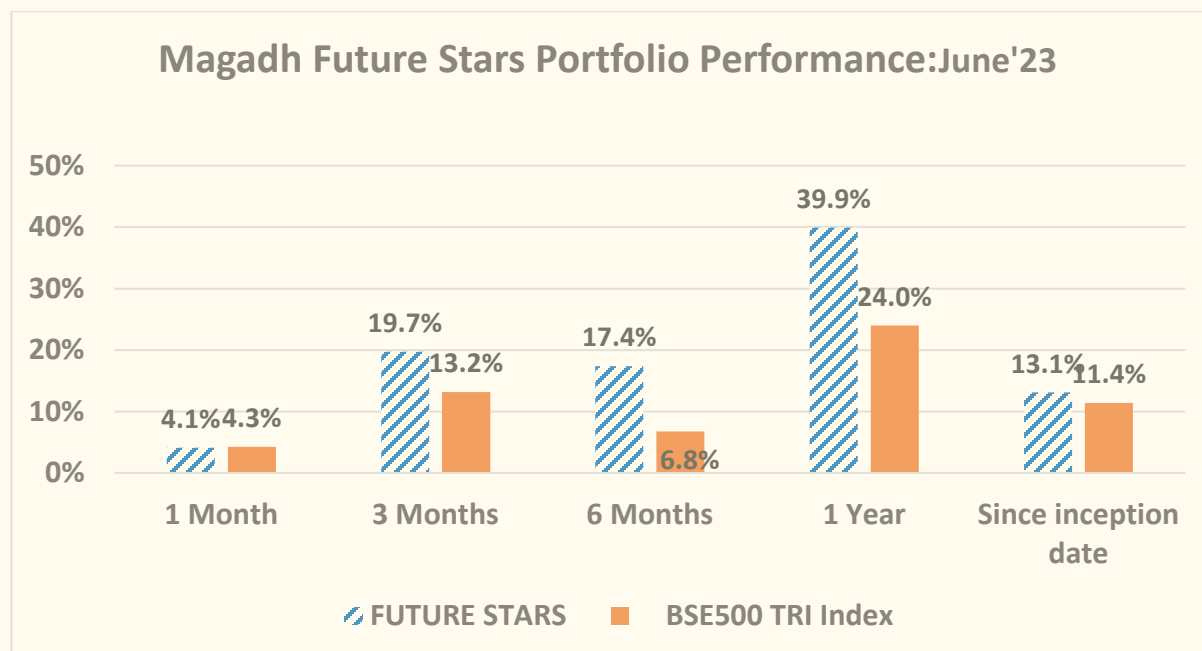
Indian stock markets are sustaining their hot streak. In June, most sectoral indices registered growth. Nifty 50 index rose by 3.5%. Over one year, as on 30th June 2023, Nifty 50 was up by 21.6%. Our Future Stars, and Value for Growth portfolios were up by 39.9% and 38.1% over one year as on 30th June while our benchmark BSE 500 TRI index rose by 24.0% in the period.

