BEHAVIORAL FINANCE

By

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INTRODUCTION

What is expected to be done in a given situation, whether it relates to a crisis situation or is a routine activity decision differs to a large extent in reality. When this happens, what had been specified as a logically expected move in vast literature of financial management is subjected to a specific behavioral attitude of a financial participant. For example, we expect that using the theories of dividend decisions a company shall resort to huge dividends, but an AGM ends without any dividend declaration. From financial analysts to investment community all are unable to digest this type of attitude as they remain unexplained by normal FINANCE literature. They simple claim these moves as irrational decisions resulting from agency problems.

Another simple example is why investors sell profit making securities and retain losing assets on the other hand. Strong evidence provided with ample theoretical back drop and practical applications fails to explain situations of this kind as they are closely associated with the behavioral aspect, the latest dimension added to financial management.

Those who are taking such decisions (claimed as irrational) will yield gains or losses is a secondary matter, but aspect of great prominence is that their behavior shall disturb the general expectations of the market. Unless modern financial management is equipped with such behavioral traits and provides a base for changing the expected values to prospective values, they remain incompetent to match the realities of investment era and gradually can lose their practical application.

Behavioural finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets. Behavioural finance is of interest because it helps explain why and how markets might be inefficient.

Conceptual development of behavioural finance is done with the combination of finance and social-psychology with an aim to solve several market puzzles that cannot be solved

without understanding the psychological dimensions in decision making. Neoclassical view of Irving fisher that all economic agents are equally rational does not hold true in reality where imperfect market conditions prevails over natural expectations.

Thus behavioural finance is a modern financial tool kit that tries to explain these abnormal reactions in the market and circumstances that lead to such situations. It explains the anomalies by linking them with the biases of investors in investment decisions. Existence of wide spread VUCA conditions in financial markets requires development of behavioural financial analysts to properly understand the possible psychological issues causing the volatile conditions in the market, increasing the uncertainty, complexity and ambiguity in managing the portfolios. The dream of complete diversification of risk is never realized unless; the reasons for anomalies are traced in the process of investment management.

NATURE

As indicated in earlier behavioural finance is a combination of two fields of study i.e Psychology and finance. Even though the need for this was felt in the early 1980's, its popularity in leaps and bundles until financial experts failed to explain the stock market behavior and reasons for various crisis in the absence of study of anomalies and biases present in the behavioral attitude of investors. This dimension was not there in the literature of finance that includes famous concepts like Markowitz efficient frontier, efficient market hypothesis, random walk theory and technical analysis.

It will be an absolute blunder to say that behavioral finance is a replacement of current studies on financial management and stock markets. Behavioral finance starts from where finance was left. Especially in the times of imperfection or irrational movements in stock markets, behavioral finance adds to the current financial understanding in predicting the proactive movements in stock market variables using some additional theories of psychology blended into finance.

SCIENCE OR AN ART?

Behavioral Finance is currently was field under extensive research around the globe. In the past two decades many thoughtful psychologist, economists and academicians have researched and developed several theories that explains with adequate prof for anomalies and biases in the market. Professor Kahneman and Amos Tversky had developed prospect theory that clearly establishes how people behave trying to take decisions in uncertainty. Behavioral finance capitalizes on existing sciences of finance and psychology and yet had gone through testing phases of its actual application in real world. Behavioural finance is argued to be a better explainer than traditional concepts like, CAPM (capital assets pricing model), Sharpe Index and option pricing models of Black, Scholes and Merton Models. So Behavioral finance can be called as a developing science.

Art as a subject is entirely different from science, In science, we work according to the rule of thumb whereas in art we create our own rules. Art helps us to use theoretical concepts in the practical world. While executing the theories and concepts of standard finance too, certain modifications and aberrations in the theories take place. These aberrations are because of the effect of the psychology of different users.

Behavioral finance focuses on the reasons that limit the theories of standard finance and also the reasons for market anomalies created. It also provides guidance to investors to identify themselves better by providing various models of human personality. Once investors get to know the limitations and also the remedies of their mental set up, they tend to plan their finances better.

Behavioural finance provides various tailor – made solutions to the investors to be applied in their financial planning, hence it can be justified as an art of finance in a more practical manner.

SAILENT FEATURES OF BEHAVIOURAL FINANCE

1. Psychology of stock markets : Understanding of economic behavior of agents is sufficient when markets are assumed to efficient and all investors act in same rationality.

But this seldom happens due to the dependency of stock prices on the mental attitude of the investing public at large. Thus behavioral finance does include the study of psychology of financial participants ranging from financial managers attitudes to the general investors beliefs. Behavioural finance takes the insights of psychological research and applies them to financial decision.

2. **Role of Biases** : Most people know that emotions affect investment decisions. People in the industry commonly talk about the role greed and fear play in driving stock markets. An investor well informed of these existing emotions currently in the market can safeguard himself from irrational behavior in the market. Investment advisors and other investor educating institutions provides propaganda on this unusual impact of greed and fear can bring market corrections and thereby reduce the impact of emotional biases on the market. Behavioural finance extends this analysis to the role of biases in decision making, such as the use of simple rules of thumb for making complex investment decisions

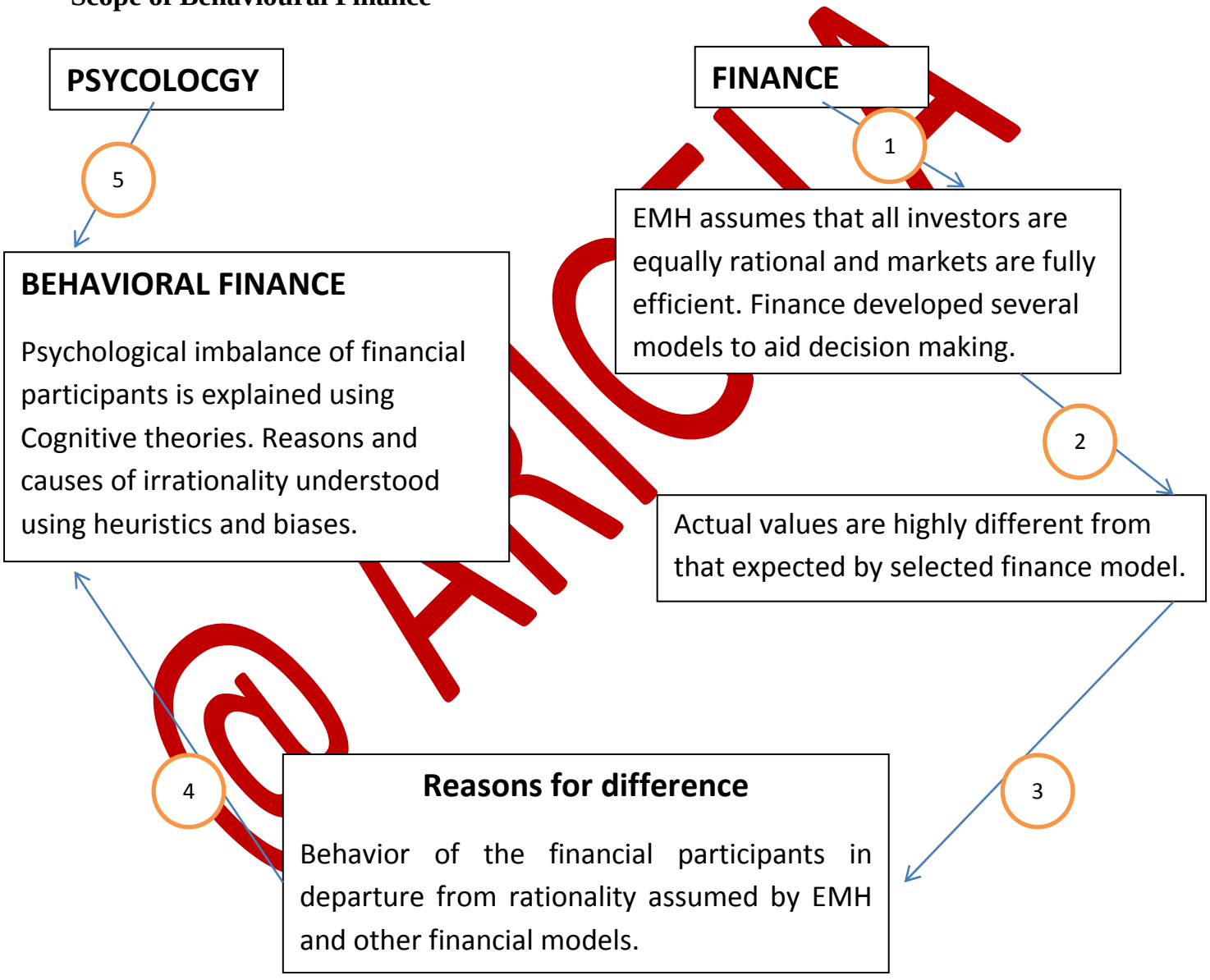
3. Heuristics and Biases : Behavioural Finance, explains that the real world is different from what neoclassical models in economics and finance assumes. Choosing a best alternative from universe of alternatives not at all possible, because people have limited cerebral capacity and information sources. Therefore they rely on heuristics which can lead to biases.

4. Vulnerability : Understanding of behavioral finance is aimed to protect the individual participants in the capital market from vulnerable effects of market behavior from being exploited. They can be advised to stick to fundamentals without over reacting to the market.

5. Hedging strategies : Analysis of risk and its identification in behavioral finance will be different from that of traditional finance. So financial engineers are expected to

develop new strategies and financial instruments that can guard the investors atleast from certain normal and repetitive biases in the market. Thus behavioral finance aims at limiting chances for extreme volatility conditions by explaining the reasons for imperfection from behavioral point of view.

Scope of Behavioural Finance



Note : Read the diagram through the numbers.

Above diagram, explains the scope of behavioral finance in that how psychology is drawn into the financial literature to explain the irrational behaviour of the financial

agents in understanding the rationality of financing models. Cognitive ease, rule of thumbs (heuristics) etc are applied by human mind in facing the complex and uncertain events which is leading to biases. Thus in behavioural finance, investors and other financial participants responses in terms of their psychology are studied to explain the reasons for irregularities in financial markets. Thus we can say scope of behavioural finance is limited to two things.

(1) Understanding the reasons for irrational behaviour of markets by studying various cognitive theories drawn from psychology.

(2) To continue the study of finance from where it was left over in the assumptions of rationality and efficient market conditions.

While drawing the theories from psychology, cognitive theories are applied only to the limited extent for explaining Investors behavior in decision making under uncertain conditions. The entire gamut of psychology is not considered for behavioural finance. Again it is important to note that, behavioral finance is not going to be a replacement of current financial management. Infact, it is continuation of current financial practices in such a way that financial participants can understand existing irrational conditions and how the application of heuristics can create biase in decision making capabilities. Thus understanding ability of financial market participants is enhanced to optimum extent though the application of theories of behavioural finance.

The standard finance academics as explained in the diagram, assumes that investors make decisions according to the assumptions of the efficient market hypothesis. But the behavioural finance literature's perspective that individuals make judgments based on and are influenced by heuristics, cognitive factors and affective issues. (Victor Ricciardi)

INVESTMENT DECISION CYCLE

Behavioral finance integrates economic principles with psychological influences of human behavior in the investment decision. The systematic cognitive errors and biases are recurrent and predictable but this can be observed mostly ex post. It is relatively easy to find an explanationon why a certain person assumed a financial decision in some circumstances but it is extremely difficult to use the explanatory power of behavior finance to predict how the respective person will react in the future to the same type of events and within similar circumstances. From a psychology standpoint, investors make non rational mistakes because the inner resorts of human nature prevail over any education, training and computing power. No matter how sophisticated is the financial data, the decision has to be implemented by a human being, subjected to emotions and fears, job security contraints etc. If these biases and errors are recurrent and predictable, that means that a rational investor can profit from non-rational decisions of some noisemakers activating in the market.

Source : https://modelinvesting.com/articles/the-cycle-of-investor-emotions

In Fig -2 above shows an approximation of the emotional states that accompany a typical market cycle. The dashed line are representation of asset prices through an economic expansion and ensuing recession.

Reluctance

It is worth starting with the word that occurs at both the start and end of the chart: reluctance. This is the 'default' state of most investors. In normal circumstances we fear taking a risk and getting it wrong, more than we fear missing out. This reluctance to get involved is compounded by another strong behavioural effect: loss aversion.

Optimism to Exuberance

Reluctance starts diminishing when markets pick up and the economy enters a positive phase. Fear of loss quickly turns into a fear of missing out. Our natural aversion to loss may now cause us to take action to increase short-term emotional comfort, this time by entering the market.

Denial to panic

Investors always try to compute gains and losses from the point at which they enter the market. Only those investors who are in immediate need of liquidity try to sell the holdings, but remaining investors hesitate to sell the stocks in loss (i.e prefer to hold loss making securities). But further fall in the market price leads them to panic situation. Few of the investors may be found to sell their investments for reasons other than liquidity needs. Thus we see fall in price a common phenomenon in all these points, only difference is volume. Volume which is dried up at denial stages bursts at panic stage.

Capitulation to reluctance

On the way down, loss aversion and denial tends to cause investors to hold on to their investments. As their portfolio plummets, the emotional pain of selling at a loss increases too, but at a diminishing rate. Losing 5% hurts, but the first 5% hurts the most. Once you've already lost 30%, the difference between -35% and -30% feels less significant than the difference between -5% and no loss at all. The point of despondence can be explained as a point of maximum safety. Hence buying process starts due to emotional

safety assumed by investors. When volume of buying gradually increases, there will be phases like depression, apathy and indifference.

JUDGMENT UNDER UNCERTAINTY

Heuristics are shortcuts and rule of thumb approaches used by human mind while making a decision on variable which are highly uncertain. Such use of heuristics can cause bias and lead to irrational responses from investors. In 1974, two brilliant psychologists, Amos Tversky and Daniel Kahneman described three heuristics that are employed when making judgments under uncertainty.

Representativeness Heuristics : When people are asked to judge the probability that an object or event A belongs to class or process B, probabilities are evaluated by the degree to which A is representative of B, that is, by the degree to which A resembles B.

