

# HOW PSYCHOLOGY AFFECTS DECISIONS IN CORPORATE FINANCE: TRADITIONAL VS. BEHAVIOURAL APPROACH

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## Abstract

The aim of this research is to draw a theoretical line to connect on a common conceptual base, behavioural finance with what is internationally known as Modern Finance. The debate often involves discussions about the prevalence of rationality over irrationality. This paper will address mainly two questions: as an economist, should I propend for traditional or for behavioural finance? And, perhaps more important, are they in opposition to each other? Linking the principles upon which the traditional theory of finance is based to behavioural finance appears also to be useful to better understand recent global turmoil in the world financial system. In finding such links, behavioural finance studies will help on driving research to define market models much closer to reality than they are today. Thus literature recognition will be carried out, starting from the most important contribution to fundamental analysis, value theory, going through modern portfolio theory and efficient market hypothesis to seminal contributions on behavioural finance, reaching recent findings of Neuronomics, in order to establish some common theoretical base in corporate finance studies.

**Keywords:** Behavioral Finance, Rationality, Efficient Markets, Cognitive Biases, Heuristics

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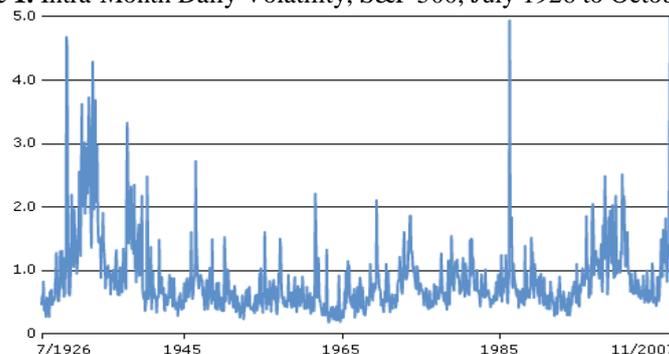
## Introduction

The global financial crisis started to show its effects during late spring of 2007, developed in 2008 and hasn't yet finished to exploit its full effects. Stock markets have fallen, large financial institutions have collapsed or been bought out, and Governments all over the world have been involved in rescue packages to bail out their financial systems and their real economies.

In one way, orthodoxy sees the market turmoil as a combination of sudden fluctuating changes in expected cash flows, and quick variation in investors'

risk aversion, both leading to changes in expectation on returns (involving discount rates for expected cash flows). Nevertheless in traditional theory, both effects can be interpreted as rational. A change in volatility, by itself, says nothing about market efficiency. It is, however, very interesting to inquire the reasons of the size volatility of expected cash flows and expected returns displayed in the past few month, and this requires a much longer and articulated analysis than simply recalling Efficient Market Hypothesis precepts.

**Figure 1.** Intra-Month Daily Volatility, S&P 500, July 1926 to October 2008



Source: Fama, E. F., & French, K. R. (2008 December, 19)

In the past twenty years, and even faster in the latest ten, the world experienced a progressive reduction of boundaries and, although this led to a recrudescence of nationalisms, particularly in emerging Countries, financial resources have started to flow through markets and territories, looking for alternative and worthy allocations. At the same time the amazing development of digital technologies helped agents to operate in a much wider and more crowded market than ever before, in this similar to the Marshallian model of perfect competition market.<sup>19</sup>

Such operational conditions suffered several bugs due to relevant discrepancies in regulatory systems throughout Countries. Nevertheless financial markets evolved rapidly toward a global one in which enormous amount of money found a variety of new financial products and started to follow high expected returns, often regarding less of risk profile. This way numerous markets appeared rather similar to a single globalized market. The size of it, the trading volumes, and the number of agents, made it similar to an efficient market, except perhaps for availability of relevant information, rationality of agents' behavior, lack of ethic and some differences, bugs and contradictions in regulatory systems.

Such environmental conditions had a role on putting behavioural finance as a direct opponent to traditional theory, frequently leading to generalizations and misinterpretations. At the same time, the evidence against market efficiency from the long-term return studies appear significantly fragile and anomalies as methodological illusions.

Thus, the debate on the theory of behavioural finance too often turned into a debate on Efficient Market Vs Inefficient Market Hypothesis. In this sense behavioural finance would appear as a simple observation of common and systematic mistakes, still remaining embedded in the traditional theory framework, while more rigorously, it should not.

However, field observation, as well as everyone's experience, shows a different picture. No one can consistently apply rational logical principles to everything he or she does. Effort cognitive costs often exceed benefits, while theorems rarely contain such errors. Nevertheless bounded rationality imposes severe limitations on our capacity to develop economic theories much earlier than it does on our economic behaviour and this is why too often at various levels, requests for new rules are addressed.

### Corporate Finance Orthodoxy

Corporate finance has, over decades developed a relevant number of theories and models. These have been accepted by scholars and became established

part of the discipline when fitting contemporary four fundamental ideas:

- value enhancement;
- financial value of time;
- opportunity cost of capital;
- risk/return relation.

Whenever the idea of value is involved, too often is omitted to recall the fundamental meaning the term has in corporate finance. At the same time most theories consider value enhancement as a natural, spontaneous and assumptive economic behavior. Not always this happen to be true: creating new value can be quite a difficult activity and the search for value very easily turn into a search for shortcuts and these, as such, create fertile conditions for mistakes.

Although value enhancement is unanimously considered the most rational thing to do, not always it seems to be a top priority in managers and investors' mind. As we read financial analysts reports or top manager's forecasts, quite often we perceive them as people who seem to know very precisely the price of everything, but the true value of nothing, to say it with Oscar Wilde.

