An Overview of Behavioral Finance and Revisiting the Behavioral Life Cycle Hypothesis

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This paper attempts to introduce an overview of the field of behavioral finance, its building blocks and how it relates to the traditional mainstream finance discipline. In addition, it revisits the behavioral life cycle model that is based on the traditional life cycle model. The point of introducing this model is to show that behavioral finance and traditional finance should not be always at war. They could actually complement each other and produce eventually modified models with enhanced predictive power.

Introduction

Investment and financing decisions are perplexing decisions that keep changing according to the surrounding circumstances and conditions. No matter how much we study them or for how long, they remain partially mysterious and at some points in time unpredictable. That is directly related to the fact that they involve a human aspect into them. And as much as the human brain is fascinating to neurologists and the decision making is amazing to psychologists, so will be the investment and financing decisions to finance academics and professionals.

This necessitated a new vision to the finance discipline, a more open and comprehensive one, a vision that encompasses many other scientific disciplines that directly affect the way we judge and evaluate things. Finance has always been regarded as an outgrowth of economics, a fact that cannot be denied. But ever since its inception it has put focus into areas that were less tapped by economists and has followed a different methodological perspective. According to Ross (1987), finance uses the modeling framework constructed in economics, but within this framework, finance has taken a different methodological perspective. It is not very accurate to characterize finance as simply another of the specialty areas of economics. While finance is specialized in its focus on financial markets, the difference between economics and finance only begins there. The principal distinction is one of methodology rather than focus. He further explains that in finance, the data are voluminous and of high quality and there is always a premium on modeling close to the data. This, in turn, leads to models whose variables are themselves observables rather than abstraction of classes of observables.

According to Wesley Clair Mitchell, all social sciences have a common aim, which is the understanding of human behavior; a common method, which is the quantitative analysis of behavior records; and a common aspiration, which is to devise ways of experimenting upon behavior (Mills, 1999).

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Given the previous statement, including psychology and sociology would be totally justified in the study of finance. After all, human behavior and decision making are the main focus of these scientific disciplines. This has paved the way for behavioral finance to offer a shift in the paradigm, a better understanding to hopefully improve the prediction power of financial models.

Behavioral Finance

Foundations of behavioral finance can be traced back over 150 years. Originally published in 1841, MacKay's extraordinary popular "Delusions and the Madness of Crowds" presents a chronological timeline of the various panics and schemes throughout history. This work shows how group behavior applies to financial markets of today. Following this was Selden's 1912 book *Psychology of the Stock Market*, which was one of the first books to apply the fields psychology directly to the stock market (Ricciardi and Simon, 2000).

In a seminal article published in 1951 by the *Journal of Finance*, Professor O K Burrell proposed 'scientific' study of psychological influences on investment behavior. Then in the late 1960s, a small group of academics led by Dr. Paul Slovic began conducting psychologically oriented investment research. During this period financial theory was primarily normative, not descriptive, with focus on the concept of market efficiency and the new capital asset pricing model. Only with the rise of the "Anomalies Literature" in the late 1980s has behaviorally oriented financial research begun to gain more applause (Olsen, 2001).

Behavioral finance is the paradigm where financial markets are studied using models that are less narrow than those based on Von Neumann-Morgenstern expected utility theory and arbitrage assumptions. Specifically, behavioral finance has two building blocks: 'cognitive psychology' and the 'limits to arbitrage'. Cognitive refers to how people think. Limits to arbitrage refers to predicting in what circumstances arbitrage forces will be effective, and when they won't be (Ritter, 2003).

Cognitive Biases

Theory of Cognitive Dissonance

According to Wilcox (Fabozzi, 2008), it is difficult for our minds to hold two views that cannot easily be reconciled. In other words, when faced with conflict, our minds unconsciously seek better balance and tend to forget or ignore the least well-integrated perception or attitude. This phenomenon was labeled cognitive dissonance reduction by Festinger (1957). Festinger's theory states that people feel internal tension and anxiety when subjected to conflicting beliefs. As individuals, we attempt to reduce our inner conflict in one of two ways: we either change our past values, feelings, or opinions, or we attempt to justify or rationalize our choice (Ricciardi and Simon, 2000). This can operate at such low levels that we may never notice it or perceive it. For investors, the issue is especially dangerous because it may cause them to hold on to a position long after

disconfirming facts are available. In addition, it makes us vulnerable to sources of information that confirm our preexisting ideas.