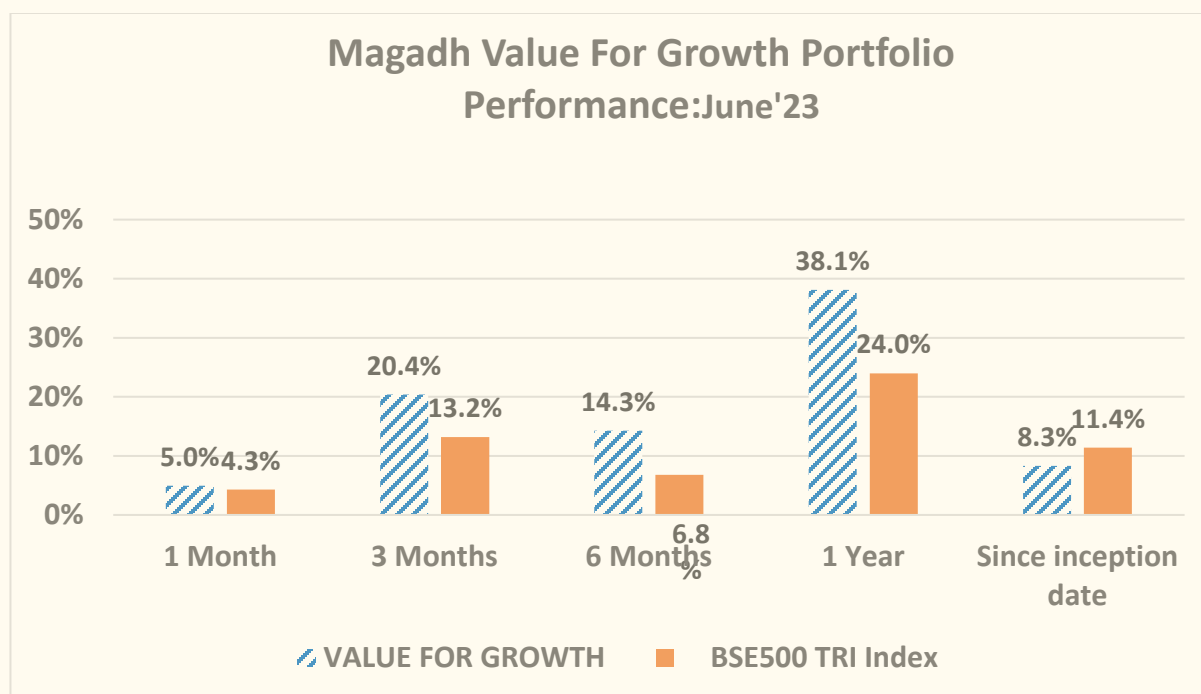
Banking stocks, where we have sizeable exposure underperformed our benchmark, BSE 500 TRI (which was up by 4.3%) in the month. However our strong Overweight position on defence sector stocks supported our portfolio performance in June. Results of companies in banking, industrials and engineering, and consumer sectors are likely to be robust for 1QFY2024.

We remain constructive on Indian equities' five year prospects notwithstanding the possibility of occasionally volatility in the way. Ongoing structural reforms, conspicuously improving infrastructure and fast growing disposable incomes are likely to keep Indian markets in the fast lane over medium term. Valuations have inched higher but cannot be termed as excessive. Based on TTM (trailing twelve months) P/E multiple of Nifty 50 index is 22.6 x , about 7% lower than last ten year average.

Towards the end of June, we trimmed our position in some defence sector stocks based on our view that upside to fair values in these stocks have reduced. However we are still maintaining an Overweight position here. We see low downside in these stocks and there are many price catalysts that can play out over coming two years.

Other sectors where we have large exposure are banking, consumer discretionary, industrials , and consumer staples. We do not have any investment in pharma and IT.





Data is for the period Aug 02, 2021 till June 30, 2023. Performance is as TWRR - Time Weighted Rate of Return. Data for more than one year has been annualized. Past performance is no guarantee of future returns. Performance data provided herein is not verified by SEBI.

A decision to sell...

In June, we cleared off our small metal and mining sector holdings in both our portfolios. As usual we did a detailed analysis before taking the decision. Still, before pulling the trigger we had to fight off a common investment bias.

While our investment style is entirely driven by the fundamental style we also apply a heavy layer of behavioural finance in our process. We try to look at decisions in probabilistic terms. Our fundamental research is aimed at deriving potential outcomes i.e., fair values of a stock, in ranges rather as points. After that the decision to buy, sell, hold, avoid etc involves a heavy dose of our behavioural finance framework.