At the same time if we go back over recent events in financial world, we see agents behavior fitting the famous "bigger fool theory of investing": the value of an asset is irrelevant as long as there is a "bigger fool" willing to buy the asset from them. In recent time many strategies were laying on such a base and by the end of 2008 everyone was clearly put aware of how dangerous this can be when time to sell suddenly comes and you may not find bigger fool investors when you most need them.

An obvious statement of value theory is that no one should be willing to pay for an asset more than it worth. Investors should not act under the pressure of emotional reasons; financial assets are acquired for the expected cash flows, consequently, perceptions of value have to be backed up by reality, which implies that prices should reflect the present value of those expected cash flows. It does not really matter how obvious this statement sounds, it is also the most forgotten and eventually rediscovered, usually when is too late.<sup>20</sup>

Value has three fundamental attributes that all together help to define its nature:

- Relativity
- Dynamicity
- Instability

"Relativity" lay on the fact that valuation cannot be considered more objective than it is the esteem of the elements needed to calculus, by definition subjective. Although quantitative models are used in valuation processes the inputs leave plenty of room for subjective judgments. The final value we obtain from these models is therefore affected by all the bias put into the process by valuator. Further argument is

<sup>19</sup> Fabozzi, F. J., Modigliani F., Jones, F. J. & Ferri M. G. (2002). *Foundations of Financial Markets and Institutions*. Pearson Education, New Jersey.

<sup>20</sup> Cfr. Damodaran, A. (1997). *Corporate Finance, Theory and Practice*. John Wiley & Sons, Inc. New York..

that too many times prices get set first and valuation follows.

One very important source of biases is given by subjective goals of the valuator. Such goals can be very strong on conditioning the whole process and the result can sometimes be very far from reality.

“Dynamicity” recalls the fact that value is determined as a differential quantity from time to time, considering normal corporate variations in fundamentals. Such variations create or destroy expectations on cash flows and affect value. Clear enough, environmental and corporate instability give quite a bit of volatility to possible results.

Deriving from the two aspects mentioned above, “instability” largely depend on environmental complexity and variability, which largely influence expectations on future cash flows and, as a direct consequence, value drivers. All this being said, thinking to value simply in terms of positive cash flows or, and this would be even worse, in terms of positive earnings, would be quite an error, easily leading to severe mistakes in investing decisions.

Financial value of time directly descends from Irving Fisher theory of money and Interest.<sup>21</sup> Fisher theory states that the market pure rate of interest represents the trade-off for an individual between present goods consumption and future goods consumption. Put it differently, a surplus agent decide to spend money in present goods or save it and eventually invest it, if the sacrifice is compensated by the market rate. At the same time deficit subjects will borrow money for their investments and consumption if the cost of loans is coherent with expected returns of investments.

The size of interest rate, as J.M. Keynes positively argued in 1936,<sup>22</sup> strongly depend on the interaction between the supply of money and the public aggregate demand for holding money. Holding money make possible to carry immediate transactions and although it does not pay any interest, the demand for money is a negative function of market interest rate. This happens because at low rate people hold money simply because they lose little pay-offs, while keeping the possibility of immediate transactions, at the same time the risk for a rise of interest and a consequent downturn in the value of bonds discourage individual investors to hold such securities. On the other side, when high rates dominates the markets, households prefer to have their money put in bonds, since they would lose much money as interest pay-offs and, in case of decline of rates, bond's value would raise significantly. These are the main arguments provided by theory that allow

considering financial value of time as one of the main pillars in corporate finance.

It was in the fifties that Franco Modigliani and Merton Miller introduced in the theory the idea of the relevance of opportunity cost of capital in what is well known as proposition one of their theory and the important relation between risk and return in the proposition two.<sup>23</sup>

With their work MM overcame Keynes' idea that individual chooses their investment having in mind a single parameter: public bond's yield. The opportunity cost of capital is defined as the weighted average cost of all sources of capital for the investor, who will properly consider each source of capital in terms of its contribution to risk profile.

During the same years, Harry Markowitz,<sup>24</sup> having in mind the idea that rational agents are in general risk adverse, demonstrates that they will choose investments considering exclusively their expected returns and risk profile, in this asserting the absolute relevance of risk/return relation. During the sixties many economists worked on a correct definition of the financial market and achieved some important results on interpreting its functions,<sup>25</sup> and defining models able to price assets in competitive markets.<sup>26</sup>

Taking advantage of such a robust theoretical corpus, in 1970, Eugene Fama present his Efficient Market Hypothesis,<sup>27</sup> which will soon become an established theoretical framework and the base for interpreting real markets functioning. He, together with Kenneth French, started also the type of scientific investigation that will be known as event

<sup>21</sup> Cfr. Fisher, I. (1930). *The Theory of Interest Rate*. Macmillan, New York and Fisher, I. (1907). *The Rate of Interest*. Macmillan, New York.

<sup>22</sup> Cfr. Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*. Harcourt, Brace & World, New York.

<sup>23</sup> Cfr. Modigliani, F. & Miller, M.H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review*, Vol. 48.

<sup>24</sup> Markowitz, H. (1952). Portfolio selection. *Journal of Finance*, vol. 7, No. 1, 77-91; Markowitz, H. (1952). The utility of wealth. *Journal of Political Economy*, vol. 60; Markowitz, H. (1959). *Portfolio selection: Efficient diversification of Investments*. Yale University Press, New Haven.

<sup>25</sup> Tobin, J. (1958). Liquidity Preference as Behaviour towards Risk. *Review of Economic Studies*, vol. 25; Tobin, J. (1984). On the efficiency of the Financial System. *Lloyds Bank Review*.