Heuristics

We can never refer to heuristics without referring to Tversky and Kahneman. Tversky and Kahneman (1974) explained that people rely on a limited number of heuristic principles—rules of thumb—that reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors. Herbert Simon emphasized empirical research on human decision making and modeled any decision by computer; in doing so, he concluded that real decisions differ from the Von Neumann-Morgenstern model of rationality. He found out that people satisfice rather than optimize—as indicated by traditional finance. That's when individuals use shortcuts, i.e., heuristics to confront the complex decisions they have to make (Fabozzi, 2008, Ch. 8).

Various types of heuristics are listed below:

Representativeness: In this heuristic, Tversky and Kahneman explain that when people are judging the probability that a certain object belongs to a certain class, they depend on the degree to which this object is representative of the class, that is, by the degree to which the object resembles the class. Thus, if the object under question is highly representative of the class, the probability that the object originates from the class is judged to be high. In essence, it is reasoning by stereotype (Fabozzi, 2008, Ch. 8). They explain, however, that this judgment rule leads to serious errors because similarity or representativeness is not influenced by several factors that should affect judgments of probability.

One of the problems is the insensitivity to prior probability of outcomes. Another is the insensitivity to sample size, also, misconception of chance. People expect that a sequence of events generated by a random process will represent the essential characteristics of that process even when the sequence is short. A locally representative sequence, however, deviates systematically from chance expectation: it contains too many alternations and too few runs. Another consequence of the belief in local representativeness is the well-known gambler's fallacy (Tversky and Kahneman, 1974).

Another problem, yet, highlighted by Kahneman and Tversky, is insensitivity to predictability and the illusion of validity. This is the unwarranted confidence, which is produced by a good fit between the predicted outcome and the input information. And a final problem is the misconception of regression. Although, one encounters many instances of regression towards the mean, people seem not to develop correct intuitions about this phenomenon (Tversky and Kahneman, 1974).

Availability: Availability is a useful clue for assessing frequency or probability, because instances of large classes are usually recalled better and faster than instances of less frequent classes. However, availability is affected by factors other than frequency and probability. In the same way, as investors we tend to give more weight to extreme or recent

events as typical, because they are most easily remembered (Fabozzi, 2008, Ch. 8). Consequently, relying on availability leads to predictable biases, like the bias due to retrievability of instances. When the size of a class is judged by the availability of its instances, a class whose instances are easily retrieved will appear more numerous than a class of equal frequency whose instances are less retrievable (Tversky and Kahneman, 1974).

Tversky and Kahneman (1974) state that there might also be a bias due to the effectiveness of a search set or biases of imaginability, also, illusory correlations to which availability provides a natural account. The judgment of how frequently two events co-occur could be based on the strength of the associative bond between them. When the association is strong, one is likely to conclude that the events have been frequently paired. Consequently, strong associates will be judged to have occurred together frequently.

Adjustment and Anchoring: In many instances, people make estimates by starting from an initial value that is adjusted to yield the final result. The initial value, may be suggested by the context of the problem, or it may be the result of a partial computation. In either cases adjustments are typically insufficient. Different starting points yield different estimates, which are biased toward the initial value. This phenomenon is referred to as anchoring. Because of anchoring, people will tend to underestimate the probabilities of failure in complex systems. Thus, the direction of the anchoring bias can sometimes be inferred from the structure of the event. The chain-like structure of conjunctions leads to overestimation, and the funnel-like structure of disjunctions leads to underestimation (Tversky and Kahneman, 1974).

Tversky and Kahneman (1974) highlight that experienced researchers are also prone to the same biases when they think intuitively. It is not surprising that useful heuristics such as representativeness and availability are retained, even though they occasionally lead to errors in prediction or estimation. What is surprising, however, is the failure of people to learn from lifelong experiences such fundamental statistical rules as regression toward the mean, or the effect of sample size on sampling variability.

They further state that the empirical analysis of cognitive biases has implications for the theoretical and applied role of judged probabilities. Modern decision theory regards subjective probability as the quantified opinion of an idealized person. More precisely, the subjective probability of a given event is given by the set of bets about this event that such a person is willing to accept. A coherent subjective probability measure can be derived for an individual if his choices among bets satisfy certain principles that are the axioms of the theory. The derived probability is subjective because different individuals are expected to have different probabilities for the same event. They conclude that the major contribution of this approach is that it provides a rigorous subjective interpretation of probability that is applicable to unique events and is embedded in a general theory of rational decision.

