

INDIVIDUAL INVESTMENT DECISION MAKING PROCESS. BIASES AND REMEDIES

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Summary

In the pursuit of understanding the behavior of the market player, the basic argument relays on the supposition that the risk appetite increases exactly at the worst moment - when the capacity to assume additional risk decreases significantly. People view a sample randomly drawn from a population as highly representative and cvasi similar to the population in all its essential characteristics. They expect any two samples drawn from a particular population to be more similar to one another and to the population than is statistically justifiable. This behavior is different from the tenets of classic finance theory.

The article reviews some psychological concepts relevant and used in the study, in an interdisciplinary effort of understanding the correlation or causality between psychology and finance. The statistical interrogation describes the sampling methodology, the frequency of data and the empirical methodology that lead to analysis of the results and concluding remarks. The study provides details on raw statistical test scores, regression results and analysis. In this study, I evaluate the association between investors' behavior and her portfolio results. The paper aims at demonstrating whether investor psychological biases lead to investment performance to tilt to the mean in the long run.

Key words: Psychology, biases, efficiency, individual investment

Classification :

REL 5F, 5G, 5K, 7J, 7K,7L, 10B,10F

JEL: G11, G12, G14

1. The Introduction and the Study Context

The statistical interrogation of the study describes the sampling methodology, the frequency of data and the empirical methodology that lead to analysis of the results and concluding remarks. The study provides details on raw statistical test scores, regression results and analysis. In this study, I evaluate the association between investors' behavior and her portfolio results. In the research reported here investigated the market pattern zigzag to see any predilections or biases or a random walk. Analyzing the data for this study leads to the academically interesting conclusion that individual psychological biases and differences should not be confounded with noise within econometric models but rather manifest a solid influential role on the dependent variable – investment outcome. Data base source for the article shows that psychological characteristics have salient relationships with various aspects of investment decision making process making and the transactional activity of the individual investor.

The findings suggest that psychological biases can have an impact on risk return optimization, asset allocation on investment portfolios and finally on investment outcome. The sources of investor biases that lead to investor finance errors the investment management industry can apply the data for the development of products and services (automated pilot investing) that may help save investors from sabotaging their financial standing and future prospects. Also, new behavioral portfolio construction methods should combine evidently classic finance math with rigorously quantified psychological metrics to improve models for operators use in giving financial advice and crate investor portfolios that enhance investors chances for reaching their life time financial goals.

2. The Investor Bias

Human brain has a limited capacity to process, assimilate and understand the huge volume of information and stimuli that assault us every second. The decisions and judgments investors undertake daily (hundreds) are constrained by personal circumstances, time pressure, psychological and emotional factors, and are at the crossfire of a rational and non-rational influences. People often ignore a good decision for the simple fact that they are, in general, more interested by simple, reasonable and feasible solutions to their investment dilemmas.

The perception, especially when it comes to money, are distorted and biased by investment performance history, present circumstances and future expectations. Attitudes and decisions in the financial area are a cocktail of rational and non-rational motives. Investors reach a certain conclusion and implement the subsequent decision based on what they know at the moment, anchoring themselves in information considered relevant, losing the larger perspective. Financial decisions are sometimes suboptimal due to simplistic, heuristic and emotional logic. Through the basic feature of human nature of search for enjoyment, investors are attracted by interesting, colored and attractive information that conforms to their hard-embedded beliefs and creeds. The intuition plays a major role in the decision, but this can be detrimentally affected by its emotional logic attributes. Biased psychological and cognitive manifestations of investors affect distort their ability to approach financial decisions in a systematic logic. The investors are short sighted, but most of the value comes from long term investing. Behavioral biases drives markets booms and busts but bring some fun to life. One logical question debated in the manual is whether a behavioral managed portfolio can outperform, on a risk adjusted basis an actively managed investment. A behavioral approach would mean trading against the cycle of emotions, buying when others are panicked and selling when others are enjoying their new found fortunes. This tactic, however, does not answer to the most critical answers, how much, when, what if initially market short term trend proves you wrong? Why are these questions important? Because even an agile investor smartly decides to buy when the market falls abruptly, probably she will buy only a small amount, since it is so emotionally difficult to overcome fear of an extended correction.