<sup>26</sup> Sharpe, W. F. (1963). A simplified Model for Portfolio Analysis, in *Management Science*; Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Condition of Risk. *Journal of Finance*; Sharpe, W. F. (1970). *Portfolio Theory and Capital Markets*. McGraw-Hill, New York; Sharpe, W.F., & Alexander, G. (1990). *Investments* (fourth edition). Prentice Hall, Englewood; Mossin, J. (1973). *Theory of Financial Markets*, Englewood Cliffs, N.J. Prentice-Hall; Lintner, J. (1965 February). The Valuation of Risk Assets and the Selection of Risk Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*; Lintner, J. (1971 December). The Effects of Short Selling and margin Requirements in Perfect Capital Markets. *Journal of Financial and Quantitative Analysis*.

<sup>27</sup> Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, vol. 25, 383 – 417.

studies. Event studies became very soon a very common and useful type of analysis and many important results were achieved over years.

### **Rationality, efficiency and social behaviour**

Theory, as seen so far, is basically a theory of rational behavior. Rationality is, in fact, essential for all traditional models to hold. We all know by now though, that bounded rationality is a characteristic of human brain, something that we simply can't do without. Since 1957 economists start to consider the idea of bounded rationality.<sup>28</sup> According to this new view, human choices don't necessarily follow a maximizing utility function, the decision problem imply choices among different utility functions and rationality limits appear on the selection of such multiple functions and in setting up their hierarchies, since the economic one don't seem to be the only relevant criteria.

Brain limits and time consuming processes impose to individuals to employ part of the available time to find shortcuts and define rules of thumbs to deal with complex problems, rather than analyze, under a strict rational framework, every single aspect of the problem, in order to eventually accomplish an optimizing result, too late to be useful. This way rationality started to be perceived not in terms of optimum results, but in terms of logic of processes. In this sense, processes need to be designed in order to economize the scarce mind capacities of human brain.

Put it differently, the idea that rationality pushes toward maximization of economic utility, limits in itself optimization possibilities of the utility functions system. In other words, rationality limits itself, in order to be able to work reasonably, and such limitation generates a self-evident contradiction:

### **Rationality Exclude Optimization**

However rationality, as a pure theoretical concept, simplify the idea of economic behavior and, this way, make much easier economic models drawing.

In such a framework is supposed to operate the *homo economicus*, an ideal agent who has as many competences as possible and a very strong logic capacity to evaluate what is relevant and better, at any moment, to make the proper decision, in order to solve a certain problem (i.e. the selection of a portfolio).<sup>29</sup> This approach took scholars directly to consider rationality as a characteristic of intelligence, in this way considering it as mere capacity to carry

out calculations. Intelligence flexibility derive instead from brain capacity to rule its functions and to set rules to enhance other rules at different levels. Such capacity allows the brain to produce original solutions to problems never faced before, and that had never been resolved before. Such processes require few simple rules to ignite itself.<sup>30</sup>

Rationality should therefore be interpreted in terms of appropriateness of consequences of decision making which depend upon four main aspects:

- Created alternatives;
- Expectations for each alternative and related probability;
- Preferences;
- Decisions' rules.

Appropriateness imposes to examine choices in a social framework (i.e. the financial market) that limits, evaluate and eventually reject or approve solutions. The social framework ensures an external level of control and gives more strength to decision making, legitimating it.<sup>31</sup> The agent has however to define his subjective level of risk acceptance, but in his/her approach to risk and inability to properly recognize and measure it, set the mainstream of cognitive biases.

Efficient Market hypothesis has been very successful because states a very simple idea: markets are efficient, and have very simple arguments to prove it. A preminent scholar in this field is Gene Fama<sup>32</sup> who in 1970 sat-up an important definition of efficient market, as one where security' prices incorporate all available information. By this definition is therefore impossible to systematically beat the market for any agent, since his/her information is at the same time possessed by all others. Since they have all relevant information, they all evaluate correctly securities.

However, even possessing information, investors in such a market have about fifty percent of probability to beat the market and this makes irrelevant professional capacities. He bases this idea on three arguments:

1. Agents are and act rationally;
2. Whenever they wouldn't act rationally, errors would display a random distribution and the overall effect would be sterilized;
3. If this would not happen sophisticated investors (arbitrageurs) would recognize anomalous market patterns and would take easy advantage out of it. In doing so they would quickly bring prices back to equilibrium.<sup>33</sup>

<sup>28</sup> Cfr. Simon, H. A. (1955 February). A Behavioural Model of Rational Choice. *Quarterly Journal of Economics*, vol. 69; Per un'analisi della letteratura sul tema si veda anche Piras, L. (1995), Alcune considerazioni sui processi decisionali nelle organizzazioni, in *Annali della Facoltà di Economia dell'Università di Cagliari*, nuova serie, vol. 8, Franco Angeli.

<sup>29</sup> Cfr. Lange, O. (1945-1946). The scope and methods of economics, in *The Review of Economic Studies*, vol. 13 (I), n. 33, 19-32. Markowitz, H. (1959). op. cit, Yale University Press, New Haven.

<sup>30</sup> Cfr. Hofstadter, D. R. (1984). Gödel Escher, Bach: un'eterna ghirlanda brillante, Adelphi, Milano, p. 28.

<sup>31</sup> In this sense see March, J. G. (1994). *A Primer on Decision Making: How Decisions Happen*. The Free Press, New York.

<sup>32</sup> Fama, E. F. (1970). Efficient capital markets: A review of the theory and empirical work. *Journal of Finance*, vol. 25, 383 – 417.