Availability Heuristics : When people are asked to assess the frequency of a class or the probability of an event, they do so by the ease with which instances or occurrences can be brought to mind.

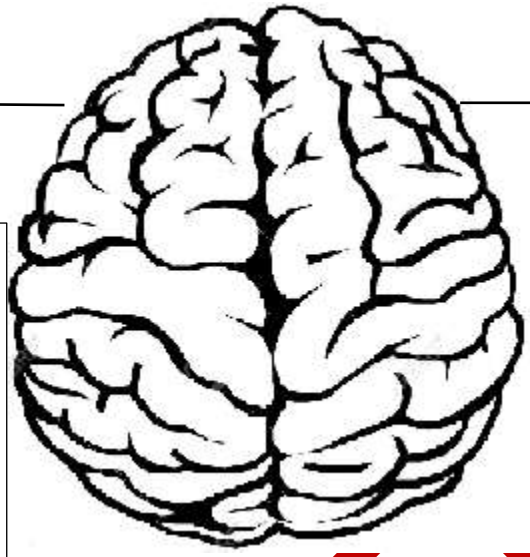
Anchoring and adjustment Heuristics: In numerical prediction, when a relevant value (an anchor) is available, people make estimates by starting from an initial value (the anchor) that is adjusted to yield the _nal answer. The anchor may be suggested by the formulation of the problem, or it may be the result of a partial computation. In either case, adjustments are typically
insufficient.

COGNITIVE INFORMATION PERCEPTION

Cognitive psychology is the scientific study of the mind as an information processor. Cognitive psychologists try to build up cognitive models of the information processing that goes on inside people's minds, including perception, attention, language, memory, thinking, and consciousness

Cognitive perception includes, aside from the senses listening, seeing, smelling, tasting and feeling, the way in which we deal with information. While perception refers to ways of obtaining information from our environment, cognition describes processes such as remembering, learning, solving problems and orientation.

People use heuristics to control extreme complexity. Heuristics are strategies for information processing, which help to find a quick but not necessarily optimal decision. Standard finance assumes unlimited cerebral capacity, but in reality human cognitive system likes to process only a limited information. In behavioural finance it is believed that people tends to make decisions with inadequate and imperfect information and have limited cognitive capacity. Thus relying on heuristics is a common process in business decision making under risk and uncertainty. A heuristic is a crude rule of thumb for making judgments about probabilities, future outcomes, and so on. A bias is a tendency toward making judgmental errors. The heuristic and biases approach studies different kinds of short cuts people employ to form judgments and the associated biases in those judgments.



System – 1

Works very fast, automatic and hence uses heuristics in processing the information

System – 2

Lazy system Works slowly on the being triggered by system – 1. It uses the actual processes needed and provides accurate results.

For understanding of cognitive information perception, understanding of working of these two systems of human brain is important. Psychologists Keith Stanovich and Richard West refer to them as System 1 and System 2. System 1 operates automatically and rapidly. It requires little or no effort and is not amenable to voluntary control. System 2 is effortful, deliberate and slow. It requires mental activities that may be demanding, including complex calculations. As Daniel Kahneman put it, "The operations of system 2 are often associated with the subjective experience of agency, choice and concentration."

Bat and Ball experiment

A bat and a ball cost ` 120. A bat costs ` 100 more than the ball. What is the cost of the ball?

The number that most probably comes to mind quickly is 20. But is a wrong calculation basically done by System – 1. The correct answer should be 10.

Psychological researchers have given the bat and ball puzzle to thousands of university students. They were shocked to find that more than 50% of students at Harvard, MIT and Princeton failed to give the correct answer. In many other cases such failure rate is even more than 80%.

This experiment proves that people tends to be overconfident in dealing with things which they presume to be familiar and provides answers based on system – 1 which uses heuristics instead of complex calculations. Human mind being familiar with calculation of 120 – 20 = 100 repeatedly uses that familiarity heuristic to give a biased answer.

HEURISTIC – DRIVEN BIASES

From an investment perspective, a heuristic learning process is one in which people develop investment decision-making rules through experiment, trial and error, or personal experience. Rather than research financial statements and other relevant data, individuals form investment rules and make investments using information that is most prominent in the media or otherwise most readily available.

Representativeness

Representativeness is a heuristic process by which investors base expectations upon past experience, applying stereotypes. For example, investors might feel that all firms with management espousing environmental awareness are "good" firms (i.e., good investments). Another example is interpreting all good earnings announcements as predictors of good future performance, without determining whether the performance will continue for the individual firm making the announcement. Note that representativeness can take many forms. Any time an investor (or anyone else for that matter) bases expectations for the future on some past or current characteristic or measure, the individual is applying an "if-then" heuristic. That is, if this has happened, then that will happen.

Overconfidence

Overconfidence means that people tend to place too much confidence in their ability to predict. One way of illustrating this is asking investors to predict a confidence interval around the expected return on a stock. The investors will consistently make the interval too narrow (i.e., they will set the range of possible returns too narrow). That is, they tend

to systematically underestimate the risk (standard deviation) of the returns on the stock. Note that overconfidence can lead to surprises. Because investors continually underestimate the range of possible returns, there is a higher than normal probability of a return outside the confidence interval (i.e., a surprise).

Anchoring-and-Adjustment

Anchoring refers to the inability to fully incorporate (adjust) the impact of new information on projections (i.e., conservatism). For example, an analyst may have already made a forecast for the performance of a stock, when the firm releases new information that can have a material effect on the stock price. The analyst, being psychologically anchored by his prior projection, will tend to not fully reflect the full value of the new information in his revised projection. Like overconfidence, anchoring can lead to surprises. In this instance, however, the surprises tend to be biased in the direction of the announcement. For example, assume an analyst receives negative information about a stock that indicates its price should fall 25%. Being anchored by a previous forecast, the analyst may fail to fully incorporate the value of the negative information and predict a fall of 15%. The next surprise, therefore, will tend to be negative as the stock falls to fully incorporate the impact of the negative information. Likewise, if the analyst fails to fully incorporate positive information, the next surprise will tend to be positive.

Aversion to Ambiguity

Aversion to ambiguity can be loosely described as "fear of the unknown." Although aversion to ambiguity can be applied to investing, it is best described using probabilities associated with choices. For example, we know the odds of heads or tails coming up in a coin toss are 50/50. Yet, individuals will often be willing to take the "bet." If the odds are unknown, however, individuals are hesitant. For example, let's assume we have several decks of cards. In any one of those decks we know the odds of randomly selecting a diamond card are one in four. That is, there are four suits in the deck, so the chance of selecting a particular suit is one in four. Now let's combine and shuffle together all the

decks and randomly draw 52 cards. Now we don't know the odds of selecting a card from one of the four suits, because we don't know the number of each suit in the sample. The application of this behavioral trait to investing is quite interesting, and you may have actually witnessed it without naming it. For example, you have probably heard of momentum investing. Following a momentum strategy, investors buy in an up-trending market and sell in a down-trending market. Using aversion to ambiguity as a starting point, could it be that in trending markets investors visualize odds? Perhaps in an up-trending market, for example, investors see the odds as greater than 50% that prices will continue moving up. In a down-trending market they might see the odds as greater than 50% that the market will continue down. A non-trending market, however, presents individuals with ambiguity. They might not be able to base their expected odds on anything, so they might shy away or at least leave the stock picking to the experts.

FRAME DEPENDENCE

Frame dependence implies that individuals make decisions and take actions according to the framework within which information is received (i.e., the media) or the individual's circumstances at the time (i.e., emotional state). If investors acted with frame independence, they would make purely economic decisions, and the form within which information is received and the individual's current circumstances would have no effect on their decision making. They would base each decision purely on its expected merits.

Behavioral characteristics that can be attributed to frame dependence include

- Loss aversion
- Self-control
- Regret minimization and
- Money illusion.

Loss Aversion : Loss aversion, one of the basic tenets of behavioral finance theory, refers to the individual's reluctance to accept a loss. A stock may be down considerably from its purchase price, but the investor holds on to it, hoping that it will recover. You can relate this to the gambler who keeps throwing the dice, hoping to break even. Loss

aversion can also lead to risk-seeking behavior. A portfolio manager, for example, may have experienced recent losses. Knowing that he must report at the end of the quarter and being reluctant to report losses, he might start taking progressively riskier positions in hopes of at least breaking even.

Self- Control : Self-control is related to frame dependence. Remember, frame dependence implies that individuals' reactions to information are affected by the framework within which the information is received, and the framework is the media carrying the information, as well as the individual's circumstances, when the information is received. For example, consider stage of life and dividends. A younger, affluent investor may totally avoid high dividend paying stocks because of the related tax consequences and the effect on the overall portfolio return. A retired investor, however, might use dividends as a self-imposed control mechanism to avoid spending the capital in his retirement account. These investors are able to psychologically separate the dividends they receive from the portfolio (i.e., their capital). They view the dividends as cash flows, and receiving and spending the cash flows does not affect the portfolio. By allocating to bonds and high dividend paying stocks and living off the cash flows only, they protect against spending down the principal too quickly (i.e., outliving the portfolio).

Regret Minimization : In an investments framework, regret is the feeling (in hindsight) associated with making a bad decision. The investor starts thinking, "If only I had…" An example is selling a winning stock and then watching it soar even higher. The investor starts thinking, "If only I had held on a little longer." Alternatively, the same investor, after holding onto the stock and watching it fall back, might say, "If only I had sold the stock last week." Regret minimization can lead to two common situations. First, to avoid the possibility of feeling regret, investors can tend to stay in comfortable investments, such as stocks and bonds (i.e., regret minimization can lead to lack of variety in investments). Next, rather than sell profitable investments, investors may tend to use their cash flows, such as interest payments and dividends, for living expenses.

Money Illusion : Money illusion refers to the way individuals react to inflation and its impact on investment performance. People tend to think naturally in terms of nominal amounts. That is, they look at the overall investment return without regard for the level of inflation and the resulting real return. This leads to positive reactions to high returns no matter what the level of inflation and resulting real return. Of course the opposite is also true. Investors tend to react negatively to low returns, even if inflation is more or less nonexistent.

PECULIARITIES OF QUANTITATIVE AND NUMERICAL INFORMATION PERCEPTION

People including the investment community had their own problems in understanding the computations in mathematics. This is especially true in their capability to deal with probability concept. Bias in terms of quantitative and numerical information perception is an unavoidable fact.

Innumeracy : In his book Innumeracy: Mathematical Illiteracy and its consequences, John Paulos noted that " some of the blocks to dealing comfortably with numbers and probabilities are due to quite natural psychological responses to uncertainty to coincidence, or to how a problem is framed. Trouble with numbers is reflected in the following areas.

1. Money illusion: People have a continued trouble in understanding the monetary values because, they seldom understands the meaning of nominal value and real value. The impact of inflation is a very hard econometrics that can be easily interpreted by people in framing the decisions on investment. They tends to make illogical approximations or just satisfies with time value of money (capital budgeting) which is more convenient way to understand the profitability of investment.

2. True probabilities : People due to their familiarity or otherwise tends to overestimate the probability or underestimate it even though numerically they have equal chances of occurrence.

The 50 Balls experiment

Suppose there are 50 balls with number marked on it as 1 to 50. Now we have to draw 5 balls at a time. When selected group of people are asked to draw 5 balls, which should be marked with 1 to 5, they tend to say it's impossible. At the same time they think that getting some other number combination is possible. But the reality is that all 5 number combinations have equal probability.

3. Big numbers and small numbers : Another irrational attitude is identified in choosing between numbers is the tendency of choosing the bigger number and ignoring smaller numbers. For example, in taking capital budgeting decisions, generally higher number NPV are compared for making the choice and Profitability index which is mostly a two digit number is ignored. In the study of financial statements, only the total net earnings are observed by EPS is ignored.

4. Base rate v/s case rate : To understand the fundamental strength of an entity at the time of investment, base rate cannot be ignored. But the limited cerebral capabilities in processing vast information for the purpose of understanding the base rate automatically avoids such cumbersome calculations and searches for a shortcut route of considering the case rate as a substitute for it. Case rate means processing currently available small amount of information.

ANCHORING

While making a quantitative judgment, people are subconsciously anchored to some arbitrary stimulus. Kahneman and Tversky carried out a famous experiment called "wheel of fortune" in 1974 to demonstrate the phenomenon of anchoring. People tried to make adjustments to the number available to them by the wheel because, they really don't know the true value for the question asked to them.

Multiplication experiment

A group of 5 students in the class are asked to make a quick estimate (in 10 seconds) of the value for 1 X 2 X 3 X 4 X 5 X 6 X 7 X 8 …… the median value of their estimate was 760 as against the true answer of 40320.

Another group of 5 students in the class are again asked to make a quick estimate (in 10 seconds) of the value of the equation 8 X 7X 6 X 5 X 4 X 3 X 2 X 1 …… the median value of their estimate is 4200.

Anchoring can be identified in these two experiments. While the first group is anchored by value received from the multiplication of first 4 or 5 numbers and adjusted to estimate the final value. Same thing happened in the subsequent case as well, but value of first 3 or 4 numbers is anchored for adjustment to get the final value. While the first group based there estimation on lower value (1 X 2 X 3 X 4 X 5) and second group might have based their expectation on higher value (8 X 7 X 6 X 5).

REPRESENTATIVENESS V/S ANCHORING

Underweighting of base rate (Representativeness) and anchoring can at times appear conflicting. While the former says that people are overly influenced by sample information (or case rate), the latter says that people tend to pay insufficient attention to sample data.

To understand this conflict, let us consider – a picnic panic story narrated by Prasanna Chandra in his book Behavioural Finance. According to him, people are "coarsely calibrated," which means that people see things as black or white and ignores all different shades of gray possible with combination of black and white.

Suppose a person is planning to picnic on a holiday with family. He learnt from metrological announcement that it is likely to be sunny day. Indeed, as he start off to the park, the day is sunny. After a while, some clouds gather. Anchored by his prior view, he ignored the clounds, viewing them as a passing phenomenon. More clouds gather but he console himself by saying "eventually it will turn out to be a sunny day." The sky,

however grows even darker. Because of coarse calibration, he abruptly change his belief and say, " it is now surely going to rain, so started to head back home.