Understanding biases can not only help an investor refine his investment strategy but also time markets. Predisposition and anticipation: We are either have a predisposition to a trend or anticipation of a reversal. This is a strong bias which affects an investor and keeps him subjective and emotional. The other guy: Market is not a casino, but only a few understand that even if know probability, there is a high chance that the counterparty is a compulsive gambler. Things became clearer, as times passed that it's not just about learning to drive the forecasting and calculated bet car, but also to take care of the reckless drivers on the capital market highway.

Peter Bernstein, economic historian says that for most of history, in terms of business decisions, the world was agricultural and risk was in weather. And we can't do anything about the weather. But when we got into capitalism in the 17th and 18th centuries and markets began to function, the risk has moved from weather to what will the other guy do? That's what the whole stock market is about. It's the other guy that not only brings risk to the system but also changes how markets work and function. Understanding his biases hence becomes key to success.

Biases are false judgment, which lack objectivity. And biases increase or enhance after real money is involved. These emotional fixations are driven by crowd emotions and are different from independent thinking. It has also to do with personal experiences. A failure or winning colours our investment approach to market. A failure makes us more risk averse, while a win makes us take more risk. One method is to get out of the market and reassess. Markets do not tolerate inflexibility. It trashes it. Removing a bias is difficult, because we are influenced by events and news around us. A study of history is a good technique. Frederick II, Holy Roman emperor and king of two Sicilies was a confirmed skeptic, refusing to accept data that he could not verify. It was in Frederick's court that Leonardo (Fibonacci) was interviewed on mathematical problems in 1220's when Europe was struggling with mathematical rationality and objectivity. An objective man in such times is an exception. The expert bias: Oil will go to \$200, Citi and GM are negative, Crisis is coming (going) could be some expert calls. First and foremost the experts appear late on the scene. Second, experts have bias too. But the problem is not just the experts, but our inability to really judge accuracy.

In time, all calls and forecasts are forgotten. And we don't really look for an expert to tell us something we don't know, we are more interested in him (her) telling things we know. It's like if you are an oil bull, the oil expert comments about \$200 per barrel will be more credible. Or for example financial sector meltdown is all over the place, the reason why the Goldman Sachs call on Citibank's negativity might be true. It's more about our preconceived positive or negative bias that we want to enhance, not even once challenging or questioning why these same experts did not tell us at \$40 where oil was heading or telling us way up in 2007 that Citi or GM stocks might crash. Once the stocks reach 10-year and 30-year lows, it's easy.

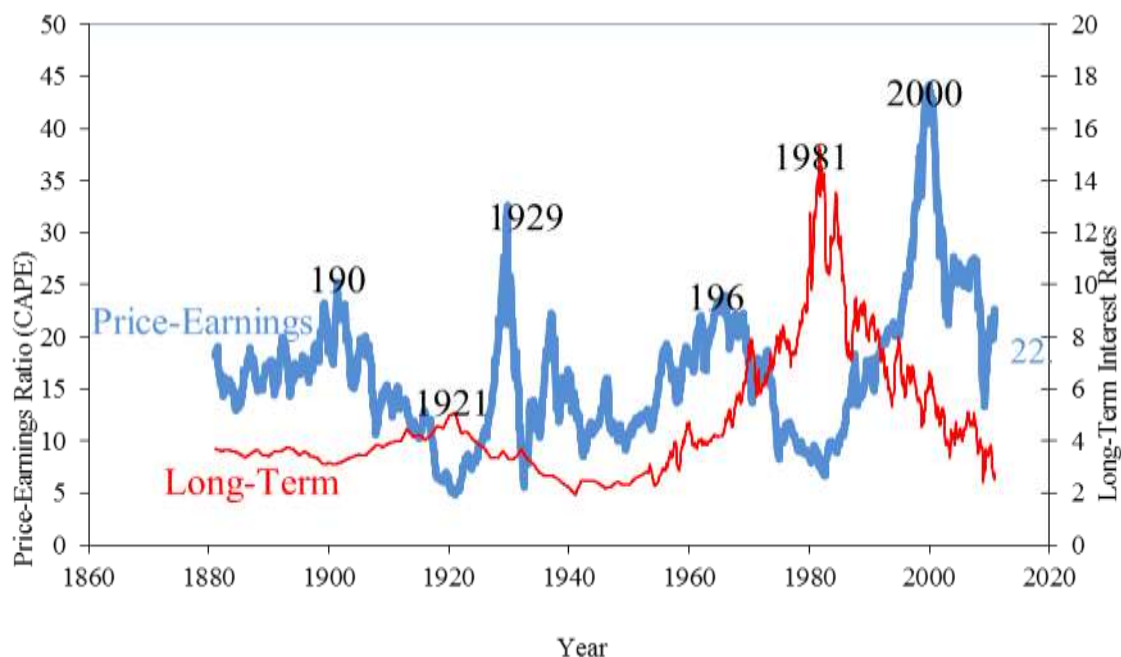
The permanent bias: Making money on trading is tough, or trading both sides of the markets are tough. As we suffer from certainty, linearity, straight line, extrapolation and positive bias. That is why brokerages are in business when markets go up and out of business when markets stagnate or go down. Their profile is linked with