<sup>33</sup> Fama's work is part of well known "Random Walk Theory" already explored at the beginning of XX<sup>th</sup> century by Louis Bachelier in 1900, Holbrook Working in 1934, Alfred Cowles in

Therefore, traditional theory is meant to be “The theory of rational behaviour [...] a study of the principles upon which a rational man would act. This rational man is unlike you and me in that he makes no errors in arithmetic or logic in attempting to achieve his clearly defined objectives. He is like you and me, on the other hand, in that he is neither omnipotent nor omniscient. He must make decisions, such as the selection of a portfolio, in the face of uncertainty. Since his information is limited, he may take less than perfect actions. Since his power are limited, his achievement may fall short of the best conceivable. Every action however, is perfectly thought out; every risk is perfectly calculated”.<sup>34</sup>

In other words, rational people do make mistakes; such mistakes display though a random distribution and can be studied statistically to measure their probability. In efficient markets this mean that expected returns will be usually coherent with their long run risk profile, while some even significant deviation can be observed in short time horizon.

Still markets, as social institutions, are the result of conscious deductive processes of human reason. As such, they are intended to emerge from a deliberate creation of consciousness. This idea implies rationality as a basic tool of consciousness. In this sense, economic behaviour is definitely a social behaviour.

A frequent misinterpretation of behavioural finance is perceiving it as a direct opponent to traditional theory, this one intended as a theory of efficient market behaviour, while the first as an empirical evidence of the failure of such a theory.

At the same time, brilliant researchers all over the world keep on declaring their loyalty to EMH considering the fact that behavioural finance hasn't yet proposed any market model likely to have the same elegance, strong theoretical framework and general applicability as the traditional models do. The bottom line seems to be represented by the fact that the evidence against market efficiency from the long-term return studies appears significantly fragile and anomalies as methodological illusions.<sup>35</sup>

The on-going debate, although very useful on helping to improve theoretical understanding of market behaviour, does not necessarily involve behavioural finance and, sometimes, leads to extreme

positions and assumptions, which seem very much arguable on both sides.

Markets' inefficiency is, in fact, perfectly explained by EMH, although traditional models do not help much on predicting neither the moment in which biases will appear, nor their intensity, nor for how long their effects on prices will last.

In this sense behavioural finance would appear as a simple observation of common and systematic mistakes, still remaining embedded in the traditional theory framework, while more rigorously, it should not.

Much more appealing to me is an image reported by Vernon Smith in his Nobel Prize Lecture in 2002, in which he doesn't oppose rationality to irrationality but uses Constructivist and Ecological rationality. That is to say that quite often and virtually in every aspect of their life, individuals must make decisions under uncertainty constraint, basically for lack of time or for incomplete information and, of course, for lack of ability. These are – he says – “fast and frugal decision making.” Such decisions are “ecologically rational to the degree that they are adapted to the structure of an environment.” Moreover, even in the past, economists argued that the values to which people respond are not necessarily confined to those one would expect, based on the narrowly defined canons of rationality. Individuals define and pursue their own interest in their own way, it is, this one, an “ecological expected utility”, to use Vernon Smith figures, that leads to a new smoother concept of “economic man”.<sup>36</sup>

### Behavioural Finance and critics to EMH

Behavioral Finance can be considered as part of a larger field of studies, known as Behavioral Economics. Using interdisciplinary approach and experimental techniques normally employed in sociology, psychology and, as we will see, Neurobiology, it tries to integrate traditional models in order to better explain agent's systematic errors and behavioral anomalies. Saied it differently, it studies financial markets' dynamics considering the idea that agents may not act that rationally after all.

Thus, the main object of interest is the study of decision making when agents show limits and troubles typical of human nature. In doing so a strong critic to Efficient Market Hypothesis rises.

It was around mid '80s when first critics to the most solid theories up to that time appeared in literature.<sup>37</sup> At that time scholars were concentrating on empirical analysis of discordances between expectations based on EMH and facts. In 1986 Fisher Black found that investors act more frequently than they are supposed to on rumours, rather than on

1937, Clive Granger e Oskar Morgenstern in 1963 and Paul Samuelson in 1965.

<sup>34</sup> Markowitz, H. (1959). *Portfolio selection: Efficient diversification of Investments*. Yale University Press, New Haven.

<sup>35</sup> an efficient market generates categories of events that individually suggest that prices over-react to information. But in an efficient market, apparent underreaction will be about as frequent as overreaction. If anomalies split randomly between underreaction and overreaction, they are consistent with market efficiency”. See Fama, E.(1998). Market efficiency, long-term returns, and behavioural finance. *Journal of Financial Economics* 49, 284.

<sup>36</sup> Cfr. Smith, V. L. (2002 December, 8). *Nobel Prize Lecture*.

<sup>37</sup> Cfr. Jensen, M. (1978). Some Anomalous Evidence Regarding Market Efficiency. *Journal of Financial Economics*, vol. 6.

concrete information. It was then that the expression noise traders started to be used (Cfr. Black, F. (1986). Noise. Journal of Finance, vol.41).

Acting this way, investor tend to sell too early good securities and too late bad ones, at the same time they tend to buy on voices or on too recent prices rather than on fundamental values. It is then possible to set taxonomy of these behaviors in three main categories (Cfr. Kahneman, D., & Ripe, M. (1998). Aspects of investor psychology. Journal of Portfolio Management, vol. 24):

- a) Attitude toward risk;
- b) Non-Bayesian structure of expectations;
- c) Strong influence of how problems are presented on decision-making.