For judged probabilities to be adequate, or rational, internal consistency is not enough. The judgment must be compatible with an entire web of beliefs held by the

individual. Unfortunately, there are no formal procedures to undergo this process, however, the rational judge will try to make his probability judgments compatible with his knowledge about the subject matter, the laws of probability, and his own judgmental heuristics and biases (Tversky and Kahneman, 1974).

Aside from Kahneman and Taversky, there are other sources of cognitive biases, the most important of which is cognitive dissonance.

Overconfidence: According to Ricciardi and Simon (2000), human beings have the tendency to overestimate their own skills and predictions for success. Mahajan (1992) defines overconfidence as an overestimation of the probabilities for a set of events. Operationally, it is reflected by comparing whether the specific probability assigned is greater than the portion that is correct for all assessments assigned to that given probability. Shefrin (2002) further explains that when people are overconfident, they set overly narrow confidence banks. They set their high guess too low and their low guess too high. Hence they get surprised more frequently than they anticipated.

Overconfidence manifests itself in a number of ways. One example is too little diversification, because of a tendency to invest too much in what one is familiar with. Also men tend to be more confident than women (Ritter, 2003).

Mental Accounting: The mental accounting structure of dividends and capital is one of many frames. People often keep their portfolio money in separate mental accounts or 'pockets'. Some money is retirement money, some is fun money, some is college education money, and some is vacation money. Markowitz tried to teach investors to consider covariance between their mental accounts and integrate them all into an overall portfolio, but he was not entirely successful. Many investors still divide their money into a mental account for downside protection (containing cash and bonds) and a mental account for upside potential (containing stocks, options, and lottery tickets) (Statman, 1999).

Framing: Frames are a part of Tversky and Kahneman's prospect theory. Prospect theory deals with the idea that people do not always behave rationally. This theory holds that there are persistent biases motivated by psychological factors that influence people's choices under conditions of uncertainty. Prospect theory considers preferences as a function of 'decision weights', and it assumes that these weights do not always match with probabilities. Specifically, prospect theory suggests that decision weights tend to overweigh small probabilities and under-weigh moderate and high probabilities. Hugh Schwartz articulates that "subjects (investors) tend to evaluate prospects or possible outcomes in terms of gains and losses relative to some reference point rather than the final states of wealth." (Ricciardi and Simon, 2000).

A dividend dollar is different from a capital dollar in prospect theory because the investor frames the dollars into two different mental accounts. A second part of prospect theory relates to observations that people vary in their attitudes toward risk among various mental accounts. Investors are often highly risk-averse with the money in their downside-protection accounts and much less risk-averse, even risk-seeking, in their

upside-potential accounts. An observation that supports this point was that of Friedman and Savage who observed that people regularly buy both insurance policies and lottery tickets (Statman, 1999).

A frame is a description. Frame dependence means that people make decisions that are influenced by the manner in which the information is presented. Frame dependence manifests itself in the way people form attitudes towards gains and losses. Many people make one decision if a problem is framed in terms of losses, but behave differently if the same problem is framed in terms of gains. An important reason for this behavior is loss-aversion (Shefrin, 2002). Benartzi and Thaler designated a term called 'myopic loss-aversion'. Loss-aversion refers to the observed tendency for decision makers to weigh losses more heavily than gains; losses hurt roughly twice as much as gains feel good. They added the adjective 'myopic' because even investors with long-term horizons appear to care about short-term gains and losses (Thaler, 1999).

Hedonic editing is the practice of choosing frames that are attractive relative to other frames. People with self-control problems often use hedonic editing to help them deal with those problems (Shefrin, 2002). Framing is beneficial to investors with imperfect self-control. Standard finance investors are immune to problems of self-control. Behavioral investors are subject to temptation, and they look for tools to improve control (Statman, 1999).

Theory of Regret: The theory of regret states that an individual evaluates his or her expected reactions to a future event or situation. Bell described regret as the emotion caused by comparing a given outcome or state of events with the state of a foregone choice (Ricciardi and Simon, 2000). Investors may avoid selling stocks that have gone down in order to avoid the regret of having made a bad investment and the embarrassment of reporting the loss. They may also find it easier to follow the crowd and buy a popular stock: if it subsequently goes down, it can be rationalized as everyone else owned it. Going against conventional wisdom is harder since it raises the possibility of feeling regret if decisions prove incorrect (www.iimcal.ac.in/community/FinClub/forum3).