In this instance, the two stocks – Hindalco in our Value for Growth portfolio, and JSPL in our Future Stars portfolio, were under water when we concluded that whatever small exposure we had in these two stocks could be better deployed elsewhere. We performed a sensitivity analysis to estimate the fair value of these stocks in various commodity price scenarios. To us the upside in these two stocks over medium term was limited at best and there was a high probability of more than 20-30% downside over medium term. Thus our fundamental analysis was in no uncertain terms indicating the need to sell. However emotions, as they often attempt, started trying to distract us – “hold for some time”, “commodity prices have been weak for some time – they’ll rebound”, “these companies will gain from deleveraging”, “volume growth looks healthy” etc. These were

excuses on the basis of which our emotional self wanted to hold on to these stocks. The real reason was that human beings are designed to avoid and dislike losses. As a corollary the natural inclination of any investor is to avoid losses in markets, at whatever cost. In this case our sub conscious mind did not want to book the loss and instead preferred to take the bet of holding the two stocks in the hope that they would trend back above their purchase price. This is where a practiced control of emotions comes handy as an investor. Having defeated such biases in the past on many occasions, we thankfully managed to get rid of our emotional side and sold the two stocks as was suggested by our dispassionate fundamental analysis process.

..... Overcoming a bias called loss aversion

Why are we as investors so anathemic to selling a stock at a loss - even a minor one , despite believing that the stock's prospects are poor? And, in some other situations, why do we sell even a well-placed stock after a minor correction post a strong rally ?

We as humans like winning and dislike losing. We are wired that way. Obviously this drives wrong decisions on many occasions.

Let us consider two situations -

Situation 1:

Which option will you choose ?

Get Rs 90,000 for sure, or 90% chance of getting Rs 100,000 ?

If you are like a majority of the people in real life situations you will choose the sure option. Unless you're a supremely numeric person driven only by hard logic you'd rate the subjective value of gain of Rs 90,000 as higher than 90% of the value of a gain of Rs 1,000.

A person driven by hard logic would be indifferent between the two options. The expected value of the second option(90% of Rs 100,000 = Rs 90,000) is exactly same as the first option. However in reality our proclivity for certainty prompts most of us to go for the first option. We are risk averse here.

Situation 2:

Which option will you choose ?

Lose Rs 90,000 for sure, or 90% chance of losing Rs 100,000 ?

In this case, if you are like the majority of humans you will go for the gamble. Here too if seen objectively there is nothing to differentiate between the two choices. They both represent an expected loss of Rs 90,000. However since this is a loss and we dislike losses we go for the gamble. We try our luck with the hope that the outcome will be better than the certainty of losing Rs 90,000. To avoid losses we display risk seeking behaviour.

Loss aversion is a behavioural bias that hinders our outcomes – in investing, and elsewhere. We dislike losses more than we like gains. We shall be elated if our portfolio appreciates by 40% in CY2023. However this joy will be much lesser as compared to the grief we may experience if the portfolio value were to decline by 40%. Daniel Kahneman in his book “ Thinking Fast and Slow” aptly states that “ This asymmetry between the power of positive and negative expectations or experience has an evolutionary history. Organisms that treat threats as more urgent than opportunities have a better chance to survive and reproduce”.

In real life situations, and in investing, we come across many situations where we face mixed options. These situations offer an opportunity to gain, and the risk of some loss - and we have the option to take or reject the gamble.

In the Covid wave a surgeon would have faced this dilemma. Call a patient with a life threatening condition to perform an elective surgery to treat the patient successfully with 80% probability, but risking Covid infection in the hospital, with 30% probability with possibly ominous implications. Similarly, before invading Ukraine, Russian strategic planners would have considered various outcomes of starting the war. A quick win – with perceived probability closer to three digits – would have fetched some conspicuous gains. Perhaps these strategists would not have assigned a high enough probability of loss, or a prolonged war leading to adverse consequences.

For an investor this situation presents itself when a stock under consideration for purchase where there is some probability that it will go up by x% and some probability that the stock will decline by y%.