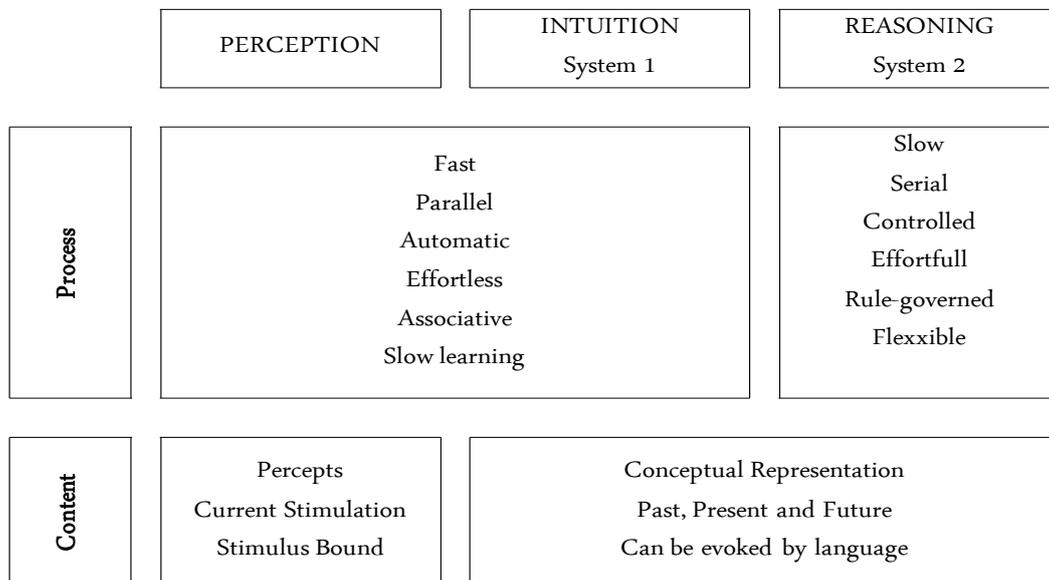
Daniel Kahneman and Amos Tversky first noticed these problems (Kahneman, D., & Tversky, A. (1973). Prospect theory: On the psychology of prediction. Psychological Review, vol. 80; Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decisions under risk. Econometrica, vol. 47) in 1973 and later in 1979 when they proposed, in their seminal studies, the Prospect Theory.

Prospect Theory investigates how individuals do carry their mind processes to forecast future events

when money is involved. Studying intuitions thoughts and preferences that come to mind quickly and without much reflection, they found three major topics: a) heuristics of judgment; b) risky choice; c) framing effects. Thoughts differ in a dimension of accessibility; some come to mind more easily than others, and drew a distinction between intuitive and deliberate thought processes. They also found that even experts and professional were subjected to such errors.

According to Kahneman and Tversky it is therefore necessary to distinguish between intuition and reasoning. The perceptual system and the intuitive operations tend to generate impressions about objects' attributes. These impressions are not voluntary and don't need to be verbally explicit. On the other hand, judgments are always explicit and intentional, whether or not they are clearly expressed. Of course reasoning is involved in all judgments, whether they turn in impressions or in deliberate reasoning. Judgments directly reflecting impressions are those we usually refer to as "intuitive". One of the functions of reasoning is to monitor the quality of both mental operations and explicit behavior.

**Figure 2.** Distinguishing between institution and reasoning



Source: Daniel Kahneman, *Nobel Lecture*, 2002

Just as Herbert Simon said, problems don't exist in Nature. They are direct consequences of mental models our brain uses to collect and organize information. Mental models frame rules and criteria used in decision-making, therefore choices are

extensively bent by how information are collected, organized and presented.<sup>38</sup>

<sup>38</sup> "For example, investors may extrapolate short past histories of past earnings growth of some companies too far into the future and therefore overprice these glamorous companies without a recognition that, statistically speaking, trees do not grow to the sky. Such overreaction lowers futures returns as past growth rates fail to repeat themselves and prices adjust to more plausible valuations". A. Shleifer

Having in mind the basic ideas above exposed, it is easier to go through the most frequent cognitive mistakes individuals face in their every day decision-making. Field evidence demonstrates that cognitive biases are systematic and mostly uncontrolled deviations from rationality. They are not always or necessarily mistakes. Often they simplify processes, by reducing complexity of mental work, thus freeing extra calculation capacity. Such distortions in rational thought involve, obviously, most human activities, but they are particularly significant in all decision making concerning the use of money. For taxonomic reasons are useful to set two main categories, each containing several types, as a mere example some can be listed:

- Biases
  - o Overconfidence
  - o Excessive Optimism
  - o Confirmation Bias
  - o Illusion of control
- Heuristics
  - o Representativeness
  - o Availability
  - o Anchoring
  - o Affection

Among mentioned, most frequent and relevant in its consequences is overconfidence. An individual display overconfidence, and often a subsequent excessive optimism, when exaggerate trust in his own judgment, predictions capacities and more general abilities. Overconfident people tend to overestimate positive chances and their ability to control events, underestimating risk associated to preferred options and neglecting to properly consider possible drawbacks and their probability distribution.

Sometimes overconfidence tend to characterize rather homogeneously professional groups. People in such groups acquire such an attitude, displaying arrogance and complacency, often not accepting ideas and opinions coming from outside their group. Typical mistakes related to overconfidence are the above mentioned illusion of control; tendency to projecting the immediate past into distant future; drawing conclusions from a limited sample size; confusing familiarity with knowledge.

Heuristics also leads to frequent mistakes in decision-making. Typical and frequent are:

- Herd-like behavior (social proof), consisting in believing that the crowd is omniscient and, therefore, right;
- Seeing patterns that don't exist, either embracing certainty (however irrelevant) or, on the other hand Overestimating the likelihood of certain events based on memorable data or experiences;
- Fears connected to changes in important aspects of life (status quo bias), of

uncertainty, deriving from information overload or from the existence of too many attractive options (Candy Store Bias) that paralyzes the decision maker;

- Reluctance to admit mistakes and excessive aversion to loss;
- Regression to the mean and ex post overestimating predicting capacity or a tendency to seek only information that confirms one's opinions or decisions;
- Mental accounting.