market upside not downside. A majority of investor suffer from permanent bull bias – they like the positive stories.

Nature has no straight line, but if the stocks are going up today, they will go up tomorrow. If stocks are falling today, they will fall tomorrow are biases we don't challenge. It can also be called as the order bias. If there is order, things are correct and when there is chaos, it's the global economy, the interest rates, the food, oil, currency or politics. A majority of us suffer from a permanent bull bias. There are a few who thrive in falling markets, but there are few of them with permanent negative bias.

Event and cause bias: A cause is linked with an event, is a bias. If you have the right information, you can profit. The information arbitrage days are over. Knowledge creates a bias linked with overestimation of skills. Before and after we started the markets, the unknown was always greater than the known. And information and cause can never explain the event. The bias creates an illusion. Hamilton Bolton, a forecaster said that it is not the news but the construction placed on the news by the market that confirms the trend.

Figure 1: Robert Shiller's' Paper on 'The Volatility of Stock markets Prices'



The model of Bachelier was introduced to the new world of finance later in 1964 by Paul Cootner: "*The Random Character of Stock Market Prices*"¹. Robert Shiller's' Paper on '*The Volatility of Stock markets Prices*' published in 1987 uses dividend data and real interest rates to seek evidence that true investment value changes through time sufficiently to justify the price changes. His paper concluded that most of the volatility of the stock market prices appears unexplained. Shiller volatility or fluctuations prove that behavior of markets is not normal. Non normal distribution series is a widely followed proof of inefficiency in prices.

The investors interpret market data and events at two cognitive levels: the intellectual level of ordination, process and analysis of real factors (economic data), and the logical and rational level of understanding what this objective identifiable factors will influence the perception of the other players on the market. The information has investment value when is correlated with professional knowledge (human intellect) and interpersonal dynamics of market players (their emotions and sentiments). Due to uncertainty and continuous change in the game of the market, there is a strong interdependence between personal experiences (autobiographic memory) and rational expectations of the investors about the future, since their personal experiences influence the way they interpret and select available data. Practically, behavioral finance complements but not replaces technical and fundamental analysis by the systematic analysis of the fundamentals of the market prices as a result of the correlation between investor experience and expectations and the market momentum. Slow changes in the market sentiment are not emotionally contagious, but they insinuate slowly in a market trend. Sudden moves, on the other side, are attributed to new strong evidence presented and disseminated by the market; these do not have a lasting effect, once the new resistance or support floor was established. In general, investors tend to accept with relative ease the market momentum that is imposed by the majority rather than adopt a contrarian investment strategy, since dissatisfaction of a negative result, after a contrarian decision, weights significantly higher than the eventual satisfaction coming from a contrarian decision.