Limits to Arbitrage: According to Ritter (2003), misvaluations of financial assets are common, but are not easy to make abnormal profits off. They are split into two types: first, those that are recurrent and arbitrageable; second, those that are non-repeating and long-term in nature. For the first type, trading strategies can reliably make money. Thus, the market is quite efficient for these assets, at least on a relative basis. For the second type, it is impossible in real time to identify the peaks and troughs until they have passed. Getting in too early risks losses that wipe out capital. In addition, if limited partners or other investors are supplying funds, withdrawals of capital after losing many times may actually result in buying or selling pressure that worsens the inefficiency. Shleifer and Vishny indicate in their article "Limits to Arbitrage" (1997) that efforts of arbitrageurs to make money will make some markets more efficient, but they will not have any effect on other markets.

Behavioral Finance Versus Traditional Finance

According to Baker and Nofsinger (2002), the difference between traditional and behavioral finance is an issue of how each discipline is developed. Traditional finance has developed in a normative way; it concerns the rational solution to the decision problem by developing ideas and financial tools for how investors should behave rather than how actually they do behave. In this respect, behavioral finance is descriptive because it offers explanations for what actually happens rather than what should happen.

According to Statman (1999), some of the distinctions between rationality and irrationality in the investment context are a distinction between utilitarian and value-expressive characteristics, the two groups into which marketing scholars, such as Munson and Austin (1981), classify product characteristics. He states that value-expressive characteristics are those that enable users of a product to identify in it their values, social class, and lifestyles. They are most prominent in jewelry, less prominent in automobiles, and almost absent in laundry detergents. In the investment context, risk is a utilitarian characteristic and those who restrict their attention to it are considered rational. The notion of 'rationality' is not so simply extended to other characteristics such as social responsibility, display of wealth, or the excitement of an initial public offering. Proponents of standard finance often regard that the value-expressive motives of investors are unimportant distractions from the bigger notion, namely, asset-pricing models. On the other hand, behavioral finance proponents would incorporate both utilitarian and value-expressive traits.

According to Statman (Fabozzi, 2008, Ch. 9), standard finance has four founding blocks:

1. Investors are rational;
2. Markets are efficient;
3. Investors should design their portfolios according to the rules of mean-variance portfolio theory and, in reality, do so; and
4. Expected returns are a function of risk and risk alone.

And behavioral finance offers an alternative block for each of the foundation blocks mentioned before:

- Investors are 'normal' not rational;
- Markets are not efficient, even if they are difficult to beat;
- Investors design portfolios according to their rules of behavioral portfolio theory, not mean-variance portfolio theory; and
- Expected returns follow behavioral asset pricing theory, in which risk is not measured by beta and expected returns are determined by more than risk.

Mullainathan and Thaler (2000) identify three ways in which behavioral finance deviates from the standard mainstream model. First, under bounded rationality conditions, humans are faced with limited cognitive abilities that constrain their problem-solving abilities. Individual investors, investment professionals, and financial academics are sometimes overwhelmed by the amount of available information and the abundant investment choices with the advancement of information technology and the Internet. For investors, a direct link exists between the cognitive biases and heuristics (rules of thumb) adopted by behavioral finance and the problems associated with information overload. Information overload is defined as "occurring when the information processing demands on an individual's time to perform interactions and internal calculations exceed the supply or capacity of time available for such processing" (Fabozzi, 2008, Ch. 10).

Second, bounded willpower illustrates that people sometimes make choices that are not in their long-run interest. Finally, bounded self-interest shows that humans are often willing to sacrifice their own interests to help others (Sent, 2004).

McGoun and Skubic (2000) do not seem to view the difference between traditional finance and behavioral finance as that radical. They explain that finance theory has made certain simplifying assumptions regarding human behavior, and, in the spirit of Friedman (1953), concerned itself with whether their implications were true, and not with whether the assumptions themselves were true. Recently, however, more interest has been shown in experimental investigation of these assumptions. This behavioral finance has been presented as a significant departure from the previous research paradigm and in some ways it is. But in some ways, behavioral finance isn't much of a departure. Behavioral finance still considers expected return and risk to be quantifiable variables and investment to be a task of estimating them and ranking investments based upon the estimates. Although the decision calculus of investors being uncovered by behavioral finance is turning out to be quite different than the rational decision calculus assumed in traditional finance (Thaler, 1999), the fundamental concepts (expected return, risk, investment) that enter into it remain the same. It differs only in a handful of assumptions in much the same way as Lobachevskian or Riemannian geometries differ from Euclidian geometry.