All the above mentioned expressions of irrational behavior and, perhaps more explicitly, their frequency, are positive arguments in favor of EMH critics:

- Investors do make mistakes
- Their mistakes are quite often positively related to each other.

In other words, not only agents are not rational as much as traditional theories assume, they also frequently are irrational in the same way<sup>39</sup> and sophisticated trader don't seem to have the power, capacity and risk attitude required to bring prices back to equilibrium. Such behavior is clearly held by professional investors as well.<sup>40</sup> Mutual funds and other professionals tend to lean too much toward their benchmarks, like S&P 500, in order to reduce the risk of being beaten by the market. In doing so they often sell securities or buy them for the only reason that they enter or exit the index.<sup>41</sup> Arbitrageurs don't seem to find as easily and frequently adequate substitutes securities to carry safe short sales.<sup>42</sup>

Many studies over years highlighted several anomalies in investors' behavior, regarding less their professional skills,<sup>43</sup> weakening, in doing so, the idea

<sup>39</sup> Cfr. Shiller, R. (1984). Stock prices and social dynamics, *Brooking Papers on Economic Activity*, vol. 2.

<sup>40</sup> Cfr. Lakonishok, J., Shleifer, A., & Vishny, R. (1992). The structure and performance of the money management industry. *Brooking Papers on Economic Activity Microeconomics*, 339-91.

<sup>41</sup> Cfr. Scharfstein, D., & Stein, J. (1990). Herd behavior in investment. *American Economic Review*, vol. 80.

<sup>42</sup> Cfr. Campbell, J.Y., & Kyle, A. (1993). Smart money, noise trading and stock price behaviour. *Review of Economic Studies*, vol. 60; "These broad classes of securities do not have substitute portfolios, and therefore if for some reason they are mispriced, there is no risk less hedge for the arbitrageur. An arbitrageur who thinks that stocks as a whole are overpriced cannot sell short stocks and buy a substitute portfolio, since such portfolio does not exist. The arbitrageur can instead simply sell or reduce exposure to stocks in the hope of an above market return, but this arbitrage is no longer even approximately risk less, especially since the average expected return on stocks is high and positive". Shleifer, A. (2000). *Inefficient Markets: An introduction to Behavioural Finance*, Op. cit., 14.

<sup>43</sup> Cfr. De Bondt W. F. M., & Thaler, R. (1985). Does the market overreact? *Journal of Finance*, vol. 40; Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: implication for stock market efficiency. *Journal of Finance*, vol. 48; Siegel, J. (1993). *Stocks for the long run*. Mc Graw Hill, New York; Shleifer, A. (2000). *Inefficient Markets: An introduction to Behavioural Finance*, Op. cit., 19;

(2000). *Inefficient Markets: An introduction to Behavioural Finance*. Oxford University Press, Oxford, 11.

of market efficiency and agents' rationality. Grouping incoherent behaviors we can have three main categories:

- a) Bounded rationality as proposed by Herbert Simon explaining limits in human brain ability in problem solving;
- b) Limited, if existing at all, capacity to predict future events leading to choices with negative long run output;
- c) Limited capacity to pursue self-interests, often in favor of other individuals.

The strength of evolutionary theory, stating the interaction between market's dynamics and learning processes drive events in the same direction predicted by models, is therefore reduced by field evidence that most irrational behavior do not provoke adequate reactions in the market. Even the idea that fools rapidly lose their money, doesn't appear to meet reality, since the increasing size of internationalized markets keep on providing new fools to irrational trading.<sup>44</sup>

Learning from experience seems not to be an easy accomplishment either. Learning can be costly in terms of effort and time consuming, nevertheless in complex environments like financial markets seeking experience can be a vain effort for agents never getting to learn the right thing by the right time.<sup>45</sup>

Summing up what stated so far and viewing the financial market as a non-personal device likely to work as supposed by traditional models, any deviation from the model is a mistake. Deviations are though represented by transaction costs, fiscal policies and irrational behaviors.<sup>46</sup> Thus market is influenced by human (fallacy) actions having different origin and experience level, here meant as the result of past mistakes, no models can so far capture and explain such complexity in every possible scenarios. This is though what create possibilities for carving out value.

If we consider the market more similar to a social system rather than to an hardware piece, we must expect that they will work in a rather similar manner. In social systems, information has an

economic value, since is not as available as the theory require.<sup>47</sup> We will therefore have that:

- a) Most valuable information will cost more;
- b) Useful information will be total information minus misunderstood information;
- c) Information value is a negative function of information diffusion.<sup>48</sup>

In this sense, economic behaviour is definitely a social behaviour. Neuroscience defines a social behavioural output as a function of online processing of social stimuli.<sup>49</sup> This leads to the consequence that a social behaviour, such as investing in the capital market, requires people to direct their attention to specific stimuli (information on investment fundamentals) coming from the specific environment considered (the capital market) and give meaning to them. Only after mentally ordering those stimuli investors can consider their personal utility function in terms of goals and expected returns and after calculating the outcomes associated with possible behavioural responses (coherent with the social environment) to decide on their personal response.<sup>50</sup>

This is why emotion has, for example, very strong and predictable effects on cognitions and decision processes. Emotional experiences engage sensible cognitive strategies that influence response selection.<sup>51</sup> People feeling good are more likely to engage in automatic cognitive process, react quickly, underestimate risk and focus on positive explanations when making decisions or judgements. On the other hand, when people are feeling bad, they are more likely to engage in effortful cognitive processes, react more slowly, overestimates risk and focuses on negative explanations when making decisions or judgements.