In such situations typically we are inclined to avoid the loss making choice. However at times this leads to wrong decisions. Even where loss probability is extremely low or extent of possible loss is not too high in reality we end up avoiding the gauntlet incorrectly. With conscious application of behavioural finance we at Magadh Capital strive to take up bets that are loaded in our favour.

In the field of investing such situations show up quite often. We are reluctant to sell a stock at a loss even if realised that the stock doesn't have good prospects . If we had bought it at Rs 100 we may not be happy to sell it even at Rs 98 even if we are aware that the stock's prospects are not good.

In the example table below, stock 2 should typically be preferred by a normal, unconstrained investor– assuming the investor is a typical equity investor who is capable of absorbing some losses - since the expected value of its upside is higher at 25%, vs 5% for stock 1. However if the investor does not control his mind well he may end up selecting stock 1. Notably, the stock1 has zero downside even in the bear case while stock 2 has 5% downside in the base case. It is this reason why an untrained mind may lead the investor towards selecting stock 1.

Exhibit 1: Loss aversion at display in investing

	Stock 1 - Purchase price Rs 100			Stock 2 - Purchase price Rs 100		
	Bear case	Base case	Bull case	Bear case	Base case	Bull case
Target price A	0%	4%	12%	-5%	30%	40%
Probability B	20%	60%	20%	20%	60%	20%
Weighted price C = Ax B	0%	2%	2%	-1%	18%	8%
Expected value = Sum of C	5%			25%		

A dispassionate process will focus on questions like – can I take the risk of 5% loss with 20% probability ? If that loss will not cause much disruption to my investment plans then the 30% and 40% upside (with 60% and 20% probabilities) should lead us to stock 2.

Cutting the flowers and watering the weeds – disposition effect

Think of a situation where you need to take some money out from your stock portfolio. So how do you decide as to which stock to sell ? Chances are high that you will sell stocks that have performed well and where you have made decent returns. You may leave stocks that are lower than your purchase price untouched .

This is an example of the disposition effect, a behavioural bias rooted in loss aversion. Our dislike for losses prompt us to continue to hold loss making stocks even if it means we have to sell stocks with better prospects.

Every investor has to fight off this tendency quite often. The key is to focus on future prospects of stocks instead of looking at profit or loss that the stock has delivered so far. When we decided to sell the commodity stocks last month our inherent trait – of loss aversion – was beseeching us to consider selling some other stock if we needed funds for investing in a other stocks. However we assessed the two stocks on the basis of what upside expectation did we see over medium term, and accordingly took our decision.

Endowment bias

This is another related behavioural bias that investors encounter regularly. Let us assume that you have invested 1% of your portfolio in stock 'A' 3 months ago. Let us also assume that you typically allocate 5% to each of your portfolio stock (thus you have exactly 20 stocks in your portfolio). After you took 1% exposure to stocks 'A' the stock has been on an uptrend. Even as you have been awaiting better price point to add to your holding of stock ' A' the latter has risen by 40%. You are not looking to purchase now given the price has shot up by 40% since you bought it, even though the portfolio weightage to this stock is much lower than what your framework demands.

At the same time you are not considering selling the stock. Isn't this anomalous ? You are not buying since the stock looks overvalued to you. And you are not selling – obviously, since you expect further upside in the stock. This is classic endowment bias at work. Since you own a

product you assign it higher value than it may have. Thus the gap between the price at which you'll sell that product (or stock) will need to be much higher than the price at which you'll buy it again in the market.

In this situation the rational action to perform as an investor would have started with estimating the fair value of the stock. If there was reasonable margin of safety over current stock price and if there was good enough upside then you should have increased the portfolio weightage of the stock as per your system to 5% by making additional purchase at current price. If the fair value was in the same range as the current stock price – implying no, or little upside, you should have sold your holding of about 1% in the stock. Here it is important to apply fundamental analysis, quantitative results, and the set of rules that one has developed with experience.