Frankfurter and McGoun (2000) explain that the methodology of financial economics in general and research in market efficiency in particular, is unmistakably the methodology of positive economics. According to Friedman (1953), Keynes introduced positive economics to deal with "what is". Its task is to provide a system of generalizations that can be used to make correct predictions about the consequences of any change in circumstances. Its performance is to be judged by the precision, scope, and conformity with experience of the predictions it yields. In short, positive economics is, or can be, an 'objective' science in precisely the same sense as any of the physical sciences. And this is built on the following three tenets:

1. The primary requisite of a theory is to produce acceptable forecasts.
2. The secondary requisite of a theory is to be simple and fruitful.
3. The assumptions of the theory must be unrealistic to satisfy requisites 1 and 2.

According to Frankfurter and McGoun (2000), behavioral finance is a methodology that is not likely to adhere to the previous three tenets as traditional finance. Friedman (1953) introduces the two terms prediction versus explanation, and the authors regard explanation as far more than just prediction. It creates understanding either in a casual mechanical sense, or it creates understanding in a unifying sense, reducing the number of patterns that must be used to describe the way the world works.

The main purpose of a behavioral finance theory is more likely to produce acceptable explanations rather than predictions; in other words, to help us understand what might occur or what has occurred in finance, relegating prediction to secondary consequence. In addition, the methodology of behavioral finance does not require that a theory be simple, as in Friedman's second tenet. The social and economic world is a complex place, and there is no evidence that its underlying structures, if there are such things, can be expressed in simple mathematical terms any more than can those of art or history. And it would be definitely detrimental to a behavioral finance theory if its assumptions were unrealistic as required by Friedman's third tenet, because then we would learn little about why a theory that works does so, which is the essence of explanation in a causal-mechanical sense. And it would not tell us what to do if the theory does not work. In fact, without a doubt, it is the unreality of the assumptions of the traditional finance theory that have provided the motivation and reason for behavioral finance (Frankfurter and McGoun, 2000).

Another distinction illustrated by Pinker to be made is that between logical and rational. What traditional finance calls rational is in fact logical, and what it calls quasi-rationality legitimately deserves the more reputable term rationality, given the current theories of evolutionary psychology. We actually do observe the logical behavior assumed in traditional finance. Fama's behavioral finance may be quite rational, and his market efficiency, though quite logical, may also be quite irrational. With further research, we might find that logical over- and under-reaction, if it is even possible to reliably detect it, might still not be rational over- and under-reaction (Frankfurter and McGoun, 2000).

Critique of Behavioral Finance

Behavioral finance is losing its heretical reputation and is becoming an eclectic field of study drawing from disciplines such as experimental economics, cognitive psychology, decision science, and neuroscience. This 'bubble' of interest in behavioral finance, as Olsen (2001) called it, has created criticism from traditional financial economists. While these critics vary, they have a common theme. They suggest that behavioral finance is not scientific because it does not have a dominant paradigm; it draws from other disciplines in an ad hoc fashion; and it is focused on ephemeral and emergent phenomena.

Olsen (2001) thinks that behavioral finance is currently at an early stage, but still scientific stage that has been common to all new sciences. As such, it is experiencing the same old age criticism that was previously levied against economics, geology, biology, and even physics before Newton.

Olsen (2001) states that "science is the study of an area that involves application of the scientific method". In more precise terms, statements or hypotheses must be potentially testable and falsifiable. Some mainstream theorists suggest that behavioral finance cannot claim to be scientific because it does not have a dominant paradigm. Their concern for having a 'unified theory' originates from two basic needs. First, there must be a common framework to ensure logical coherence and consistency. Second, there must be a common framework to guide the search for answers to questions that are viewed as important. Students of the history of science view this as detrimental to the scientific enterprise because it discourages innovative ideas. They note that while the so-called 'normal' sciences do have dominant paradigms, most new sciences in their 'non-normal' stage do not. For example, physics before Newton, biology before Darwin, and electricity before Franklin were non-normal sciences without dominant paradigms. This does not mean that good science was not or could not be practiced in this non-normal phase. He adds "that means that before a common ground was found, research topics were usually related to the personal agenda of the investigators and that writings tended to be more long-winded and contentious, as the lack of a well accepted vocabulary as well as a common point of view encouraged vigorous debate. Overtime, non-normal sciences become normal ones, as major themes emerge and evidence accumulates" (Olsen, 2001).