The reality, however, is more complex. At the beginning of the day. The meteorologist had forecasted that it was likely to be a sunny day with some probability of rain. But being coarsely calibrated, he focused on "sunny day" and ignored the possibility of rain. He clung on to this view, despite mounting evidence of potential rain. When the sky turned too dark to ignore, he coarsely transitioned to a view that the probability of rain was 100%, not realizing that the dark clouds might blow away. Perhaps the true probability of rain had gone up but not to 100%. Instead of heading back to home, perhaps he should have remained near the car, ready for a sudden down pour or else resuming his picnic.

This narration is equally applicable to investors in investment decision cycle framed with uncertainty. Thus we can conclude that Anchoring and Representativeness heuristics are different. Underweighting of base rate is called representativeness, complete ignorance of it is called as Anchoring.

Exponential discounting - Hyperbolic discounting (Present Bias – Lack of self-control)

Standard finance assumes exponential discounting of future cash flows for taking Investment decisions. According to exponential discounting model, r = discount rate remains constant throughout the life of the project. More unrealistic is that everyone depending up on the risk level of the project should have same discount rate. That means discount rate is project specific and risk aversion levels of individual investors is not a concern. Behavioural finance model try to adjust this fallacy by introducing the hyperbolic discounting model. Here it is important to note that the false base is not in the finance theory but in the behavior of investors who lacks self-control. They tends to systematically violate the constant discount rate assumption of standard finance. Between

various points of time they have different rates of discounting. That means the ratio of discounting is not constant. This makes the model called Hyperbolic discounting with different discounting ratios and changing preferences on the curve. To understand Hyperbolic discounting consider a scenario, where an option is given to receive 100 in one year from now or to receive 130 in two years from now. The persons tends to choose 130 in two years. But same option is given as 100 today (immediate) and 130 a year from now. Choice is to take 100 today. This is the reason for having two different preferences between two points on the same curve. As t is nearing Zero, immediate payments are preferred and t is far away from Zero we see the tendency to choose large values in future. This asymmetric behaviour is called present bias or lack of self control.

Equations and graphs of Exponential and Hyperbolic curves

Pn = Present value at nth period

An = Amount at nth period

e = exponential value

r = discount rate

t = time period (1,2,3,4 ……..n)

Exponential discounting model provides the relationship between present value and future value as ….. $P_n = A_n * e^{-rt}$

$\int e^{-rt} = 1/r$ the total are bounded between the exponential curve and x,y axis of the graph.

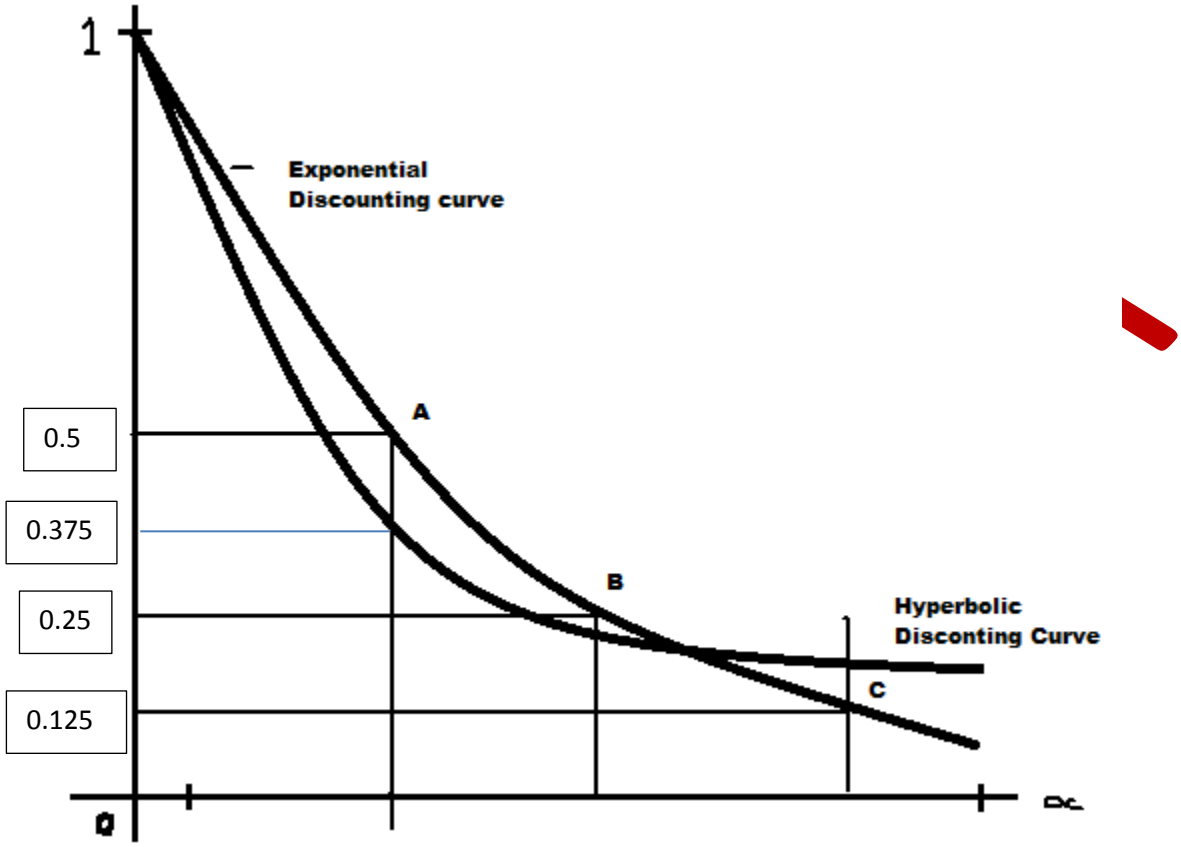
Hyperbolic Discounting ǎ = risk aversion of investor for discounting such that ……..

Discounting model is given by …….. $1 / (1 + ǎ *t)$

$\int 1 / (1 + ǎ *t) = \infty$ (Infinite)

When these functions are graphed on the same graph, we observe that exponential discounting overvalues the present values. That means value presumed by investors considering their risk aversion in hyperbolic discounting is lower present value defined by exponential discounting model. (Short run). But, over a long period of time, present

values under hyperbolic discounting tends to be more than constant discount under exponential discounting model.



In the above graph we can observe that a time period called t = 0 we have present value = 1 for both the models. But at point A when t = 1, we can see that value on Y – axis is 0.50 for exponential discounting but value on the same axis is 0.375 for Hyperbolic discounting.

At point –B same is the behavior but the difference is very narrow. At Point C we observe a reverse tendency, where Value under hyperbolic discounting curve is higher than exponential discounting value. Individuals who display such preferences are described as **present – biased** as they lack self-control. William Jevons one of the economic stalwart, explains this myopia as the preference for present consumption over future consumption but at diminishing rate. That means the preference for present consumption decreases gradually over a time.

UNIT – 2

How should we decide? And how do we decide? These are the two central questions of Decision Theory. In the prescriptive (rational) approach to decision making explains how rational decisions should be made. But descriptive(behavioral) approach explains how actual decisions are made. The study of rational decisions is classical and behavioral theories have raised several questions on its actual application in late 1970's.

Utility preference function

A common feature of decision theories under risk and uncertainty is that they define so called preference relations (or) preference functions between lotteries. A lottery is nothing but a set of states together with their respective outcomes and probabilities. A preference function is a set of rules that defines how we make pairwise decisions between lotteries.

To give a formal description of likings and dis-likings of the things the concept of preferences is introduced in decision theories. A preference compares lotteries, i.e probability distribution denoted by P, on the set of possible payoffs. If we prefer lottery A over B, we simply write A > B. If we are indifferent A~B. If either of them holds A⩾B.

Approaches to Preference relations

1) State preference approach
2) State Independent approach
3) State dominance approach
4) Stochastic approach
5) Utility functional approach

State preference approach

In this type of approach, decision making depends on state, its probabilities and also on outcomes of each state. A persons preference for a hot coffee or Ice cream depends on

state of weather. In an investment scenario state can be like boom or recession where their respective probabilities and outcomes.

State	Probability	Equity Investment	Bonds Investment
Boom	P1	a11	a12
Recession	P2	a21	a22

Above table is called state preference approach to decision making under risk and uncertainty.

The expected utility of an act is a weighted average of the *utilities* of each of its possible outcomes, where the utility of an outcome measures the extent to which that outcome is preferred, or preferable, to the alternatives. The utility of each outcome is weighted according to the probability that the act will lead to that outcome.

State Independent approach (or) Lottery approach

State becomes independent when every outcome had same probability under different states. In such case decision can be taken on alternatives having highest total payoff. This it is also called as lottery approach.

State dominance approach

Preference choice can be identified based on the dominance of payoffs in an alternative compared to another alternative. Suppose that equity alternative had larger payoffs than bond payoffs, we call it as state dominance, because one alternative had dominating preference in any state.

State	Prob	Equity	Bonds
Boom	2/3	1000	400
Recession	1/3	500	380

Above table is an example state dominance preference. Equity can be preferred because, 1000>400, 500 > 380. Here state and corresponding probabilities are independent.

Stochastic approach

In conditions where dominance is not clear but still preference is identified due additional advantage in one state, such approach is called as stochastic approach. Taking above example where we replace a payoff of 380 with 600. Then state of dominance is absent since 500<600. But still equity is taken as a preference considering the special advantage of difference between 1000 and 400 in one state (Boom). That means loss with equity in recession is compensated with large advantage available in boom. This is called stochastic approach.

EXPECTED UTILITY THEORY

Expected utility theory is a rational approach to decision making under risk and uncertainty. When there are Xi outcomes associated with S states and Pi probabilities, expected value is defined as the sum of the products of outcome pay offs and their respective probabilities.

If A is an alternative, then expected value of A = EV(A) = $\sum$ Xi * Pi

Thus subject to the satisfaction of certain axioms, expected value is the statistical expectation of the values the individual assigns to the outcomes of that gamble.

The Von Newmann- Morgenstern Axioms

Completeness : It implies that all possible preferences are identified and no undefined or unidentified preference is left out in the possible preferences.

For every A and B either A > B or A~B or A <B.

In other words, the individual either prefers A to B, or is indifferent between A and B, or prefers B to A.

Transitivity:

As an individual decides according to the completeness axiom, the individual also decides consistently.

Axiom: For every A, B and C with A ⪰ B and B ⪰ C we must have A ⪰ C. In words, if the individual prefers, A to B and B to C, then he must prefer A to C.

Independence: If two gambles are mixed with a third one, the individual will maintain the same preference order as when the two are presented independently of the third one.
Axiom: Let A,B and C be three lotteries with A⪰B, and let p be the probability ϵ (0,1); then pA+(1-p)C > pB + (1-p)C

Continuity: When there are three lotteries (A,B,C) and the individual prefers A to B and B to C, then it should be possible to mix A and C in such a manner that the individual is indifferent between this mix and the lottery B.
Axiom : Let A,B and C be lotteries with A⪰B⪰C then there exists a probability p such that pA + (1-p)C is equally good as B

Omission of Irrelevant Alternatives: The individual ignores irrelevant alternatives in deciding between alternatives. For example, in evaluating two (or more) alternatives, the individual ignores outcomes that occur with equal probability under both alternatives being considered.

Frame Independence : The individual cares only about outcomes and the probabilities with which they occur and not how they are presented or bundled.

EXPECTED UTILITY THEORY OVERVIEW:

In many cases, we note the behavior of decision makers under conditions of uncertainty does not match the standard value of expected cash. For example, we find that most owners of real estate and auto buying insurance for their property in spite of our observation that, they pay for the insurance companies more than what companies pay them compensation, as most insurance companies make a profit. According to the standard value of expected cash should not buy any these owners the amount of insurance where the monetary value of the expected less than zero. Hence the question of why pay them more than they get from insurance companies? One of these reasons is that they do not follow to maximize the value of expected cash in their decisions, but follow to maximize the expected utility. Know the benefit as the amount of happiness or autarkic derived by a person of possession or use of objects and vary the amount of benefit from one person to another that is to say the idea of utility is the idea of self-in basis, for example, may check a piece of bread of great benefit to the poor hungry while others may not achieve any benefit to the rich fed. Besides, the benefit achieved by the extra piece of bread be less than the first, whether the consumer is rich or poor, this is known as the law of diminishing marginal utility in economics. According to the standard expected utility to choose the act which maximizes expected utility is calculated not by money but by what achieved by the money of benefit to the people.

EXPECTED UTILITY THEORY DEFINTION:

The expected utility of an entity is derived from the expected utility hypothesis. This hypothesis states that under uncertainty, the weighted average of all possible levels of utility will best represent the utility at any given point in time.

Key assumptions of expected utility theory:

1. It is regarded to be rational to be an expected utility maximizer, as this theory is based on compelling axioms about how people should behave. Expected utility theory posits

that decision makers choose the prospect that maximizes their expected (or average) utility.

2. Under expected utility, risk preferences are captured by the shape of the utility function. Decision makers are risk-averse if $U(x)$ is concave, and risk-seeking if $U(x)$ is convex.

3. EUT is based on the tenet that decisions makers are risk-averse.

4. EUT assumes decision makers are rational.

5. Expected utility theory assumes that preferences between prospects donot depend on the manner in which they are described. *(invariance assumption*).

6. Expected utility theory assumes that choices only reflect final outcomes. For example, if one were the beneficiary of a `100 check, but also received a `100 speeding ticket, these two events would offset one another in monetary terms.

7. Expected utility theory assumes this principle—adding a common consequence to two prospects should not change which alternative the decision maker prefers. This principle is known as the *independence axiom*

Allais Paradox

Maurice Allais, a Nobel Laureate in economics identified an inconsistency between actual observed choices and that predicted by EUT. In the experiment conducted for this purpose, two different situation X and Y are given to several people. In each situation there will be two alternatives X1, X2 and Y1,Y2. People are expected to select one choice in each of the alternatives.