Loss aversion and anchoring bias

Think of another scenario - if I considered buying a stock at Rs 100 with upside of Rs 75, i.e. I expected it to move to Rs 175 over one year. Let's say the stock moves up to 110. Now I don't buy the stock. If I buy at Rs 110, to me this will seem notionally like a loss of Rs 10. Getting anchored to the price at which we initially spotted despite expecting a much bigger upside (Rs 175 over Rs 110) our bias prevents us from purchasing the stock at Rs 110, obviously mistakenly.

In all the situations above the first requirement for rational behaviour is the awareness of such biases. Then only, if we take some time to think over the decision point, we can apply our fundamental analysis properly. Documenting and keeping the “ do's” and “ don't's “ lists ready for various situations can be helpful to counter behavioural pitfalls in investing.

The above cognitive biases can be understood better and more holistically by studying two important parts of behavioural finance, and of applied economic theory, known as expected utility theory, and prospect theory. Proper understanding of prospect theory especially provides investors more firepower to overcome biases like loss aversion, disposition effect, and endowment bias.

Gamble or a sure thing ? - Expected utility theory

The concept of risk and tools of risk management traditionally focused a lot on gambles. Many studies in this field were focused on how to help gamblers become more productive. The field of insurance as European merchants started making long voyages was developing with similar focus and around the same time. Till about 17th century there was unanimity amongst mathematicians that the value of a gamble equalled the expected value of the gamble which essentially was the weighted average of the possible outcomes, ie. the summation of product of each outcome and its probability. This is undoubtedly the rational approach.

However, in reality human beings behave quite differently from the rational approach. If given a choice between A) 80% chance to win Rs 100 and 20% chance to win Rs 10, and B) sure Rs 80, which one would you take ? If you are like the vast majority you'll choose the certain option. By the way, the expected value of the first choice is (80% of 100) + (20% of 10) = 82. Even though the second option seems inferior by Rs 2 in rational terms most respondents of this survey are found to go for the certainty that is provided in the second option.

In mid 18th century the famous Swiss scientist Daniel Bernoulli came up with the concept of utility theory in this problem.

Bernoulli had been perplexed by responses to surveys like the above where people displayed clear preference for the sure outcome over a gamble. He concluded that human beings dislike risk. In this case, risk represented the lower payoff if one opted for choice A where one would have to settle for Rs 20. As a result most of the respondents go for the certain outcome, choice B in this case which offers Rs 80 for sure – thus culling out risk from the inferior outcome.