¹ Sales, Mark; David McLaughlin, David (April 1997); „*Fractals in Financial Markets*”; Vanderbilt University <http://ftp.ec.vanderbilt.edu/Chaos/FMH/main.html>

3. The Intuition System and its influence on the investor cognitive decisions

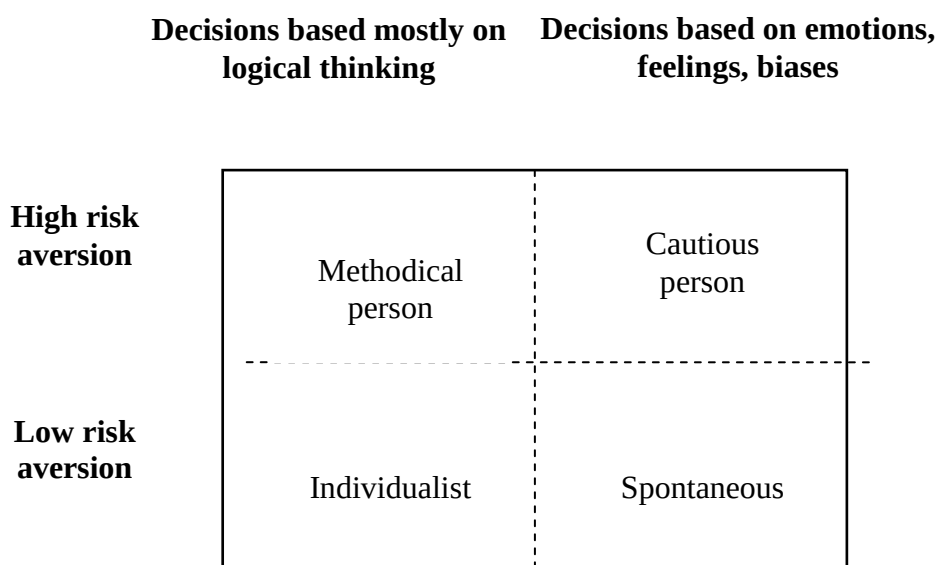
High mathematics downplays intuition as unsystematic, emotional, and unaccountable. However, the more we move into time systems and try to mechanize entries and exits; we realize that we can never eliminate risks. Execution is about intuition. At the heart of things we are all investors. Whether some of us are overdoing it with housewife calls or calling ourselves knowledge workers who have nothing to do with markets, we are a part of the same chain.

Stock market intuition is a high skill for life. We confuse it with speculation and all that herding. First and foremost, the intuition system is not very fast moving. If you think you have one, it should not give you calls every day intraday. It should be more like a multi month, maybe 18-24 month system or more. Intuition systems are not about trends. They guide us with understanding the minimal risks. What is a minimal risk entry or exit? Intuition systems are also built on patience. You can't have an intuition system based on stress related to certain expiration.

An intuition system is something which gives you the confidence to buy puts, bleed, but rollover at expirations. If you are bleeding every 18 months, it is a minimal risk, not a high risk. If you are doing puts and calls every month, you have no intuition system. The problem with intuition systems is that they are generally about a crash or scary bubbles. A real intuition system works both ways. It tells you to buy in March 2009 or sell in November. A test of intuition systems can be if it can differentiate between underperformance and outperformance. But then intuition systems can't do everything. A performance ranking could be a good decision support for intuition systems. The best of the best are to be avoided, and the worst of the worst are to be selected. This simple idea can give you the courage to listen to your intuition.

Figure 2: Personality and cognitive decisions

*Personality and other individual circumstances and differences systematically influence investment decisions.
Personality influences investment decision making.*



Probably one of the most interesting and attractive tenets of behavior finance is that it can teach investors to harness his impulse and build self-awareness. The human cortex is wired such that emotions and feelings have, most of time, the upper hand over our cool logic. From an evolutionary perspective, our deeply embedded fear emotions are an essential prerequisite tool for our survival, as individual and species.

The cost of a false positive caused by fear is fairly low: sleeping under a tree, our ancestors suddenly awaken- up by a bush blown over by a burst of wind, would rather not spending any second on deciding whether is a tiger or not but rather climb the tree, survive and then debrief. On the other side, the cost of a false negative can be very severely and the harm irreparable, so our human nature is conditioned as to over exaggerate the risk, and rather error on the caution side, just to fight another day. The payoff is not symmetrical, but this early warning system geared toward survival can be highly detrimental in today's complicated financial matrix.