Situation – X

X1 ---- ` 100,000 with 100% probability (Certainty)

X2 ---- ` 0 with 1% probability and ` 100,000 with 88% and ` 500,000 with 12% (Uncertainty)

Situation – Y

Y1 ---- ` 0 with 89% probability and ` 100,000 with 11% (Uncertainty)

Y2 ---- ` 0 with 90% probability and ` 500,000 with 10% (Uncertainty)

Results of the experiment

Results of the study indicated that large proportion of people choose X1 and Y2. If expected utility theory had been applied in the given scenario X2 and Y1 should be choice. This type of orthodox behavior exhibited by the investors deviating from rational expectation is called Allais Paradox.

Daniel Bernoulli Theory

Daniel Bernoulli explained the paradox, by differentiating between EV (Expected Value) and U (value of utility). According to Bernoulli theory, value of wealth (U) is a diminishing function. If a payoff had 100,000 wealth and a Utility = 10 Units, It does not mean that another payoff with 200,000 wealth will have Utility = 20 Units. Due to diminishing nature (or) Concave shape of the curve such Utility is likely to be lower than 20 Units say 18 Units. Consider the following example.

Wealth (`lakhs)	1	2	3	4	5	6	7
Utility (Units)	10	18	25	31	36	40	43
Marginal Utility	10	8	7	6	5	4	3

Above table indicates that adding 1 Lakh to a wealth in each stage provided marginal utility of 10 units, 8 Units, 7 Units …. So on in diminishing manner. That means the total utility is increasing but at decreasing rate.

Situation – 1 ……. Having 4 lakhs of wealth (100% probability)

Or

Situation – 2 ……. Have 2 lakhs of wealth (50% prob) and have 6 Lakhs of wealth (50% prob).

The Utility in the case of situation – 1 is 31 Units and in situation – 2 is (18*50% + 40*50%) = 29 Units. Thus Bernoulli offered a solution to the famous paradox and explained why investors become more risk averse in times of adding wealth i.e gains.

EUT and Risk attitudes of Investors

Utility and Risk Preferences

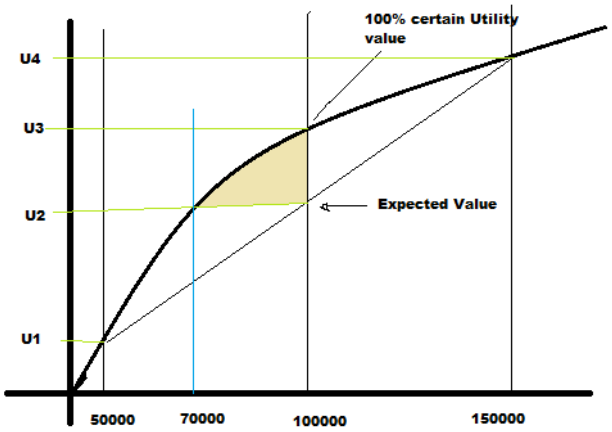
Different Investors have different preferences for risk.

- Risk averse – has diminishing marginal utility of wealth.
- Risk neutral – has constant marginal utility of wealth
- Risk taker – has Increasing marginal Utility of wealth.

Example

A gamble had 50% chance of winning 50000 and 50% chance of winning 150000.

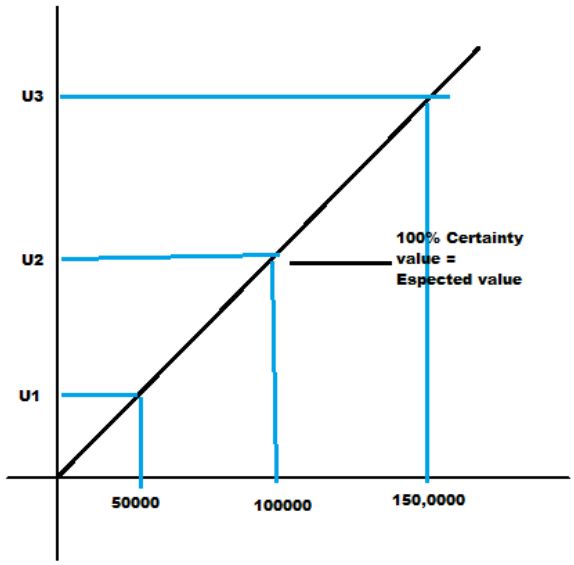
Expected value of gamble = 0.50 * 50000 + 0.50 * 150000 = 100,000



When the payoff is at 50000, there is U1 Utility which increased to U3 when payoff is 100,000. For a payoff of 150000 there is wealth of U4. From 50K to 100K the difference in U3 and U1 is very significant compared to 100K to 150K where U4 and U3 are considered. That means (U3 – U1) > (U4 – U3). So Investors does not be interested creating wealth beyond 100,000 where marginal utility derived is very low. Now if a risk averse investor selects 70000 with 100% certainty instead of EV of 100,000 it is due to the cost of insurance the investor is ready to pay to avoid the risk. The shaded arc area in the above diagram indicates the reason why investors chose an alternative that pays them lower payoff then EV. A careful observation of the diagram clearly indicates that U2 is the Utility that is common for payoff of 70,000 as well as 100,000, hence 70000 with certainty equivalent is selected by investors.

Risk neutral

Investor is said to be applying risk neutral attitude when he chooses an alternative which expected to be choosen using EUT. This happens because the marginal utility remains constant between payoffs.

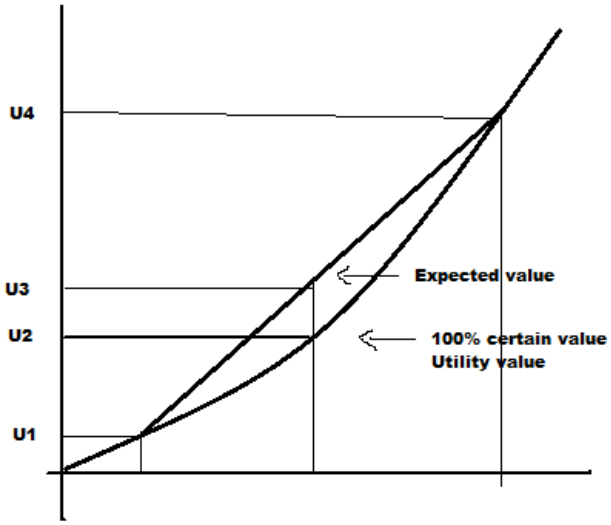


In the above diagram, a movement of wealth from 50000 to 100,000 had an additional utility of U2 – U1. This is exactly equal to U3 – U1 when moving from 100,000 to 150,000 of wealth. Thus risk neutral attitude is the only case where EUT is validated by investors in their behavior. When there are two situation, an investor shall choose the alternative with highest EV, provided marginal utility remains constant. Thus when the investor is risk neutral, he is indifferent in terms of risk, so bases his decision only on expected value.

Risk taker

Risk taking attitude is identified in investors when the marginal utility is increasing. That means additional wealth is creating more value to the investor. At EV we observe that 100% certain value is lower than EUT. Increasing tendency of the marginal utility attracts

the investors to take more risk. So 100% certain value gives him less utility and encourages to take additional risk for additional wealth.



In this diagram, marginal utility curve of the investor is convex shape. It is increasing from left to right indicating that each additional wealth is bringing increased utility to the investor so he prefers gamble to 100% certain values. The proportion of utility to wealth in segment U3 – U1 is less than the proportion of wealth in the segment of U4 – U3.

PROSPECT - THEORY

Human behavior is difficult to determine accurately, but can be expected, and this applies to human behavior in financial matters or the so-called behavioral finance, there are many theories of control and describes the investment decision through human behavior. Will compare in this paper between the two theories, expected utility theory and prospect theory.

PROSPECT THEORY DEFINITION:

Formulated by Daniel Kahneman and Amos Tversky, Prospect Theory explains decision making involving uncertainty in the context of psychology and economics. In part, Prospect Theory offers insights into why people make non-optimizing decisions rather

than only those that are profit maximizing. Prospect Theory is central to much of Behavioral Finance and is often contrasted with the more conventional Efficient Market Hypothesis and Expected Utility Theory.

HISTORY AND MOTIVATION:

In 1979, Daniel Kahneman and Amos Tversky conducted a series of thought experiments testing the Allais Paradox in Israel, at the University of Stockholm, and at the University of Michigan. Everywhere, the results followed the same pattern. The problem was even framed in many different ways, with prizes involving money, vacations, and so on. In each case, the substitution axiom was violated in exactly the same pattern. Kahneman and Tversky called this pattern the *certainty effect* -meaning, people overweight outcomes that are certain, relative to outcomes which are merely probable. Using the term "prospect" to refer to what we have so far called lotteries or gambles,(i.e. a set of outcomes with a probability distribution over them), Kahneman and Tversky also state that where winning is possible but not probable, i.e. when probabilities are low, most people choose the prospect that offers the larger gain. This is illustrated by the second decision stage in the Allais Paradox.

EXPERMENTS AND FINDINGS:

Kahnemann and Tversky also found strong evidence of what they referred to as the *reflection effect*

To illustrate: Imagine an Allais Paradox-type problem, framed in the following way. You must choose between one of the two gambles, or prospects:

Gamble A:

A 100% chance of losing $3000.

Gamble B:

An 80% chance of losing $4000, and a 20% chance of losing nothing

Gamble C:

A 100% chance of receiving $3000.

Gamble D:

An 80% chance of receiving $4000, and a 20% chance of receiving nothing.

Kahnemann and Tversky found that 20% of people chose D, while 92% chose B. A similar pattern held for varying positive and negative prizes, and probabilities. This led them to conclude that when decision problems involve not just possible gains, but also possible losses, people's preferences over negative prospects are more often than not a mirror image of their preferences over positive prospects. Simply put – while they are risk-averse over prospects involving gains, people become risk-loving over prospects involving losses

Differences between EUT – PT

Expected Utility Theory	**Prospects Theory**
1. Expected Utility theory assumes that investors are generally risk – averse.	1. According to prospects theory individuals are not universally risk-averse. They dislike risk in some situations, while liking risk in others.
2. Under expected utility, risk preferences are captured by the shape of the utility function. Decision makers are risk-averse if $U(x)$ is concave, andrisk-seeking if $U(x)$ is convex.	2. In prospects theory risk preference depends on most losses and most gains situations. Individuals are risk-averse for most gains, but risk seeking for most losses.
3. Expected utility theory assumes that preferences between prospects donot depend on the manner in which they are described, *(invariance assumption*).	3. Prospect theory demonstrates that the same choices can be framed indifferent ways to produce dramatically different preferences. In other words, our choices do not always obey the invariance assumption.
4. Expected utility theory assumes that — adding a common consequence to two	4. Common consequence to two options changes preferences, contrary to expected

prospects should not change which alternative the decision maker prefers. This principle is known as the *independence axiom*	utility theory.
5. EUT assumes that investors always try to avoid risk or takes care for risk in making investment decisions. i.e it assumes risk aversion.	5. PT assumes that investors always try to avoid losses. This dislike of losses is known as *loss Aversion.* Put simply, losses loom larger than gains.
Classical Finance	**Behavioral Finance**
6. No Reference Dependence – In classical theory, investors will consider the terminal wealth value.	6. Reference Dependence – in behavioral finance, an investor's decision will depend on where they are now, their reference point. Example : is their stock up or down in value.
7. Risk Aversion – Considers the expected value of the outcome relative to the variability.	7. Loss aversion - the pain of a loss is greater than the joy of a gain, so investors choose the safe alternative unless the risky outcome has a very high expected return.
8. Asset integration – assets viewed in a portfolio context.	8. Asset Segregation – assets viewed individually. This may lead investors to choose an incorrect combination.
9. Frame Independence – in classical theory, preference do not depend on how the decision is framed.	9. Mental Accounting – Investors may have separate "mental accounts" in which they place their funds. This may lead to different preferences depending on how the question

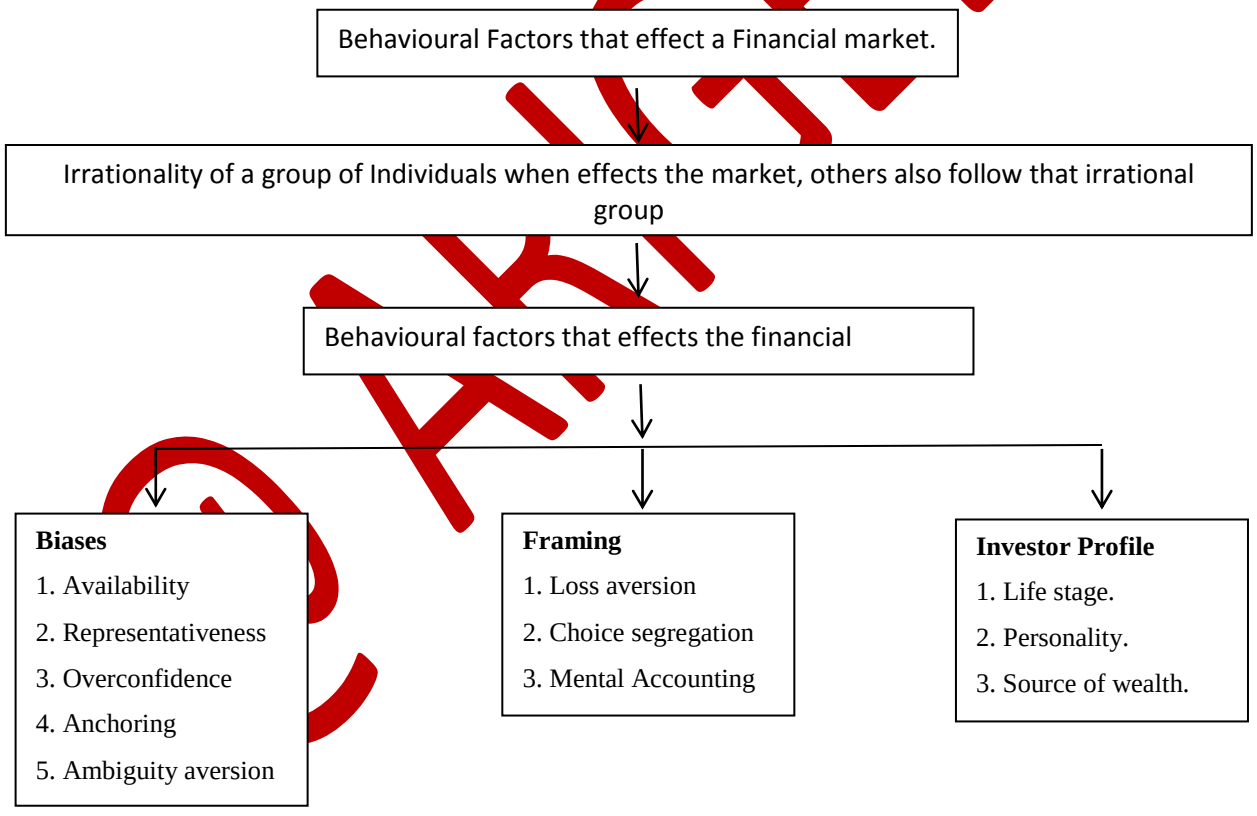
	is "framed".
10. Rational expectations – unbiased rational decision making.	10. Biased expectations – people tend to be overconfident about their ability to predict unknown, future events.
11.Rational expectations – Investors understand random chance and do not draw conclusions based on small samples.	11.Representativeness – Investors tend to draw strong conclusions from small samples. (or) Investors tend to underestimate the effects of random chance.
12.Investors do not ignore relevant information.	12.Investors tend to ignore information that conflicts with their existing beliefs.