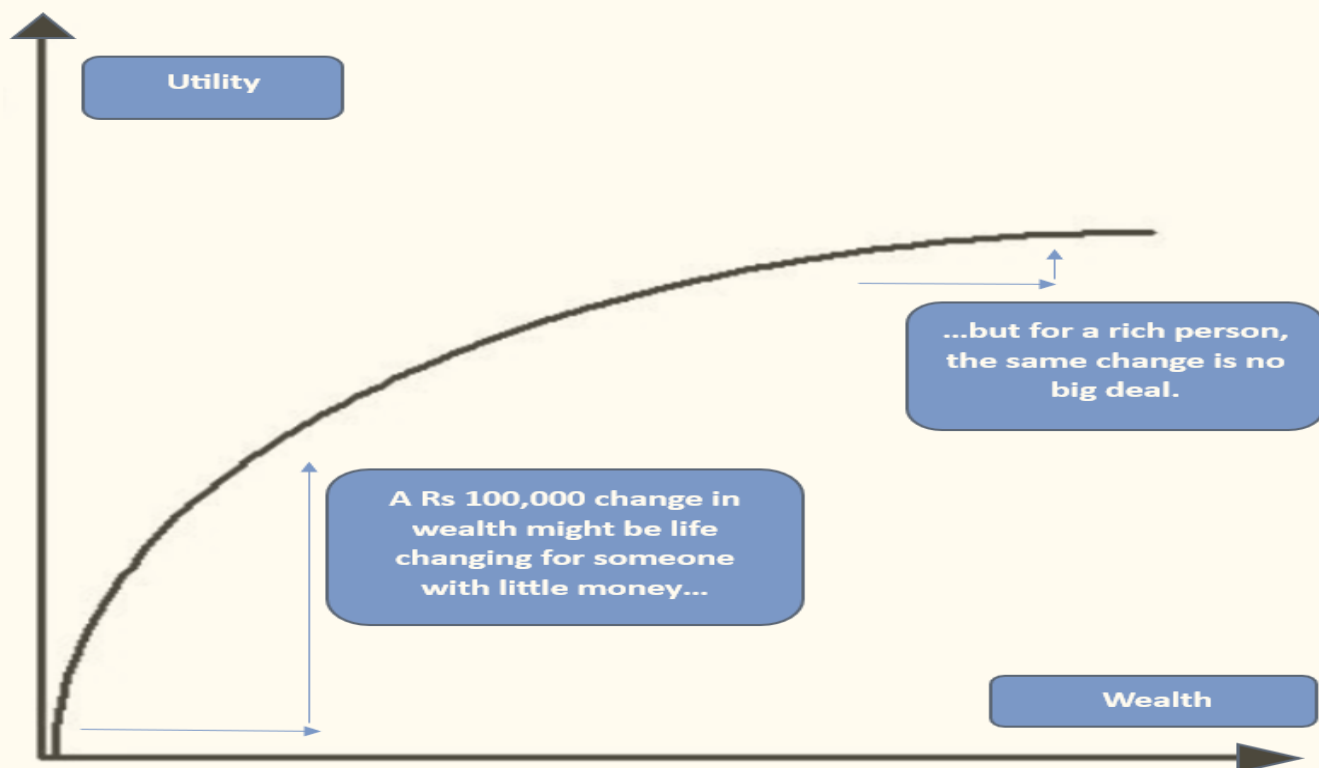
In a way, the urge to avoid negative surprises is what prompts people to buy term life insurance. By paying a relatively small premium periodically one ensures that in the unfortunate even of loss of life the family has some corpus to fall back upon and there is no disruption to the quality of life.

In essence Daniel Bernoulli was postulating that people make their choices based not on money value of outcomes but instead on psychological value of those outcomes, known in traditional economic parlance as utility of those outcomes. In the above example the utility of choice A is not the weighted average of the two outcomes and instead it is the weighted average of the utility of these two outcomes.

Bernoulli proposed that this risk aversion – preference of the sure option over a favourable gamble where the gamble's expected value was equal to the sure option or even slightly higher- could be explained by the diminishing marginal value of wealth.

Taking the argument further Bernoulli suggested that people's happiness, or utility in economists' parlance – increases as they get wealthier but at a decreasing rate. This is the principle of diminishing sensitivity. It is not counterintuitive to imagine that as wealth grows the perceived benefit of a certain fixed increase in wealth decreases. So, if a taxi driver wins Rs 1 crore in Kaun Banega Crorepati it'll be a life changing event for him. However for a Bollywood superstar such a win may not mean much.

Exhibit 2: Expected Utility Theory



As seen above a utility function of this shape suggests risk aversion since the utility of the first thousand rupees is more than the second thousand rupees. As a corollary if a person with wealth of Rs one lakh is offered a choice between additional Rs one lakh for sure, and a 50% chance of winning Rs two lakh he will opt for the sure thing because he values the second Rs one lakh less than the first Rs one lakh. He will not risk losing the first Rs one lakh as he seeks to win Rs two lakh.

This concept was developed further and published in a paper as expected utility theory in 1944 by mathematician John Von Neumann and economist Oscar Morgenstern. The theory in some shape has been in use and has been analysed for the last 300 years regarding decision making in risky situations.

To an extent this theory explains well why a new investor has a high proportion of his wealth parked in fixed deposits. As he starts moving up the wealth curve he invests incrementally in other asset classes like debt mutual funds, equity mutual funds, small cap focused mutual funds, and then into private equity markets. Beyond a point on the wealth curve of course another kind of risk aversion set in where people focus more on wealth preservation.