The local market research introduced also by the paper tests the random walk hypothesis to see if markets move at random and investors do not express any behavioral biases. To test daily return distribution and independence, a regression equation is introduced:

$$\ln(I_t) = \mu + \rho \ln(I_{t-1}) + \varepsilon_t$$

where I_t is the index value (the most representative, BET Index) in day t and:

$$\varepsilon_t$$

is the residual value. Next, to test the linear dependence, the paper introduces the regression:

$$\varepsilon_t = \phi_0 + \phi_1 \varepsilon_{t-1}$$

If :

$$\phi_1$$

proves to have statistical significance than we can conclude with the degree of confidence that the evolution is linear dependent, the market does not follow a random walk. Then, the nonlinear dependence is tested by GARCH models. ARCH general model (GARCH (p,q)):

$$r_t = \beta_0 + \beta L(r_t) + \varepsilon_t$$

$$\varepsilon_t \approx N(0, h_t)$$

$$h_t = \alpha_0 + \alpha(L)\varepsilon_t^2 + \gamma(L)h_t$$

Where r_t is an ARMA process $(p', q')^2$ (or AR(p') or MA(q'));

$$h_t$$

is an ARCH(p) process and GARCH(q).

The anticipatory behavior of most investors, who would rather take into account the market developments rather than the financial and economic performance of a company, is predominant. We were excited by the idea³ first introduced by the paper of Stancu, I., Stancu, D., (2013), *Rationality versus Irrationality on the Romanian Capital Market*; the authors contend that: “*The shares of financial services companies confirm the second case, that of irrational, subjective behavior, not only at the level of the individual investor but also at the level of the community of stock exchange operators. The shares are traded mostly for short-term gains purpose. Their stock prices reflect investor expectations of the stock market development and not the issuer's financial performance. As a consequence, investors have the priori belief that these performances are greater than they are in reality. With that in mind, their concern is purely speculative*”.

Next, intrigued by the idea, we have chosen to test BET and BETC as an interesting indicator of the investor over confidence in their prediction power. The author's elegant conclusion on real economy issuers vs. nominal economy companies: “*The share of successful manufacturing companies confirms the rational economic behavior, consistent with fundamental financial analysis. This conclusion is reinforced by the fact that these companies have evidently*

² General format of an AR process with a finite number of p variables contribute to the current level of y

variable: $y_t = a_1 y_{t-1} + a_2 y_{t-2} + \dots + a_p y_{t-p} + \varepsilon_t$, where a_i are the coefficients to be estimated and ε represents the

random residual in a classical regression equation. $\varepsilon_t = y_t(1 - a_1 L^1 + a_2 L^2 + \dots + a_p L^p)$. L^i is a lag operator that for the value of the variable for the period and for the current period. The MA process of a q ranking can be arranged as

follows: $y_t = \varepsilon_t - \sum_{i=1}^q b_i \varepsilon_{t-i}$ and also can be expressed based on time lag: ARMA

process: $y_t(1 - b_1 L^1 + b_2 L^2 + \dots + b_q L^q) = \varepsilon_t(1 - b_1 L^1 + b_2 L^2 + \dots + b_q L^q)$

³ Stancu, I., Stancu, D., (2013). *Rationality versus Irrationality on the Romanian Capital Market*. Theoretical and Applied Economics Journal 17, International Finance and Banking Conference, FIBA 2013. (http://store.ectap.ro/suplimente/International_Finance_and_Banking_Conference_FI_BA_2013_XIth_Ed.pdf)

stable numbers of trade and significant volumes of sales on the stock market. Moreover, the financial results are obtained based on tangible products sales, which gives confidence in their stability. This is the result of long-term investments in their assets. Other companies in the manufacturing industry, characterized by large fluctuations in turnover and lower trading volumes on the stock exchange, reject the assumption of rational economic behavior. The investors sanction the instability of these companies financial activity and their volatility of the stock price volatility”.