UNIT – 3

Behavioral Factors and Financial Markets

Behavioral finance is the study of why individuals do not always make the decisions they are expected to make and why markets do not reliably behave as they are expected to behave. As market participants, individuals are affected by others' behavior, which collectively affects market behavior, which in turn affects all the participants in the market. Thus people are not always rational and hence markets cannot be expected to be efficient.

An understanding of behavior factors that impact the market shall decrease the vulnerability of investors. Ability to anticipate inefficient market behavior improves financial decision making in such markets.



Availability bias occurs because investors rely on information to make informed decisions, but not all information is readily available. Investors tend to give more weight to more available information and to discount information that is brought to their

attention less often. The stocks of corporations that get good press publicity, are deemed to do better than those of less publicized companies but in reality these "high-profile" companies may actually have worse earnings and return potential.

Representativeness is decision making based on stereotypes, characterizations that are treated as "representative" of all members of a group. In investing, representativeness is a tendency to be more optimistic about investments that have performed well lately and more pessimistic about investments that have performed poorly. Investors in their mind will stereotype the immediate past performance of investments as "strong" or "weak." This representation then makes it hard to think of them in any other way or to analyze their potential. As a result, they may put too much emphasis on past performance and not enough on future prospects.

Objective investment decisions involve forming expectations about what will happen, making educated guesses by gathering as much information as possible and making as good use of it as possible.

Overconfidence is a bias in which investors have too much faith in the precision of their estimates, causing them to underestimate the range of possibilities that actually exist. They tend to underestimate the extent of possible losses, and therefore underestimate investment risks.

Overconfidence also comes from the tendency to attribute good results to good investor decisions and bad results to bad luck or bad markets.

Anchoring happens when investors cannot integrate new information into their thinking because they are too "anchored" to their existing views. By devaluing new information, investors tend to underreact to changes or news and become less likely to act, even when it is in their interest.

Ambiguity aversion is the tendency to prefer the familiar to the unfamiliar or the known to the unknown. Avoiding ambiguity can lead to discounting opportunities with greater uncertainty in favor of "sure things." In that case, the bias against uncertainty may create an opportunity cost in the portfolio. Availability bias and ambiguity aversion can also result in a failure to diversify, as investors tend to "stick with what they know."

Framing

Framing refers to the way we see alternatives and define the context in which we are making a decision. A. Tversky and D. Kahneman, "The Framing Decisions and the Psychology of Choice," Investors framing determines how they imagine the problem, its possible solutions, and its connection with other situations.

Every rational economic decision maker would prefer to avoid a loss, to have benefits be greater than costs, to reduce risk, and to have investments gain value. **Loss aversion** refers to the tendency to loathe realizing a loss to the extent that you avoid it even when it is the better choice.

How can it be rational for a loss to be the better choice? Say you buy stock for $100 per share. Six months later, the stock price has fallen to $63 per share. You decide not to sell the stock to avoid realizing the loss. If there is another stock with better earnings potential, however, your decision creates an opportunity cost. You pass up the better chance to increase value in the hopes that your original value will be regained. Your opportunity cost likely will be greater than the benefit of holding your stock, but you will do anything to avoid that loss. Loss aversion is an instance where a rational aversion leads you to underestimate a real cost, leading you to choose the lesser alternative.

Loss aversion is also a form of regret aversion. Regret is a feeling of responsibility for loss or disappointment. Past decisions and their outcomes inform your current decisions, but regret can bias your decision making. Regret can anchor you too firmly in past experience and hinder you from seeing new circumstances. Framing can affect your risk tolerance. You may be more willing to take risk to avoid a loss if you are loss averse, for

example, or you may simply become unwilling to assume risk, depending on how you define the context.

Framing also influences how you manage making more than one decision simultaneously. If presented with multiple but separate choices, most people tend to decide on each separately, mentally segregating each decision. By framing choices as separate and unrelated, however, you may miss making the best decisions, which may involve comparing or combining choices. Lack of diversification or over diversification in a portfolio may also result.

A concept related to framing is **mental accounting**: the way individuals encode, describe, and assess economic outcomes when they make financial decisions. In financial behavior, framing can lead to shortsighted views, narrow-minded assumptions, and restricted choices.

EFFICIENT MARKET HYPOTHESIS

The term “Efficient” in EMH doesn’t mean either business efficiency or operational efficiency. It relates to informational efficiency. i.e How fast the share price in the market reflect the new information? How reliable is the share market price in reflecting the situation of the company?

The efficient market hypothesis (EMH) is an investment theory that states it is impossible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the EMH, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and the only way an investor can possibly obtain higher returns is by purchasing riskier investments.

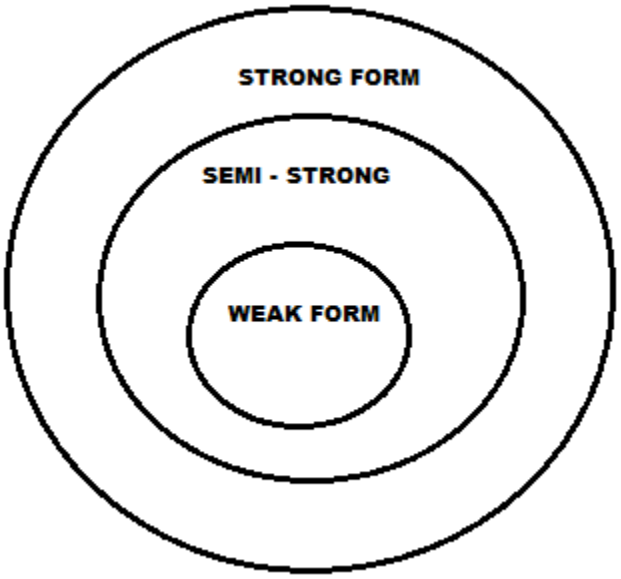
An efficient market is one in which the market price of a security is an unbiased estimate of its intrinsic value. Note that market efficiency does not imply that the market price equals intrinsic value at every point in time. All that it says is that the errors in the market

prices are unbiased. This means that the price can deviate from the intrinsic value but the deviations are random and uncorrelated with any observable variable. If the deviations of market price from intrinsic value are random, it is not possible to consistently identify over or under – valued securities.

Forms of Market Efficiency.

Strong form of Market efficiency.

Share price reflect all available (public + Private) information and thus investors would not be able to take abnormal returns on a regular basis by using a private information. This is because share price reaction towards new information is instantaneous and unbiased. In the strong form EMH, all available information, public as well as private, represents stale information. This means that even private information, sometimes described as inside information, cannot be used for earning superior risk-adjusted returns because such information quickly leaks out and gets reflected into prices. The strong – form EMH subsumes both the weak-form EMH and the semi-strong form EMH as shown in the following diagram.



According to Eugene Fama(1970), EMH is characterized by the type of information incorporated in the share price.

Weak form of Efficiency – Past information.

Semi-strong form of efficiency – Past + Current.

Strong form of efficiency – Past + current +Private.

Example

On January 1st 2018, Compay A value under a sophisticated financial calculation is 60 million Rupees. The share price then should be `10 per share.

On March 1st 2018, company A got a new project that will increased its profit. This project is expected to raise the company's value by say 10%. This is still a private information and the company announced it to public on the next day (March 2nd). How does the share price react?

In Weak form of market efficiency, there will not be any change in the price of the share on 1st March. Again on 2nd march also generally no substantial change will occur, since private information to become really public i.e known to all shares holders, shall take some time, so desired change can be identified only in the long run.

In semi-strong form price traded contain all current and past information. The share price will react on the day of the announcement i.e March 2nd. The share price will increases by 10% since the investors has access to public information.

In strong form of market, price traded contains all (public +private information). As such the share price reaction is instantaneous and unbiased. On march 1st, the share price will increase by 10%. The private information found its way to investors (instantaneous) and investors quickly understand exactly the impact and re-evaluate their bid/offer in the market.

Conditions of Market efficiency

According to Andrei Shleifer, any one of the following three conditions will lead to market efficiency.

(1) Investor rationality

(2) Independent deviation from rationality

(3) Effective arbitrage.

Investor Rationality : Rational investors value each security at its fundamental value, the net present value of future cash flows discounted at the risk adjusted rate of return. When such investors learn something that has a bearing on fundamental values of securities, they quickly respond to such information by bidding up the prices when the news is favourable and bidding down the price when the news is adverse. As a result, security prices reflect fundamental values. The EMH is thus a consequence of equilibrium in competitive markets thronged by rational investors.

Independent deviation from rationality : Remarkably, investor rationality is not a necessary condition for the EMH. The markets can be efficient even if the investors are not rational. In a commonly considered scenario the irrational investor in the market trade in a random fashion. Suppose Dr.Reddy's Lab announces an acquisition that is not understood by most investors. As a result, some may react in an overly optimistic manner while others may react in an overly pessimistic manner. As long as the deviations from rationality are independent and uncorrelated, errors tend to cancel out and the market price will still be an unbiased estimate of the intrinsic value. This argument rests on the assumption that the trading strategies of the irractional traders are uncorrelated. So, its validity may be quite limited.

Effective Arbitrage: Even if the trading strategies of the irrational traders are correlated, a case can be made for the EMH. This case, as argued by Milto Friedman and Eugene Fama is based on arbitrage, which is clearly one of the most intuitively appealing and plausible arguments in economics. William Sharpe and Gordon Alexander define arbitrage as the simultaneous purchase and sale of the same, or essentially similar, security in two different markets at advantageously different prices. Suppose that a security becomes overpriced in relation to its fundamental value because of correlated purchases by irrational investors. Realising that it is overprice, smart investors, or arbitrageurs, would sell or even short sell this security and simultaneously purchase other essentially similar securities which are relatively cheaper, to hedge their position. Their actions will bring the price of the security to the level of its fundamental value. In fact, if arbitrage is swift and effective, because substitute securities are available and keen competition exists between arbitrageurs, the price of a security cannot deviate much from its fundamental value.

A similar argument applies to an underpriced security. In such a case, the arbitrageurs will buy the underpriced security and sell essentially similar but relatively overpriced securities to hedge their position. Their actions will bring about a parity between the price and the fundamental value of the security.

Arbitrage has another implication. As irrational investors buy overpriced securities and sell underpriced securities, they earn inferior returns compared to arbitrageurs or even passive investors. Irrational investors lose money relative to their peers. As Milton Friedman pointed out, since irrational investors cannot lose money forever they eventually disappear from the market. Thus, in the long run, arbitrage and competitive selection ensure market efficiency.

Market predictability

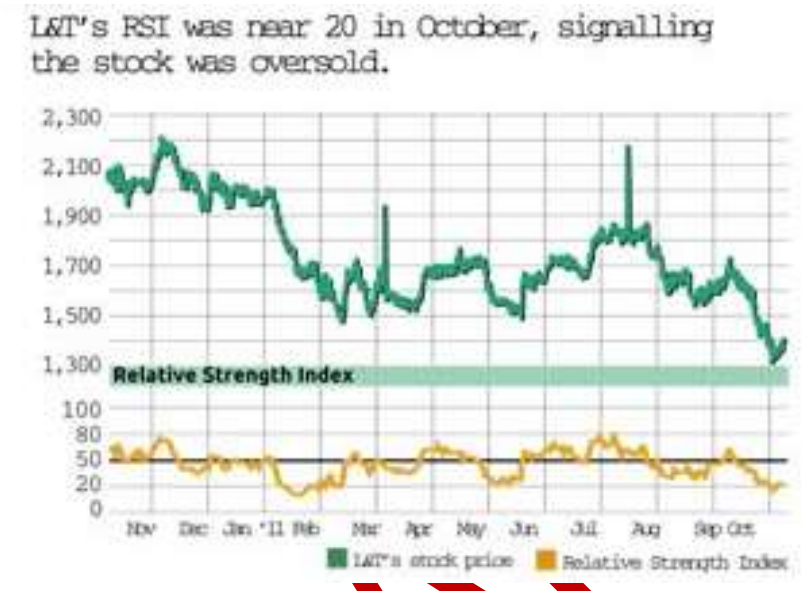
Market predictability implies the ability to forecast future returns and prices of the stock in the market. In the book “Your strategy needs a strategy” authors M.Reeves, et al define predictability as the ability to predict the potential changes in the market structure. The

term "predictability" can be confusing if one think of it as the synonym of "no risk." In this context, though, predictability means "no surprises" in future developments. Markets can be risky, but still predictable. In short, this means knowing how bad things can get and can predict negative consequences. Thus, some industries appear to be more predictable than others. For instance, commercial banking is far more predictable than technology driven industries.