Olsen (2001) views behavioral finance as a non-normal science. However, it is on the road to developing a paradigm of its own. Specifically, researchers have identified a few statements which appear to have the potential to serve as structural members of a common framework. These are:

- Financial decision makers' preferences tend to be multi-faceted, open to change and often formed during the decision process itself.
- Financial decision makers are satisficers and not optimizers.
- Financial decision makers are adaptive in the sense that the nature of the decision and environment within which it is made influence the type of the process utilized.
- Financial decision makers are neurologically predisposed to incorporate affect (emotion) into the decision process.

A second group of financial economists suggest that behavioral finance cannot lay claim to being scientific because it does not deal with topics and methods of experimentation that lead to the production of general 'overarching' laws. This argument, however, ignores the fact that most of the social sciences fail to mimic the so-called 'hard' sciences. Also linking sciences together and applying scientific methods and theories to new disciplines do not mean that those new disciplines are subordinate (Olsen, 2001).

Professor Slovic developed a new theoretical framework and scientific approach to the study of risk, which is now known as the psychometric paradigm. It used a variety of psychometric scaling techniques to produce quantitative measures of perceived risk, benefits and other aspects of perception. Extensive testing of the paradigm across natural, technological and social hazards and across different cultures yielded a common set of results. These are:

- Risk is multi-attribute in nature. It involves such elements as feelings of control, dread, and knowledge.
- Risk perceptions are influenced by social and cultural factors such as trust, fairness, and democratic values.
- Risk always contains an emotional or affective dimension.

The most important conclusion to come from Professor Slovic's research is that risk is not objective, but always subjective. It does not exist 'out there' as an independent attribute of a hazard. It is an emergent phenomenon that results from the uniqueness of a situation (Olsen, 2001).

It is quite clear from the previous discussion the importance and the effect behavioral factors have on investor financial decision making. Accepting the fact that investors are not always rational and that they are susceptible to behavioral biases due to different set of factors, forces us to put more effort and analysis into these factors. Awareness of such biases and knowing how to overcome them are two basic ingredients towards a better decision-making process. And actually, although departures from rationality are sometimes random, they are often systematic (Baker and Nofsinger, 2002).

Behavioral Life Cycle Model

One of the attempts to better understand individual decision making was that made by Shefrin and Thaler in 1988, producing a theory that incorporates self-control, mental accounting and framing in the life cycle theory of saving. The assumptions of the theory go as follows:

- Wealth is non-fungible, even in the absence of credit rationing. It is assumed to be divided into three mental accounts, namely: 1) current income, 2) current assets, and 3) future income.
- Perfect capital market.
- Zero real rate of interest.
- The doer is pathologically myopic, concerned only with current period consumption.
- Diminishing marginal utility.
- Non-satiation.
- Psychic costs will result from exercise of willpower.

- Increase in willpower effort is necessary to reduce consumption.
- Increased willpower effort is painful.
- Increased willpower becomes increasingly more painful as additional power is applied.
- Willpower becomes less costly as retirement draws near.
- Willpower effort is especially costly at low consumption levels.
- Temptation to spend \$1 of wealth depends on the location of that \$ in the mental account system.

The model specifies that:

Lifetime income stream is $y = (y_1, ..., y_T)$

Retirement income $y_T = 0$

Lifetime wealth is $LW = \sum_{t=1}^{T} y_t$

Consumption stream is $C = (C_1, ..., C_T)$

Lifetime budget constraint $\sum C_t = LW$

Doer sub-utility function is $U_t(C_t)$

$U_t(\cdot)$ is concave in C_t (diminishing marginal utility)

U_t is strictly increasing in C_t (non-satiation)

Opportunity set is X_t

Psychic cost is W_t

Total doer utility function is the sum of pleasure and pain $Z_t = U_t + W_t$ ...(1)

Willpower effort is θ_t

$\theta_t(\cdot)$ is decreasing in C_t

The above implies that $\partial Z_t / \partial \theta_t \cdot \partial \theta_t^* / \partial C_t \rangle 0$ ...(2)

$\partial / \partial C_t \left(\partial Z_t / \partial \theta_t \cdot \partial \theta_t^* / \partial C_t \right) \langle 0$ ...(3)

$D \left(\partial Z_t / \partial \theta_t \cdot \partial \theta_t^* / \partial C_t \right) - \partial Z_t / \partial C_t \rangle 0$ ...(4)

where D can be regarded as the net marginal cost of using willpower. D decreases with C_t and approaches zero for C_t sufficiently large.