Interpreting the statement above in terms of EMH requires agents to have an information set and the capacity to use it by far more complete than could ever be given to one mind. Also, as Damasio demonstrates, because of the brain physiology, such a talented mind would be totally incapable to stop at an appropriate level the number of iterations needed to make a proper decision. This may cause the temptation in scholars to ignore this reality because it is poorly understood and does not yield to our familiar although inadequate modelling tools, and to

De Bondt W. F. M., & Thaler, R. (1987). Further evidence on investor overreaction and stock market seasonality. *Journal of Finance*, vol. 42; Fama, E., & French, K. (1992). The cross section of expected stock returns. *Journal of Finance*, vol. 42; Lakonishok, J., Shleifer, A., & Vishny, R. (1994). Contrarian investment, extrapolation and risk. *Journal of Finance*, vol. 49.

<sup>44</sup> Cfr. De Long, B., Shleifer, A., Summers, L., & Waldman, R. (1990 August). Noise Trader Risk in Financial Markets. *Journal of Political Economy*, vol. 98; Shleifer, A., & Vishny, R. (1997 March). The Limits of Arbitrage. *Journal of Finance*, vol. 52.

<sup>45</sup> Cfr. Shefrin, H. (2000). *Beyond greed and fear: Understanding behavioral finance and the psychology of investing*. Harvard Business School Press, Boston, USA.

<sup>46</sup> Cfr. Graham, B., Dodd, D. (1934). *Security Analysis*. McGraw-Hill, New York, 23. "Hopefully, future research will throw more light on the inner workings of the "voting machine" and make clear how market and individual decision making anomalies are linked."

<sup>47</sup> Grossman, S., & Stiglitz, J. On the impossibility of informationally efficient markets. *American Economic Review*, vol. 70, 393-408.

<sup>48</sup> Cfr. Maxwell, J. (1871). *Theory of heat*. Green & Co., Longmans, London.

<sup>49</sup> Cfr. Crick, N.R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, 115, 74-101.

<sup>50</sup> Cfr. Beer, J. S. (2007). *The Importance of Emotion-Social Cognition Interactions for Social Functioning*, in Jones, E. H. and Winkelman, P., *Social Neuroscience, integrating Biological and Psychological Explanations of Social Behavior*. The Guilford Press, New York, 15.

<sup>51</sup> Cfr. Levenson, R.W. (1999). The interpersonal functions of emotion, *Cognition and Emotion*, 13, 481-504.

proceed in the implicit belief that functions and curves capture what is most essential of what we observe.

Creating deliberately rules of action and being conscious of their effectiveness require to remain sensitive to the fact that most human decision making is not primarily guided, if at all, by conscious rationality. The brain has over millennia developed arrangement capacities and survival properties that take account of opportunity costs and environmental challenges, which are invisible –so far -, to any possible modelling effort.

Perhaps the most revealing example of what stated above is the role played by trust in social behaviour everywhere in the world, in different times and among all species socially organized. To trust someone imply the existence of an interpersonal link aimed to achieve an improved state compared to the status quo. Possible outcomes of a choice strongly depend on combined effects of others' choices and behaviour. Being impossible to adequately calculate all implications for each external stimulus, trust operates as a consistent simplifying factor for those calculi.<sup>52</sup>

In more simple words, trust seem to be a convenient shortcut for economic choices, but works somehow in the wrong direction when interpreted in a classical theory framework. If the idea of maximising subjective utility function is essential on coding economic rational behaviour and this because rationality imply correct logic and calculus, trust, which is nothing more than a quite often not very accurate esteem, has very little to do with precise calculus, and, as a direct consequence, with rationality. Still trust is an essential component of economic behaviour adding efficacy and efficiency in all cases in which contracts fail on considering every possible effect of misbehaviour.<sup>53</sup>

Putting it again as Vernon Smith does, "We have become accustomed to the idea that a natural system like the human body or an ecosystem regulates itself. To explain the regulation, we look for feedback loops rather than a central planning and directing body. But somehow our intuitions about self-regulation do not carry over to the artificial systems of human society. The actual shape we observe is the consequence of myriads of individual decisions."<sup>54</sup>

What appears really important to me is not to confuse rationality with selfishness, since standard models usually promote or require selfish behaviour. Still, as demonstrated by experimental economists, selfish behaviour is not necessarily prevalent in

common economic decisions and this seems to somehow contradict standard models. But when one actor' selfish behaviour is perceived as unfair (quite often I would say) by other actors, the latter may react, punishing such behaviour and such costly consequences should drive rational behaviour toward a non selfish attitude.

## Conclusions

In traditional corporate finance theory - and portfolio theory within it – price mistakes are an essential source for potential value or, in other words, in the period of time between the emerging of mispricing in the market and the correction by arbitrageur's activity, value can be created by some investors. Following EMH such dynamics must be interpreted in a statistical sense: market equilibrium must be intended in a long run framework and in a dynamic flexible way.

About the contribution of behavioural finance we study cognitive biases for their intrinsic interest and for their value as diagnostic indicators of mental mechanisms, in order to derive useful rules for interpreting and – eventually – predicting market trends. Choices are often affected not only by the four elements above mentioned, but also by contingent judgments about the scenarios, and the potential impact of each choice on the decision maker general frame of reference, in this considering previsions on the social adequacy of a choice and the forthcoming behavior.

Searching for links between the principles upon which the traditional theory of finance is based to behavioural finance, it is so far possible only to conclude that the latter will drive the research to define market models much closer to reality than they are today. Behavioural finance is, in fact, a study of errors. Errors and biases are such if seen in the frame of a correct theory. Therefore the correct theory should be the traditional one. In a theoretical dispute traditional theory of finance Vs behavioural theory of finance, the second loses.