Tools : Traditional finance had applied certain statistical tools to explain the predictability of stock markets that include, correlation, regression, trend analysis, time series analysis etc. Technical analysis suggests several types of graphs to predict the market trends of the past and anticipations for the future. Technical analysis is done on the basis of historical price movement plotted on a two-dimensional chart. One reason it has become popular is that anybody can look at the chart and see how prices have moved. Analysts and market experts take the help of various parameters to confirm if a stock is a trade pick. These include moving average, relative strength index, moving average convergence divergence, or MACD, Fibonacci retracement and candle stick price chart. The terms may sound daunting, but software available nowadays makes technical analysis easy.

Moving Averages: One of the widely used tools is the moving average. When the price of the stock rises above the moving average line, it's a buy signal, and when the price falls below the moving average line, it is a sell signal. In the graph, Moving Averages, you can see the Sensex movement compared to the 200-day moving average

of the Sensex. The trend line is the moving average line. In February, the line went above the price bars and the Sensex started falling. When the 200-day moving average fell below the price bars in April, the markets started going up. In the graphic, the Sensex is below the moving average, indicating bearishness. But this is just one parameter. Source:http://www.businesstoday.in/moneytoday/stocks/technical-analysis-tools/story/21155. html



Relative Strength Index (RSI): RSI compares the magnitude of recent gains to recent losses to see if an asset is oversold or overbought. RSI is plotted on a scale of 0-100. Generally, if it is above 70, the stock is considered overbought and so one can look to sell it. Similarly, an RSI of less than 30 indicates the stock is oversold and can be bought. In the chart, Relative Strength Index, you can see that RSI was near 20 in October 2011, signaling that L&T's shares were oversold. It reversed from 20 and the stock moved up.

Support and Resistance : Prices move in a zig-zag fashion and form lows and highs. A support is plotted at the daily low price and

resistance at the daily high price. For example, in the given chart, a typical investor may say he sees support of 4,700 for the Nifty and if the index falls below this, it may fall further to 4,300. He may have plotted resistance at 5,177 levels.

Active Portfolio Management: return statistics and sources of systematic underperformance

Asset pricing under a portfolio theory approach assumes efficient markets, such that assets should be efficiently priced and the market portfolio represents the appropriate equity investment choice. Despite the efficient market hypothesis, there are reasons to believe that active management can have effective results.

Objectives of Active Portfolio Management

Equilibrium Markets : Market efficiency prevails when many investors are willing to depart from maximum diversification, or a passive strategy, by adding mispriced securities to their portfolios in the hope of realizing abnormal returns. The competition for such returns ensures that prices will be near their true value. Most managers will not beat the passive strategy on a risk adjusted basis. However, in the competition for rewards to investing, exceptional managers might beat the average forecasts built into market prices.

Shift to passive strategies : Purely passive strategies are those that use only index funds *and* weight those funds by fixed proportions that do not vary in response to perceived market conditions. For example, a portfolio strategy that always places 60 percent in a stock market index fund, 30 percent in a bond index fund, and 10 percent in a money market fund is a purely passive strategy. If analysts cannot beat the passive strategy, investors will be smart enough to divert their funds from strategies entailing expensive analysis to less expensive passive strategies. With less capital under active management and less research being produced, prices will no longer reflect sophisticated forecasts. The potential profit resulting from research will then increase and active managers using this research will again have superior performance.

Increase in competition : The lure into active management may be extremely strong because the potential profit from active strategies is enormous. At the same time, competition among the multitude of active managers creates the force driving market prices to near-efficiency levels. Although enormous profits may be increasingly difficult to earn, decent profits to the better analysts should be the rule rather than the exception. For prices to remain efficient to some degree, some analysts must be able to eke out a reasonable profit. Absence of profits would decimate the active investment management industry, eventually allowing prices to stray from informationally efficient levels.

Acid test : If markets are not entirely efficient, investing in the market portfolio and in index funds will be suboptimal. The activities of thousands of investment professionals can then be justified not merely on the basis of protecting investors from their own mistakes and building portfolios that serve the interest of those investors; instead they will be able to identify departures in the pricing of assets from their inherent values and turn these into profits for investors. This may be through modification of asset allocations over time or by the over- and underweighting of assets in a diversified portfolio. This potential, if realized, certainly justifies the salaries of the analysts paid to determine the appropriate values of equities and bonds, and portfolio managers who determine their weights in active portfolios.

Predictive ability: This predictive ability, if measured directly, rather than by fund performance, was shown to exist and when the predictions were used efficiently in portfolio design, the ability was sufficient to outperform index funds.

Client Behavior : What does an investor expect from a professional portfolio manager, and how does this expectation affect the operation of the manager? If the client were risk-neutral, that is, indifferent to risk, the answer would be straightforward. The investor would expect the portfolio manager to construct a portfolio with the highest possible expected rate of return. The portfolio manager follows this dictum and is judged by the

realized average rate of return. When the client is risk-averse, the answer is more difficult. Without a normative theory of portfolio management, the manager would have to consult each client before making any portfolio decision in order to ascertain that reward (average return) is commensurate with risk.

Allocation ability : Proper allocation of investment funds to the risk-free and risky portfolios requires some analysis because *y*, the fraction to be invested in the risky market portfolio, *M*, is given by

$y = (E(rM) - rf) / (0.01A\sigma_M^2)$

where E(rM) – rf is the risk premium on M, σ_M^2 its variance, and *A* the investor's coefficient of risk aversion. Any rational allocation therefore requires an estimate of σ_M^2 and $E(rM)$. Even a passive investor needs to do some forecasting, in other words.

Forecasting $E(rM)$ and σ_M^2 is further complicated by the existence of security classes that are affected by different environmental factors. Long-term bond returns, for example, are driven largely by changes in the term structure of interest rates, whereas equity returns depend on changes in the broader economic environment, including macroeconomic factors beyond interest rates. Once our investor determines relevant forecasts for separate sorts of investments, he/she might as well use an optimization program to determine the proper mix for the portfolio. It is easy to see how the investor may be lured away from a purely passive strategy, and we have not even considered temptations such as international stock and bond portfolios or sector portfolios.

MEASURING RETURNS AND CALCULATING AVERAGES

In order to evaluate the performance of a portfolio manager, we will need both a measurement of the returns of the portfolio and a way of comparing those returns to one or more benchmarks considering the risk involved. The first problem is not quite as trivial as it might seem, as it also implies the question of whether the past performance is indicative of future performance. The second process depends greatly on the context in which the comparison is made.

HPR (Holding Period Return) is the return generated by fund/ security from the date of holding to the date of selling. Suppose we evaluate the performance of a portfolio over a period of 5 years from 20 quarterly rates of return. The arithmetic average would be the best estimate of the expected rate of return of the portfolio for the next quarter. The geometric average, which can differ substantially from the arithmetic, is the constant quarterly return over the 20 quarters that would yield the same total or cumulative return.

The geometric average, *rG*, for the 20-quarter investment period is computed from the quarterly rates of return as

$$1 + r_G = [(1 + r_1)(1 + r_2) \cdots (1 + r_{20})]^{1/20}$$

Each return has an equal weight in the geometric average. For this reason, the geometric average

is referred to as a **time-weighted average.**

To set the stage for discussing the more subtle issues that follow, let us start with a trivial example. Consider a stock paying a dividend of $2 annually that currently sells for $50. You purchase the stock today and collect the $2 dividend, and then you sell the stock for $53 at yearend. Your rate of return is

Total Proceeds / Initial Investment = (Income + Capital gain) / 50 = (2+3)/50 = 10%

Time-Weighted Returns Versus Dollar-Weighted Returns

When we consider investments over a period during which cash was added to or withdrawn from the portfolio, measuring the rate of return becomes more difficult. To continue our example, suppose that you were to purchase a second share of the same stock at the end of the first year, and hold both shares until the end of year 2, at which point you sell each share for $54. Total cash outlays are

Time	Outlay
0	50 to purchase first share
1	53 to purchase second share a year later
	Proceeds

1	2 dividend from initially purchased share
2	4 dividend from the 2 shares held in the second year, plus 108 received from selling both shares at 54

Using the discounted cash flow (DCF) approach, we can solve for the average return over the 2 years by equating the present values of the cash inflows and outflows:

$50 + 53 / (1+r) = 2 / (1+r) + 112 / (1+r)^2$

resulting in $r = 7.117$ percent.

This value is called the internal rate of return, or the **dollar-weighted rate of return** on the investment. It is "dollar-weighted" because the stock's performance in the second year, when two shares of stock are held, has a greater influence on the average overall return than the firstyear return, when only one share is held.

Notice that the time-weighted (geometric average) return in this example is 7.83 percent:

$r1 = (53+2-50) / 50 = 10\%$ and $r2 = (54+2-53) / 53 = 5.66\%$

$rG = (1.10*1.0566)^{1/2} – 1 = 0.0783 = 7.83\%$

The dollar-weighted average was less than the time-weighted average in this example because the return in the second year, when more money was invested, was lower.

Risk-Adjusted Performance Measures

Risk Adjustment Techniques

Calculating average portfolio returns does not mean the task is done—returns must be adjusted for risk before they can be compared meaningfully. The simplest and most popular way to adjust returns for portfolio risk is to compare rates of return with those of other investment funds with similar risk characteristics. For example, high-yield bond portfolios are grouped into one "universe," growth stock, equity funds are grouped into another universe, and so on. Then the (usually time-weighted) average returns of each fund within the universe are ordered, and each portfolio manager receives a percentile ranking depending on relative performance within the **comparison universe**. For example, the manager with the ninth-best performance in a universe of 100 funds would

be the 90th percentile manager: his performance was better than 90 percent of all competing funds over the evaluation period.

Methods of risk-adjusted performance evaluation using mean-variance criteria came on stage simultaneously with the capital asset pricing model. Jack Treynor, William Sharpe, and Michael Jensen recognized immediately the implications of the CAPM for rating the performance of managers.

1. *Sharpe's measure:* $(r_P - r_f)/SD_P$

Sharpe's measure divides average portfolio excess return over the sample period by the standard deviation of returns over that period. It measures the reward to-(total-) volatility tradeoff.

2. Treynor's measure: $(r_P - r_f)/B_P$

Like Sharpe's, **Treynor's measure** gives excess return per unit of risk, but uses systematic risk instead of total risk.

3. *Jensen's measure:* $\alpha_P = r_P - [r_f + B_P(r_M - r_f)]$

Jensen's measure is the average return on the portfolio over and above that predicted by the CAPM, given the portfolio's beta and the average market return. Jensen's measure is the portfolio's alpha value.

4. Information ratio: $SD_P/SD_{(eP)}$

The **information ratio** divides the alpha of the portfolio by the nonsystematic risk of the portfolio. It measures abnormal return per unit of risk that in principle could be diversified away by holding a market index portfolio.

UNIT – 4

Behavioural influences on corporate decision-making

Corporate governance research has been increasingly dipping into the behavioural and cognitive fields. Langevoort's work considers behavioural factors in the context of securities markets, corporate boards, and monitoring. Understanding behavioural biases that affect businesses is particularly important for big organisations. Multinational corporations and financial institutions are particularly vulnerable to biased decision-making – the complexity of the organisation complicates the acquisition and processing of information.

There are several heuristics and biases that are regularly discussed in relation to corporate decision-making:

Over optimism is considered to be a particularly strong influence, not in the least due to the corporate selection that generally favours optimistic individuals. Generally, optimism and confidence are beneficial for the organisations and facilitate effective and energetic working culture. However, overoptimism and overconfidence can lead to excessive risk-taking with potentially disastrous consequences. Arguably, overoptimism of the CEOs and senior management at major financial institutions was the driving force behind their aggressive risk-taking during the run-up to the 2008 financial crisis.

Escalation of commitment is another powerful factor that can distort allocation of resources in a company. It reflects a behavioural pattern where an individual, when confronted with the negative outcome of a previous decision, tends to downplay the adverse consequences and increases risk-taking to avoid suffering a loss. In the corporate context, this bias results in significant degree of commitment to the decided upon course, which does not falter even at signs of trouble. The individuals involved in the decision-making process will tend to interpret negative information positively, which will threaten effective internal communication and information processing in a company.

The **confirmation bias** leads decision-makers to misinterpret neutral information in a way that supports their previously formed beliefs . This bias may provide explanation for

the merger decisions that have no or negative effects on profitability. Studies suggest that the way data is collected by the acquiring firms shifts the focus towards information favourable to the merger .

Groupthink is especially relevant in relation to board-level decision-making. It is a commonly shared view that group decision-making improves the decision quality. However, this bias can effectively silence any dissent by imposing a presumption of unanimity within the group. To avoid the stress of re-evaluating a chosen stance, the group will tend to exclude or rationalise away any information contradicting it. This behavioural pattern weakens the evaluation of available information by the board members.

Pluralistic ignorance is another factor potentially affecting boardroom decision-making. This social psychological bias causes all members of a group to uphold norms or rules that they themselves privately reject, but believe that all other members accept. This phenomenon provides insight into the failure of many boards to change the strategy in response to falling corporate performance .

Awareness of these behavioural factors would allow senior corporate decision-makers to 'debias' decision-making processes and ensure adequate dissemination and processing of information. That would likely lead to a significant increase in the efficiency of corporate governance arrangements.

Need for behavioural science to improve corporate decision-making

Outcomes of corporate misconduct differ in their severity. From loss of profits to public condemnation and legal consequences for the employees involved, consequences of flawed decision-making can be disastrous. There might be a way to rectify those flaws by correcting systematic decision-making pitfalls, instead of focusing on individual failings.

Behavioural analysis of the corporate environment can inform the optimisation of internal information processing and decision-making. Some business services and consultancy

companies are advocating the value of incorporating cognitive biases into strategic decision-making. Ensuring that managers and directors make better choices would enable businesses to achieve their goals more effectively. It would also improve compliance, which is especially important for heavily regulated industries, such as banking. Development of specific behavioural solutions requires empirical research into internal corporate processes.