Current income $I = (1 - s)y_t$

Current wealth $A = \sum_{T=1}^{t-1}\left[(1-s)\,y_T - C_T\right]$ ...(5)

Future wealth is sum of future income and pension wealth SLW.

Marginal doer utility is $\partial Z_t/\partial\theta_t \cdot \partial\theta_t^*/\partial C_t$ ...(6)

m_t measures temptation, and at any level of C_t, increased temptation will make the doer worse off, in the sense that:

$$\partial Z_t/\partial m_t = \partial w_t/\partial m_t + \partial w_t/\partial\theta_t \cdot \partial\theta_t^*/\partial m_t \rangle\ 0 \quad ...(7)$$

and

$$\partial/\partial m_t\left(\partial Z_t/\partial\theta_t \cdot \partial\theta_t^*/\partial C_t\right) \langle\ 0 \quad ...(8)$$

$$\partial^2 Z_t/\partial m_t^2 \rangle\ 0 \quad ...(9)$$

$C = f(I, A, F)$

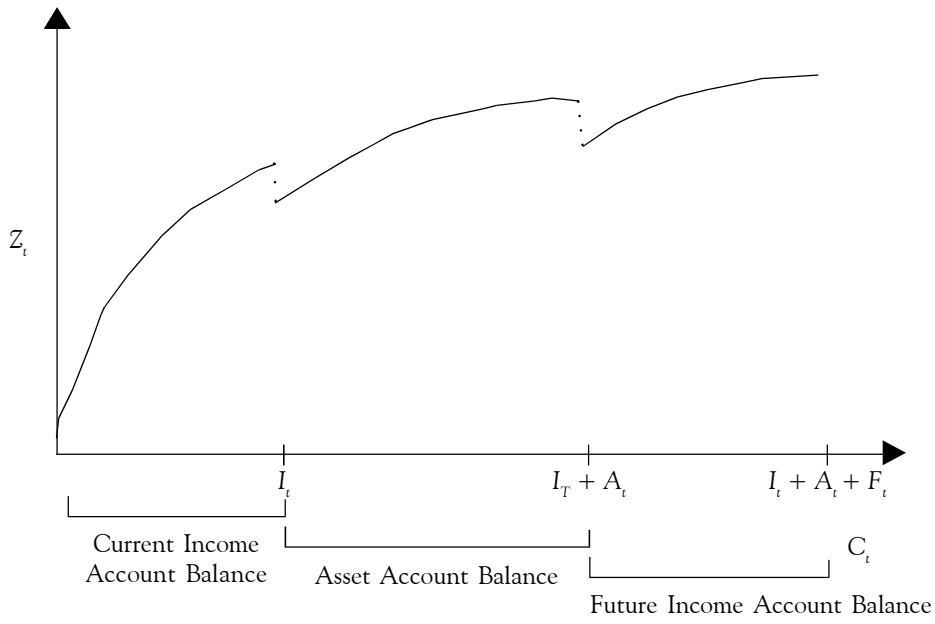
The model suggests that $1 \approx \partial C/\partial I \rangle\ \partial C/\partial A \rangle\ \partial C/DF \approx 0$ ...(10)

When Shefrin and Thaler first introduced the model, they tested it using a short survey among MBA students in Santa Clara University, who were mostly full-time employees, to directly test the differential MPC hypothesis. And they justified this method by stating that they know of no available complete test of the hypothesis. Their survey had three questions asking respondents about their estimated consumption of a windfall with a present value of $2,400 taken on a monthly basis ($200 per month) or a lump sum or to make them payable in five years' time. Introducing the same amount of money in different forms has triggered this mental accounting bias that make the marginal propensity to consume from the first option (coded as current income) higher than the second option (coded as current wealth) and the second option higher than the third (coded as future income). This result supports the differential MPC hypothesis, thus proving that money is not fungible.