We appreciate this academic path as interesting and a prime on behavioral finance literature: Not only personal and individual circumstances or market and contextual influence converge to an investment decision; a third factor can modify the investor perception, i.e., what type of company is the focus of investment analysis. Different sectors have different life cycles, but most important, sectors swap places in investor's scope from great interest (like) to complete disregard (dislike). These new dimensions add an informative angle to investment and behavioral portfolio management. For the locally available index BET⁴:

With the following specifications: r_t is AR (1), h_t is ARCH (1), GARCH (1) cu asymmetry factor for lag 1, the result is TGARCH (1, 1, 1):

Dependent Variable: D_L_BET

Method: ML - ARCH (Marquardt) - Generalized error distribution (GED)

Sample (adjusted): 3 2721

Included observations: 2719 after adjustments

Convergence achieved after 17 iterations

Variance backcast: ON

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*RESID(-1)^2*(RESID(-1)<0)
+ C(6)*GARCH(-1)

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000481	0.000191	2.520458	0.0117
D_L_BET(-1)	0.194777	0.019558	9.958822	0.0000
Variance Equation				
C	2.69E-05	3.67E-06	7.312937	0.0000
RESID(-1)^2	0.316145	0.039609	7.981630	0.0000
RESID(-1)^2*(RESID(-1)<0)	0.092534	0.057950	1.596802	0.1103
GARCH(-1)	0.557362	0.036212	15.39155	0.0000
GED PARAMETER	1.193076	0.033061	36.08695	0.0000
R-squared	0.027324	Mean dependent var		0.000142
Adjusted R-squared	0.025172	S.D. dependent var		0.015930
S.E. of regression	0.015728	Akaike info criterion		-5.908766
Sum squared resid	0.670881	Schwarz criterion		-5.893556
Log likelihood	8039.967	F-statistic		12.69742
Durbin-Watson stat	2.061150	Prob(F-statistic)		0.000000

This regression is statistically significant, so we can conclude that a significant nonlinear dependence exists between daily returns on that specific index, BET. We can confidently assume that index pattern evolution does not follow a random walk. The local market research introduced also by the paper tests the random walk hypothesis to see if markets move at random and investors do not express any behavioral biases. We can infer that there is linear dependence between daily returns, and the index series of BET does not follow a random walk pattern. Other factors could influence this evolution, and they are persistent and consistent. Research in behavioral finance has important practical and academic applications.

⁴ BET index public data: Apr. 1998 – Jan. 2012

The research can help guide investment portfolio allocation decisions, both by helping the understanding the kinds of errors that investors tend to make in managing their portfolios, and also by allowing us to understand better how to allocate assets and locate profit opportunities for investment managers. Understanding the psychological foundation of human behavior in financial markets facilitates the formulation of investment policy statements for individual investors. Methods that originate in psychology are used as research tools, along with traditional finance research methods. Over these years, the academic and practitioners world of finance have seen the blossoming of behavioral finance into a significant body of knowledge. The combination of theoretical and empirical work has allowed us to see the relevance of the basic psychological theories to many financial phenomena. The newly developed body of knowledge is an important addition to the theory and practice of modern finance.

If tests of market efficiency reveal a strong form of efficiency, then a professional portfolio manager could not obtain abnormal returns only if she used insider information. A lack of liquidity and depth of the market can be profitable for some investors that are capable to use this apparent inefficiency and departure from random walk, for the increased investment performance. From academics and economists perspective, financial world is populated by rational investors, but from practical perspective, behavioral investors manage the world.

4. The Conclusion of the Study

The article reviews some psychological concepts relevant and used in the study, in an interdisciplinary effort of understanding the correlation or causality between psychology and finance. The paper aims at demonstrating whether investor psychological biases lead to investment performance to tilt to the mean in the long run. As a reflection of the behavioral biases and influences, the statistical demonstration supports the conclusion that markets do not random walk. Analyzing the data for this study leads to the interesting conclusion that individual psychological biases and differences should not be confounded with noise within econometric models but rather manifest a solid influential role on the dependent variable – the investment outcome. Data base source for the article shows that psychological characteristics have salient relationships with various aspects of investment decision making process making and the transactional activity of the individual investor.

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