Capital structure and Behavioral factors

Deciding on the capital structure is to determine the corporate choice between debt and equity. When an organization choices a capital structure suitable to its internal environment, several questions shall arise, whether it is optimum or not, does it had low WACC, what is likely to be the impact of such debt equity ratio on value of the firm etc. Modigliani and Miller attempted to explain how firms choose their capital structure and whether an optimal capital structure actually exists, which contains both debt and equity.

Behavioural factors based on capital structure theories

(1) Tax based theories and bankruptcy costs: Financial managers believe that tax saving is an important tool for maximization of firm value. When all things remains same, a firm's ability to save tax increase a projects cash generation capabilities. Anchored with this type of tendency managers get into a debt trap that can considerably increase their bankruptcy costs. Credit rating is completely ignored in such circumstances which results in increased cost of capital, leading to devaluation of entities securities. Overconfidence is also an important factor that encourages management to put heavy faith on debt capital. Executives fail to read the business cycles, over optimizes with past achievements does not care the raising degree of financial leverage (DOL) in the business.

(2) Agency cost theories : Separation of management and ownership always carries agency cost, in the sense that management does not act in the best interest of owners.

That means, at the time of taking decisions on capital structure, they give unnecessary importance to safety by ignoring the benefits of business. Instead of managing the risk, management tends to minimize the risk at the cost of owner's funds. This is the reason why, it was said that for management, equity is like a pillow and debt is a sword. This is the result of underestimating the entities capabilities due to over pessimism on the part of managerial behavior.

(3) Asymmetric information theories. : Supply and demand factors relating flow of capital in capital markets is an important factor at a given point of time when capital is to be raised. Information about which is more accessible to management rather than investors. This asymmetric information leads to irrational behaviors. Availability heuristics drives investor's attitudes in stock markets as a response to capital structure decision taken by management. Suppose, management raised further capital through issue of debt securities. Management had the analytical and researched information that currently there is good supply of debt capital and there are likely chances for RBI to raise interest rates in the economy. But the investors, who does had this information perceives increasing financial risk. Those with high risk aversion tendency will try to sell their holding to get away from perceived risk which really does not exists.

Behavioural factors based on type of management

Why managers make certain financing choices is also depending on type of management. Overconfidence as a particular behavioural bias in capital structure decisions is sources from following styles of management.

(1) Owner – Management : In this case, entrepreneurial nature of the managers tend to display overconfidence cognitive biases more frequently than non entrepreneurial (employee) managers. This is mainly due to lack of minimum fear or greed creeping in mind to out perform in the market. Capital structures are found to be highly levered when the management is in the hands of founder or owners.

(2) Hired – Management: Opposite behavior is exhibited by non entrepreneurial managers who actually avoids risks. They tends to show risk aversion, as they think it is unnessary to do experiments for same level of return (managerial remuneration). They generally fear being fired out. Hence general tendency is that such organization remains unlevered or low levered. However, some times hired management assumes too risky decisions in structuring the capital by raising more debt capital for investing in highly risk projects (near to gambling). They take it as a last resort to help themselves before being fired by owners for current trend of losses. Thus lose aversion biases tunes capital structure.

Capital Structure dependence on Market Timing

Baker and Wurgler introduced a "market – timing" hypothesis for capital structure theory. In the context of capital structure, market timing refers to management's effort to take advantage of market conditions to minimize the cost of capital. A manager who is timing the market would choose to issue equity when stock prices are perceived to be overvalued and repurchase equity when stock prices are relatively low.

Market to book value ratio : Market to book value ratio plays a significant role in market timing. This relative valuation of equity indicates there is strong, negative correlation between high levels of leverage and high market – to – book ratios. High ratio is an indication for predicting managers to issue stock and low ratio indicates possible buy-back of securities by management. This results in higher levels of debt when stock prices are relatively low and vice versa.

Long term impact : This practice of market timing has a persistent impact on long-term capital structure, leading to the conclusion that capital structure is related to historical market values.

Interest rates : Market timing of capital structure is dependent on perceived interest rates. Firm's management issues significantly higher amounts of debt when long-term interest rates were perceived to be low relative to historical values. Although refinancing activities can explain some of this activity, nonrefinancing activity is also considerably higher when interest rates are relatively low.

Results of timing strategies : Generally market-timing driven equity issuances are likely to be beneficial because stock prices tends to decline after the equity issuance. This resulted in a lower cost of equity for issuing firms relative to their non-issuing peers. Firms that make accurate anticipation of future interest rates shall have decrease in the overall cost of debt. They do this by issuing long term debt during increasing interest rate predictions and short term debt in decreasing interest rate conditions.

Systematic approach to using behavioral factors in corporate decision making

A systematic approach to using behavioral factors assumes that rational managers need to work in the best interest of long terms investors. This like rational mangers with irrational investors approach. Accordingly, managers recognize market inefficiencies or mispricing to make decisions that exploit or further encourage mispricing. The decisions that they take to maximize the short-term value of the firm, however, may lower the long-run value of the firm when prices converge to fundamental values.

It appears that manager balance three objectives :

(1) Fundamental value

(2) Catering and

(3) Market timing

The first goal is to maximize the intrinsic value of the firm. This means choosing and financing investment projects mean to increase the rationally risk-adjusted present value of future cashflows.

The second goal is the maximize the current market value of the firm. In a perfect (efficient) capital market, the first two objectives are the same, since market efficiency

implies that price equals fundamental value. However, when there is mispricing, managers try to cater to short term investor demand by choosing investment projects or financing packages or other actions that maximize the appeal of the firm's securities to investors. Inter alia, catering may include:

- Investing in a particular technology that is currently in boom.
- Adopting a conglomerate structure or a single – segment structure depending on what the market fancies.
- Changing the name of the company. For instance, during the internet craze of late 1990's many companies changed their names to "dotcom" names.
- Initiating dividends.
- Issuing bonus shares or splitting shares.

The third goal is to exploit the current mispricing for furthering the interest of existing, long term investors. This involves selling securities that are temporarily overpriced and repurchasing securities that are temporarily underpriced. Such a policy transfers wealth from the new or the outgoing investors to old or the ongoing long run investors. The wealth so transferred is realized as mispricing corrects itself in the long run.

Dividend Policy

Merton Miller and Franco Modigliani (MM) provided the standard neoclassical treatment for dividend policy. The cenral premise of the MM framework is that the value of a firm depends solely on its earnings power and is not influenced by the manner in which its earnings are split between dividends and retained earnings.

The substance of MM argument may be stated as follows: If a company retains earnings instead of giving it as dividends, the shareholders enjoy capital appreciation equal to the amount of earnings retained. If it distributes earnings by way of dividends instead of retaining it, the shareholders enjoy dividends equal in value to the amount by which his capital would have been appreciated had the company chosen to retain its earnings. Hence, the division of earnings between dividends and retained earnings is irrelevant from the point of view of the shareholders.

In essence, the basic premise of the MM theory is that investors are immune to framing effects. If a firm pays low dividends and investors want greater current income, they can sell some shares; likewise, if a firm pays high dividends and investors want lower current income, they can buy some shares.

The MM theory assumes a perfect capital market, wherein the following conditions are assumed:

- Information is freely available to everyone equally
- There are no taxes
- Floatation and transaction costs do not exist.
- There are no contracting or agency costs (these costs refer to the cost of managing conflicts of interest between holder of different securities or between management and holders of securities)
- No one exerts enough power in the market to influence the price of security. This means all participants are price – takers.
- Investment and financing decisions are independent.

The real world, however is characterized by imperfections such as taxes on dividend income as well as capital profits; floatation costs and transaction costs; informational asymmetry and agency conflicts.

Behaviour factors influencing payment of dividend

Despite the tax disadvange of dividends and the issuance costs associated with external equity, firms pay dividends and investors generally regard such payments positively. Reasons for such behaviour can be analayised as under

(1) Investors behavioural preference for dividends

(2) Information signaling

(3) Clientele effect and

(4) Agency costs

Investor Preference for Dividends : If taxes and transaction costs are ignored, dividends and capital receipts should be perfect substitutes. Yet there appears to be a strong demand or preference for dividends. Hersh Shefrin and Meir statman offer explanations based on the behavioural principles of self control and aversion for regret. In essence, their argument is that investors have a preference for dividends due to behavioural reasons. Hence, dividends and capital receipts are not perfectly substitutable.

(a) Self-control and Dividends : Individuals often lack self control. So, they rely on rules and programmes which check their temptations. Smoking clinics, diet programmes and the like exist because they help in disciplining individuals with weak determination. In the realm of personal financial management, individuals would like to protect their principal from their spendthrift tendencies. A simple way to do this is to limit their spending to the dividend income so that the capital amount is maintained intact. Such a rule explains a preference for dividend by those who otherwise have difficulty in exercising self-control.

(b) Aversion to Regret and Dividends : Look at the following two cases:

- You receive ` 30,000 as dividend and use it to buy a television set.
- You sell a portion of your shares for 30000 and buy a television set.

The price of the stock rises sharply subsequently. In which case would we experience more regret? Although dividends and capital receipts are perfectly substitutable, when taxes and transaction costs are abstracted away, empirical evidence suggests that most people feel more regret when they sell the stock because they can readily imagine the consequences of that action. Hence, it is believed that persons who have an aversion to regret prefer dividend income to capital receipt, even though the two are perfect substitutes in finance theory. Hence there is a demand for dividend.

2. Informational signaling : Management often has significant information about the prospects of the firm that it cannot disclose to investors. The information gap between management and shareholders generally causes stock prices to be less than what they would be under conditions of information symmetry.

How can firms that have promising prospects convey information credibly to the market? According to signaling theory, these firms need to take actions that cannot be easily imitated by firms that do not have such promising projects. One such action is to pay more dividends. Increasing dividends suggests to the market that the firm is confident to its earning prospects that will enable it to maintain higher dividend in future as well. This is a positive signal for the market and it has buoying effect on the stock prices.

By the same token, a decrease in dividends is perceived as a negative signal by the market because firms are reluctant to cut dividends. Consequently, such an action leads to a drop in stock prices.

By and large, the empirical evidence concerning market reaction to dividend increases and decreases is consistent with these stories.

3. Clientele Effect : Investors have diverse preference. Some want more dividend income; others want more capital gains; still others want a balanced mix of dividend income and capital gains. Over a period of time, investors naturally migrate to firms which have a dividend policy that matches their preferences. The concentration of investors in companies with dividend policies that are matched to their preferences is called the clientele effect. The existence of a clientele effect implies that (a) firms get the investors they deserve and (b) it will be difficult for a firm to change an established dividend policy.

4. Agency costs : If shareholders have complete faith in the integrity and rationality of management, there is no reason why a company that has profitable investment opportunities should pay any dividend. In reality, however, shareholders rarely consider management as a perfect agent. They are concerned that management may squander money over uneconomic projects. And, that is where the relevance of dividends lies. Several scholars have argued that dividends can mitigate agency costs. A firm that pays regular dividends can reduce managerial propensity to waste resources.

UNIT – 5

Decision making power of an individual is certainly effected by their emotions. This is the reason for suggesting not to make promises in over joy and keep your silence in anger. Controlling of these emotions is called emotional intelligence. In financial decisions, emotions leads to suppress the reasoning ability of the mind. Physiology of finance is more apt then psychology of finance in dealing with emotions. Rational thinking and decision making does not leave any room for emotions. This means, emotions of any kind (good / bad) should not remain at the time of trading in financial securities, since emotions are irrational occurrences that may distort reasoning power of mind.

A further common view is that decision making is a rational mental process without emotion, and that emotions disrupt and jeopardize the rational process. In decision research, rationality is mostly understood as formal consistency, that is, conforming to the laws of probability and the axioms of utility theory. If people behave rationally in that sense, they will make optimal choices. Emotions, then, can only interrupt and impede the process of achieving an optimal decision.

However, there are presently both theories and research focusing on the important role of emotions in decision-making. Loewenstein and Lerner divide emotions during decision-making into two types:

1. Anticipating emotions
2. Immediate emotions

Risky decisions are taken by human with both anticipated emotions and immediate emotions. Immediate emotions refer to the uncontrollable preasure people feel as they contemplate a specific decision option when they have alternatives available at that movement. Whereas anticipated emotions are those emotions that people forecast that they will feel once they experience possible consequences of that decision. Thus expected emotions refer to anticipated emotional states associated with a given decision that are never actually experienced. Immediate emotions, however, are experienced at the time of

decision, and either can occur in response to a particular decision or merely as a result of a transitory fluctuation.

Damasio formulated the somatic marker hypothesis (SMH), that proposes a mechanism by which emotional processes can guide (or bias) behavior, particularly decision-making. Pfister and Böhm believe that "the issue of rationality should be based on the validity of emotional evaluations rather than on formal coherence."

Emotional mechanisms in modulating risk-taking attitude

1. The Loewenstein-Lerner classification Loewenstein and Lerner (2003) construe emotions according to their place along the time course of a decision process, beginning with a deliberation phase leading to a choice, then implementing the choice, and, eventually, experiencing the outcomes. They distinguish between anticipated emotions and immediate emotions, with immediate emotions further classified into incidental and anticipatory emotions. Anticipated emotions are beliefs about one's future emotional states that might ensue when the outcomes are obtained. Immediate emotions, in contrast, are actually experienced when making a decision, thereby exerting an effect on the mental processes involved in making a choice. Immediate emotions come in two variants, either as incidental emotions caused by factors which are not related to the decision problem at hand, and as anticipatory or integral emotions, which are caused by the decision problem itself.

2. Peters' functional roles of affect Peters (2006) recently proposed a classification of the roles that affect plays in decision making. Affect is loosely defined as experienced feelings about a stimulus, either integral or incidental. Four roles are identified:

First, affect plays a role as information. These feelings, act as good-versus-bad information to guide choices, according to the affect heuristic proposed by Slovic.

The second role played by affect is as a spotlight, focusing the decision maker's attention on certain kinds of new information and making certain kinds of knowledge more accessible for further information processing.

Third, affect operates as a motivator, influencing approach-avoidance tendencies as well as efforts to process information.