The Flaws

This theory was not disproved for a long time. However in late 20th century ss work intensified in the field slowly some chinks in the armour of expected utility theory started showing. There are instances where this theory is unable to explain risk aversion and risk seeking behaviour.

Let us consider the following example –

Mr A and Mr B both have a net worth of Rs two crore as of today.

Yesterday, Mr A had a net worth of Rs one crore while Mr B had a net worth of Rs five crore.

As per expected utility theory Mr A is as happy as Mr B. However in reality Mr A would be in a super happy state while Mr B would be gutted.

The trend, the change, in wealth is what matters for our happiness as can be seen from the above easily relatable example.

In investing such situation can appear if a high exposure stock has declined substantially on some adverse news flow. Staying invested even if the stock's prospects do not seem too constructive is a choice many investors take, unwisely.

Somehow expected utility theory does not seem to work here.

Prospect Theory

In the early 1970's two of the world's most prominent behavioural economists, Daniel Kahneman and Amos Tversky were starting on a project to develop insights into decision making in real life situations. In their pursuit to study people's attitudes to risky options they were mainly looking for

answers to the question “ What rules govern people’s choices between different simple gambles, and between gambles and sure things ?”.

The outcome of this research – an essay titled “ Prospect theory: An analysis of decision under risk” , turned out to be seminal in the sense that it formed the core largely around which the field of behavioural economics eventually developed over the coming decades. Kahneman received the Nobel prize in economics in 2006 for this work.

Prospect theory plays a big role in investing, whether we know about it and/or acknowledge its presence or not. In stock markets the decisions to buy/sell or not, or buy/sell a stock A versus buying a stock B eventually take the shape of probabilistic outcomes.

Traditional economics suggests that man is a rational being and always acts to maximize his utility. However in real world it has been proven that man doesn’t always behave rationally. In real world man’s actions are often driven by what is called cognitive biases and are different from what traditional economics suggests.

Kahneman and Fletcher had started working on the topic casually as they got interested in the question and in the recent work on utility of money. As they delved deeper they obviously worked more on expected utility theory too which was then the widely accepted theory pertaining to that field. Their work on decision making under risk used some aspects of the expected utility theory but added some crucial perspectives which helps prospect theory explain human behaviour better.

Prospect theory is widely recognised as the central feature of behavioural science. Many important heuristics and biases that we apply, and suffer from, are somehow connected to prospect theory. In investment too understanding this concept helps us avoid some common and repeatable mistakes thus helping us in our wealth creation journey.