Still considering the problem using a correct theoretical approach, the question of which theory prevail, should be answered referring to the four basic concepts above explained. Rationality is attractive to scholars since simplify models, but being a qualitative parameter can be used only to evaluate the adequacy of an individual decision, not very useful though to evaluate social behaviour such as those driving capital market dynamics. Also the adequacy of a decision largely relay on:

1. The number of alternative likely to be generated by individuals;
2. Expectations related to each alternative and associated probabilities;
3. Subjective preferences assigned to the values of possible results;
4. Rules used to make decisions.

<sup>52</sup> Cfr. Pelligra, V. (2007). *I paradossi della fiducia: scelte razionali e dinamiche sociali*, Il Mulino, Bologna.

<sup>53</sup> Cfr. Mill, J. S.(1848). *Principle of political economy*. John W. Parker, London; Arrow, K. J. (1974). *The limits of Organizations*. Norton. New York.

<sup>54</sup> Cfr. Smith, V. L. (2002). *Nobel Prize Lecture*, op. cit, here referring to Herbert Simon.

Traditional models remain extremely robust on their normative power, they also work properly on describing market behaviour in the state of normal competition, in which about one half of investors beats the market and the other half does worse, each part taking the correct amount of risk.

Traditional models usually suffer on predicting what can so far be considered anomalous behavior. In more simple words traditional models are blind to irrationality. Still irrationality occurs and, quite often, not in terms of a random walk. Furthermore, arbitrage isn't, most of the time, effective enough to bring order back.<sup>55</sup>

If behavioural finance studies errors and biases, it means that, somehow, individuals do not have full control of brain processes. Brain does a significant part of it's work automatically and largely outside of our awareness, while fooling the mind into making believe it is in control.

In drawing inferences from long-term returns Fama argues that market efficiency must be tested jointly with expected normal returns models. Such models for expected returns are though significantly incomplete descriptions of the systematic patterns in average returns during any sample period. As a result, he concludes, tests of efficiency are always contaminated by a bad-model problem.<sup>56</sup>

This is why we can possibly say that traditional theory is a correct but largely incomplete theory. This is also why we can possibly say that behavioural finance represents the best attempt to complete traditional theory, by observing and understanding rules people follow without being truly able to articulate them. Discovering those rules and learning how to derive them is the major task of experimental and behavioural economics. This would be of a great utility for what we could call a general theory of finance and this does not appear as an opposition to me.

We are probably way too far from the possibility to derive convincing conclusions from arguments addressed in this paper, being more pertinent the assertion that there is still much research work to be done. It is although possible to set some points likely to drive research toward further achievement.

First it is not useless to keep in mind the scientific nature of corporate finance theory as well as behavioral finance theory. In doing so every possible step forward will add value to the knowledge corpus, but it will not be possible to consider those steps as a significant falsification (as Karl Popper would had said) of classical theory until the point in which the fundamental concepts and principia of such a theory remain valid and convincing. In this sense behavioral and experimental economics have not yet, in my view, reached the point.

The hypothesis that prices fully reflect available information is a partial and faulty description of price formation. Following the standard scientific rule, however, market efficiency can only be replaced by a better specific model of price formation, itself potentially rejectable by empirical tests.

Alternatives must though specify biases in information processing that cause the same investors to under-react to some types of events and over-react to others. At the same time they must explain the range of observed results better than the simple market efficiency.

At the same time some questions should be addressed, regarding the possible evolution patterns of corporate finance theory and the capacity to understand agents behavior.

Do agents always search optimal strategies?

Do we have a better theory than EMH?

Is there a reliable measure of market Tobin efficiency?

Is there a reliable measure of market Fama efficiency?

What is the desirable strength of market efficiency?

How far can experimental psychology contribute to corporate finance?

How predictable is investor sentiment?

Will ever be possible to import mental frames and heuristics in an asset pricing models?

The possibility for economic models to embed all discussed elements face relevant obstacle on subjective behavioural complexity, primarily because rational behaviour and optimizing behaviour are no longer perfect conceptual substitutes. External constraints can for sure limit optimization strategies, but not necessarily rationality.

Making a decision need to adequately consider context variables, also because those variables determine the social endorsement of the choice, more important to individuals than evaluations expressed in terms of economic orthodoxy.<sup>57</sup> This idea would perhaps add a sort of a collective rationality to decision making, since external constraints provide a strong contribution in terms of experience. Rationality should then be valued not only in terms of efficacy (achievement of expected results) but also in terms of coherency with the environment.

Cognitive biases and deviations from rationality are not necessarily errors. They help the mind to work conveniently in a complex environment (i.e. the capital market). The more an environment is complex, the more frequent biases will appear, although not necessarily more relevant for the social system as whole. In this sense, the best way to manage uncertainty seems not to discover the truth, but to produce sense.<sup>58</sup>

<sup>55</sup> Cfr. Shleifer, A., & Vishny, R. (1997 March). The Limits of Arbitrage. *Journal of Finance*. vol. 52.

<sup>56</sup> Cfr. Fama, E. (1970). Efficient capital markets: a review of theory and empirical work. *Journal of Finance* 25, 383-417.

<sup>57</sup> Cfr. March, J. G. (1994). *A Primer on Decision Making: How Decisions Happen*. Free Press, New Haven.

<sup>58</sup> Cfr. Luckmann, T., & Berger, P.L. (1966). *The Social Construction of Reality*. A Treatise in the Sociology of

Personally, I have not found yet a convincing and conclusive answer to any of addressed questions, but I am realistically optimistic on the possibility behavioural finance will strongly contribute to. This is the reason why there is still a strong need for extensively and intensively study and teach behavioural corporate finance.

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