Finally, a fourth role of affect is to serve as a common currency in judgments and decisions. Just as money does for goods, affect provides a common currency for experiences. Affective reactions enable people to compare disparate events and complex arguments on a common underlying dimension.

3. The influence-on metaphor : Emotions - or affect, or feelings - are portrayed as external forces influencing an otherwise non-emotional process. It is assumed that the domain of emotion is qualitatively different and functionally separate from the domain of cognition. Decision making is then seen as an essentially cognitive process, which does not necessarily entail emotions. Emotions may have an influence on decision making, but decision making per se might as well proceed without emotion. This is the premise of traditional approaches of behavioral decision making, but is also reflected in current dual-system theories. This antagonism of emotion and decision making is commonly accompanied by further dichotomies: Irrational emotions disturb rational cognitions, intuitive feelings outsmart deliberate thinking, and hot affect overwhelms cold logic.

4. Positive and negative emotions All emotions are naturally classified as either positive or negative. More precisely, all emotional states can be mapped onto a one-dimensional scale of valence, characterized by contrasting labels such as positive versus negative, pleasurable versus painful, or helpful versus harmful. This assumption of one dimensional scalability corresponds to the economic notion of utility, which takes for granted that choice reveals an underlying one-dimensional utility scale. In a parallel manner, research on hedonic feelings and happiness postulates a general dimension of pleasant versus unpleasant feelings on which all experiences can be evaluated. Empirically, however, this view just does not hold, and ample evidence demonstrates that human preferences do not conform to simple scalability.

Experimental Methods of measurement of Risk

Economists and psychologists have developed a variety of experimental methodologies to elicit and assess individual risk attitudes. Choosing which to utilize, however, is largely dependent on the question one wants to answer, as well as the characteristics of the sample population.

1. BART Method. (The Ballon Anologue Risk Task) :

The Balloon Analogue Risk Task (BART) measures risk preferences by presenting individuals with a computer simulation of pumping air into a series of balloons. Balloons of three different colors (blue, yellow and orange) are presented one at a time. For each successive pump, the balloon grows in size and the individual earns money that is deposited into a temporary reserve. The value of the reserve is never revealed to the participant. As the balloon becomes bigger, the chances that it would pop after another pump grows as well; the probability of popping is negligible before the first pump and grows to certainty after the balloon reaches a particular size. If the balloon pops, all earnings in the temporary reserve disappear and a new balloon appears. At any given time, the participant can either pump the balloon or collect what she has earned so far. If the participant chooses to collect her earnings, that money is deposited into her permanent account and a new balloon appears. She then faces the same scenario with the next balloon.

The probability of popping increases monotonically with each successive pump and evolves according to a function specific to the color of the balloon. As participants are not informed of the actual probability function, this method thus tries to collect information on risk taking attitude of the individuals. Individuals are presented with 90 balloons in total, with the colors randomized accordingly.

Since each successive pump carried an increased risk of causing the balloon to pop, the authors took the average number of pumps, excluding balloons that exploded, to be the adjusted value corresponding to the individual's risk preference. This value correlated significantly with reported real-world risky behavior such as gambling, drug use etc.

2.Questionnaires

Questionnaires are a commonly used method of eliciting risk preferences that rely on the individual's self-reported propensity for risk. A typical general risk question comes in the form of: "Rate your willingness to take risks in general" on a 10-point scale, with 1-completely unwilling and 10-completely willing.

Such general risk questions implicitly assume that they are measuring a single, stable risk preference that influences behavior across various domains. In turn, risk preferences derived through this method are commonly used as indicators for the propensity to engage in behavior ranging from portfolio selection to smoking. However, a substantial amount of evidence suggests that the measured risk preferences are highly dependent on the domains in which they are elicited. The risk attitudes of company managers, for example, appear to differ substantially depending on whether risk was in the recreational or financial domain.

3. The Gneezy and Potters method

The elicitation method of Gneezy and Potters (1997) provides a measure of risk preferences in the context of financial decision-making with real monetary payoffs. Here, the decision maker receives $X and is asked to choose how much of it, $x, she wishes to invest in a risky option and how much to keep. The amount invested yields a dividend of $kx ($k > 1$) with probability p and is lost with probability $1 - p$. The money not invested $(X - x) is kept by the investor. The payoffs are then $(X - x + kx) with probability p, and $(X - x) with $1 - p$. In all cases, p and k are chosen so that $p \times k > 1$, making the expected value of investing higher than the expected value of not investing; thus, a risk-neutral (or risk-seeking) person should invest $X, while a risk-averse person may invest less. The choice of x is the only decision the participants make in the experiment.

For example, consider the case in which the participant receives an endowment of 100 cents. She is then asked to choose what part of this endowment (x) she would like to invest in a risky asset and how much to keep. The risky asset returns 2.5 times the amount invested with a probability of one-half and nothing with a probability of one-half.

The participant keeps the money that she does not invest (100 − x). The amount invested is then used as the measure of risk preferences.

Note that for these parameters, risk-neutral (and, in turn, risk-seeking) individuals should invest their entire endowment.

Hence, a disadvantage of this method is that it cannot distinguish between risk-seeking and risk-neutral preferences. However, since risk-seeking preferences appear to be relatively uncommon, and a fairly small fraction of participants choose to invest the entire amount of points, the amount invested x provides a good metric for capturing treatment effects and differences in attitude toward risk between individuals.

This elicitation method has been used to provide support for myopic loss aversion in the financial decisions of students, as well as professional traders. The method has also been used to show a positive correlation between risk taking, testosterone levels, and facial masculinity, and to compare gender differences in risk attitudes.

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4. The Eckel and Grossman method

The method developed by Eckel and Grossman (2002), was explicitly designed to be a simple way of eliciting risk preferences that produced enough heterogeneity in choices to allow for the estimation of utility parameters. The method asks subjects to make only one choice; participants are presented with a number of gambles and are asked to choose one that they would like to play. The number of presented gambles can be varied. For example, participants are given with six gambles. Each of the gambles, listed in Table 1, involves a 50% chance of receiving the low payoff and a 50% chance of the high payoff. One of the gambles is a sure thing: in this case, Gamble 1 with a certain payoff of $28. For Gambles 1–5, the expected payoff increases linearly with risk, as represented by the standard deviation. Note that Gamble 6 has the same expected payoff as Gamble 5 but with a higher standard deviation. The gambles are designed so that risk-averse subjects should choose those with a lower standard deviation (Gambles 1–4), risk-neutral subjects should choose the gamble with the higher expected return (Gamble 5), and risk-seeking subjects should choose Gamble 6.

Table 1
The Eckel and Grossman measure.

Choice (50/50 Gamble)	Low payoff	High payoff	Expected return	Standard deviation	Implied CRRA range
Gamble 1	28	28	28	0	$3.46<r$
Gamble 2	24	36	30	6	$1.16<r<3.46$
Gamble 3	20	44	32	12	$0.71<r<1.16$
Gamble 4	16	52	34	18	$0.50<r<0.71$
Gamble 5	12	60	36	24	$0<r<0.50$
Gamble 6	2	70	36	34	$R<0$

This method allows for parameter estimation: the chosen gamble implies an interval for the risk coefficient under the assumption of constant relative risk aversion (CRRA). Under this assumption, utility can be represented by the function $u(x) = x^{1-r}$, with r corresponding to the coefficient of relative risk aversion and x corresponding to wealth. Individuals with $r > 0$ can be classified as risk averse, $r < 0$ as risk loving and $r = 0$ as risk neutral. Table 1 contains intervals for the risk coefficient corresponding to each chosen gamble. The intervals are determined by calculating the value of r that would make the individual indifferent between the gamble she chose and the two adjacent gambles. For example, a choice of Gamble 3 implies a risk coefficient in the interval of (0.71, 1.16):

indifference between Gambles 3 and 4 corresponds to r = 0.71, and indifference between Gambles 2 and 3 to r = 1.16.

This measure has been used in Eckel and Grossman (2008) to demonstrate that women are significantly more risk averse than men. The authors also examined the stereotyping of risk attitudes by asking subjects to guess the gamble choice of others and found that both men and women predicted greater risk aversion for women. In a field experiment with French farmers, Reynaud and Couture (2012) compared several risk elicitation methods and found the measure elicited using the Eckel and Grossman method correlated significantly with those elicited through the other methods. The measure is relatively easy for individuals to understand. However, it cannot differentiate between different degrees of risk-seeking behavior.

Neurophysiology of risk taking.

Introduction to Neurophysiology of Finance

Neurophysiology is different from Psychology. Former is a study of body reactions and later is about mind directions to those reactions. There will be a communication channel between body and mind through the use of chemical messengers called Hormones. When watching a Chicken biryani making video, some may feel that their mouth is watering. It happens automatically, even though it not possible to taste that while watching it on TV. It's not possible to have control over these chemical messengers. Even though people know that what they are watching in a drama show is not really happening, they cannot stop crying for what happen to a character in the drama.

NeuroFinance or Neurophysiological Finance is thus an advancement in the field of behavioral finance. Here experiments are done on mind, hormone levels at the time of making a decision. For example, blood samples (or) urine samples if gathered from traders at the time of peak trading time, we can find that those traders, who are actual on loss on that day, shall have higher levels of Adrenalin, Cortisol in those samples.

This is a well-known fact that mind plays an important role on the body. The co-ordination between these is essential for rational decision making. Understanding of

Neuroscience to certain extent that helps us to understand the two important emotion states called Euphoria and stress shall provide the behavioral finance to take it's holistic form.

Behavioural Finance V/S Neurophysiological Finance

Behavioural Finance	**Neurophysiological Finance**
Greed	Euphoria / mania
Fear	Stress / Depression

Behavioural finance explains why people tends acquire stocks or takes excessive risk than needed. This is because of a behavioural attitude called greed for money. This type of bias increases risk taking tendency, because human tends to earn like others and even want to do it much faster to reach there. Greed infact overcomes the fear.

Neurophysiology takes an extra mile in explaining what make the mind to become such a greed or fear mind. What are likely symptoms for that state of mind in short run and implications in long run.

Take the case of traditional Indian Ayurveda, when a person is suffering with fever – a part from giving medicine, such person is advised to go on fasting and take complete rest without body movements. For every activity like digestion, improving the immune system to fight against the virus, or even for natural needs energy is consumed. So when a person is on fasting, total body energy will be dedicated towards improving of immune system and recovery shall be fast. Modern day sciences, especially neuroscience also accepts that if mind belives then body relives. This can be explained by an experiment, where a dummy capsule is given as pain killer, patients used to say a small amount of recovery is there. This called placebo effect in western medical practices.

Neurophysiology of Risk taking - Hormones and their roles

Hormones are the chemical messengers that create a feel in mind. A feel of hunger, thirst, short of oxygen, sensation of heat or cold are all the results of chemical messenger communication between mind and body. Neurophysiology believes that risk taking attitude is also the impact of hormones at various stages of human life cycle.

Steroids – a special class of Hormones in the sense that they can send multiple messages at a time. They are very powerful in the sense that they can alter growth, shape, metabolism, immune function, mood, memory etc at time. This is the very reason for prohibiting these steroids in sports.

Types of Hormones / Steroids

Dopamine and Testosterone : Dopamine is the important hormone that sends message of satisfaction. A person after having a `1000 net earnings from a day's trading will have increased dopamine content in his blood for a short while. This state of mind is called euphoria. When the investor continues to do so for further few days, dopamine levels produced in diminishing rate. That means in order to have the same satisfaction level, humans need more dopamine release in the body to signal satisfaction in the mind. This feedback loop increases the risk taking attitude, as more of dopamine is needed to get same amount of satisfaction.

Disadvantage:

An alcoholic or smoker does not care the statutory warnings (i.e prefers to take risk) because levels of dopamine release from nicotine or Cocaine are many folds then taking food or any other normal pleasure giving activity. Thus excessive risk taking attitude through continuous trading can disrupt the normal euphoria levels to reach a clinical mania stage where medical intervention may be needed. Testosterone is similar to dopamine but acts like a steroid, so excessive risk taking with spontaneous decisions is quite possible with those traders having high levels of testosterone.

Dopamine scale

Food	+ 50%
Sex	+ 100%
Nicotine	+200%
Cocaine	+400%
Amphetamine	+ 1000%

Adrenalin and Cortisol :

These are the hormones responsible for body responses to fear. Even though market ups and downs are common, human minds ability to use rationality is highly questionable. Adrenalin creates fear, change in facial expressions, increase in heart beat etc. With a decision being take (fight or fly) these hormone impact restores to its balance. But when there is continuation of the fear (or) stress there will be release of Cortisol levels in the blood which can in long run lead to depression requiring medical treatments.

A traders feelings infront of a falling SENSEX is equivalent to that of a deer in front of a lion. Adrenalin is produced immediately to help body movements needed at that time.

The stress response like elevated heart rate, elevated blood pressure, elevated blood sugar levels, Sweating, Goosebumps, sudden urgency for urination or stooling are all the results of release of adrenalin. All these body reactions are needed for deer to escape from lion by running faster. But fact of most importance is fear or stress in normal life last for few minutes to days, but in financial markets, its long lasting, hence traders are highly vulnerable to Cortisol releases in blood in long run leading to depression.

Vagus nerves / Vagal brake / Response: Our physiological systems for defense are all wired together. Thus, we often experience simultaneous increases in heart rate, rapid respiration, sweating and muscle tension, all systems that need to be brought on line in order to protect ourselves in situations of threat. This is again the defensive system known as the sympathetic nervous system. However, when we activate the alternate

system the impact is more calming (parasympathetic nervous system). Those responses are also wired together. Thus, if we can change one variable in that system, we can typically change the functioning in other areas. Since management of breathing is by far the easiest of those four systems of control, many techniques for breathing have been developed to help increase the involvement of the more common parasympathetic response.

The three types of situation that elicit a massive psychological stress response are "novelty, uncertainty and uncontrollability", according to Coates. In market terms, he found that cortisol levels rose substantially with the volatility of the markets and that as the variability of traders' P&L rose, so too did their cortisol levels.