The key cognitive features of the prospect theory are –

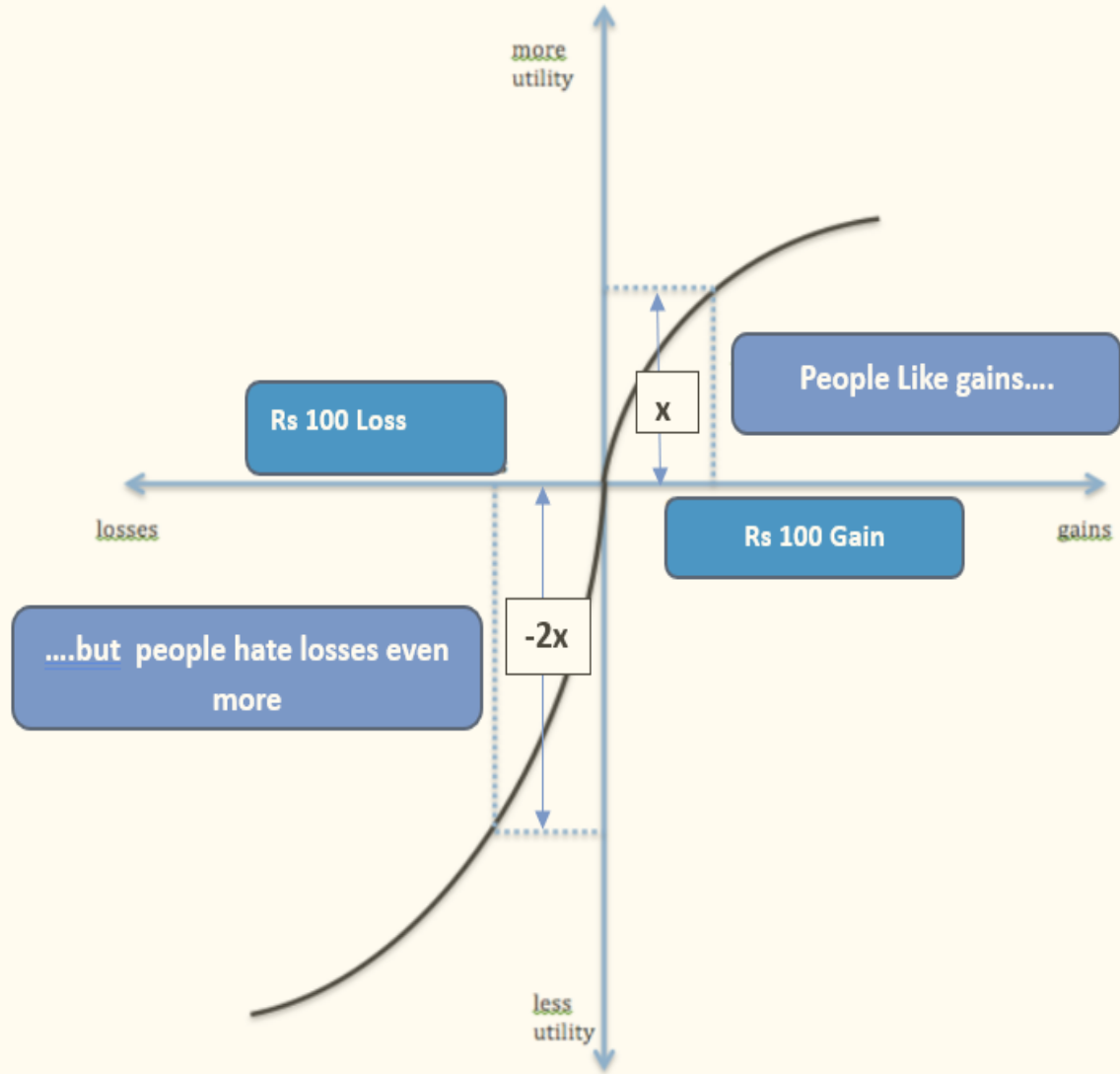
Diminishing sensitivity – This was the core of expected utility theory too, and before that, of Daniel Bernoulli’s utility theory. As mentioned earlier the perceived gain from a certain amount reduces as the state of wealth increases for a person. This is what explains the risk aversion of an investor in going for a fixed deposit with a promised return of 7% over expected stocks market returns of say, 12-13%.

Reference point – As seen earlier, a key reason why the expected utility theory fails to explain behaviours in some risk related situations is the fact that it doesn’t consider reference points in its analysis. Reference point can be status quo, or an outcome that you feel you deserve. For example, a stock purchased by a friend that delivered 40% return last year may set this 40% return as your reference point when you invest in stocks next year. Outcomes better than reference points are gains and below the reference point are losses.

Loss aversion - We discussed this earlier in this newsletter. Appreciation of the fact that we dislike losses much more than we like losses, helps prospect theory to explain human, and investor behaviour, in many tricky situations.

Exhibit 3: Prospect Theory

The chart below (adapted from Richard Thaler’s book “ Misbehaving ”) explains the prospect theory well. The first quadrant represents the concept of diminishing sensitivity and is a replica of Exhibit 2. The centre is the reference point here. The fact that slope in the third quadrant is much higher than in the first quadrant explains the cognitive dissonance of loss aversion.



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