They indicated that while they found the evidence from the survey of MBA students compelling, they should also obtain evidence based on actual behavior. They added some partial evidence based on a study by Courant, Gramlich, and Laitner in 1986 which distinguished between two types of wealth—current and future. The authors report being astonished by the difference between MPC from these two accounts specially that there is supposed to be no difference within the life cycle model. They also reported that the MPC out of current assets was very high, implying that households consume approximately 25% of their existing assets every year. However, the MPC of future wealth was found to be considerably lower (Shefrin and Thaler, 1988).

Shefrin and Thaler (1988) suggest that different sources of income are categorized in different mental accounts. More precisely, labor income is encoded into current income denoted by I, while capital income—with the exception of dividend income—are encoded into current wealth account denoted by letter A (see Figure 1). They, thus, predicted that the marginal propensity to consume from capital income is less than from labor income.

Figure 1: Graphical Representation of Behavioral Life Cycle Model



Source: Shefrin and Thaler (1988)

The first formal empirical test of the behavioral life cycle model using a large panel dataset such as those that have been used to study other models of savings was done by Levin (1998). Previous evidence for the behavioral life cycle has either come from small surveys of college or MBA students or been garnered from anomalies found in other studies that were not designed to test the behavioral life cycle model. Although this type of evidence is valuable, it cannot be definitive because of small sample size or possible biases in studies that were not designed to study behavioral decision making. Testing the behavioral life cycle model necessitates taking the assertions of that model and creating empirical tests that distinguish between it and conventional models of life cycle savings. It also requires building an econometric model that controls for the biases inherent in examining consumption data. Another novel feature of Levin's study was that many goods were used to study consumption. In previous empirical studies of consumption only food spending is used because it is the only category of consumption included in the PSID and other commonly used datasets. Levin used the Retirement History Survey which contains

information on how much is spent on 10 different goods. This creates an opportunity to investigate how spending patterns differ between goods (Levin, 1998).

Another study done by Huang (2006-2007) tested the validity of the BLC by deriving data from a community survey in China. He surveyed 150 respondents who were between 50 and 55 years old in 2006. The questionnaire contained detailed information on individual's wealth, income and consumption. In studying consumption, he used seven expenditure categories as dependent variables in the regression analysis, including commodities, food eaten at home, food eaten out, entertainment, transportation, vacations, and gifts. On the other hand, one set of independent variables was used. It consisted of the different assets of individuals. Huang divided them into four types of assets: current income, liquid assets, non-liquid assets and future assets.

Huang concludes that income has a positive effect on individuals' consumption in all categories. On the other hand, wealth variables have less effect on individuals' spending behavior and future wealth and property had showed negative coefficients on four of the seven consumption categories. The test shows that individuals do not treat different types of assets as being substitutable.

The appeal of the BLC model is its adaptability to an investment context, though its original purpose was to understand consumption and saving behavior. A test to alter its perspective was done by Zhong and Xiao (1995), where they examined the characteristics of individual bond and stock holders, using data from the 1989 survey of consumer finances. They used the BLC model to act as the theoretical framework within which the results would be interpreted. They suggested that the factors that could influence holdings of bonds and stocks included three sets of variables, based on previous studies. They are demographic characteristics, financial resources, and socio-psychological variables.

The results of the tobit models showed that bonds and stocks are more likely to be held by families with adequate financial resources to maintain daily lives and enough funds to meet short-term financial needs. Households having a financial planning horizon of 10 years or more hold higher amounts of bonds and of stocks. Reporting a saving motive of 'growth' was associated with higher stock holdings, but reporting a saving motive of 'retirement' was not associated with higher bond or stock holdings. Controlling for income and other variables, stock and bond holdings increased with education and were higher for whites than for non-whites (Zhong and Xiao, 1995).

The problem of testing the BLC in whatever context, whether saving or investment depends on the availability of individual and household data. The longitudinal retirement history survey and the survey of consumer finances are two comprehensive national surveys that have the data required for this type of analysis. But unfortunately, these national surveys are far from universal. They are not available in every country and thus emerges the need for community surveys in countries where such national surveys are not available.

The problem with community surveys is the representative ability of the sample, where there might be unobserved differences between individuals caused by different tastes and different income levels, besides the time frame within which the survey is conducted. Conducting a survey in a single period might bias the results due to that specific period events. Repeating the survey may be needed to examine how behavior changes across time.

In addition, the questionnaire as a technique is susceptible to the subjective opinions of the respondents. When asking about previous events extending farther into the past, investors' responses are exposed to their subjective ability to recollect specific past events. The respondents may also have changed their perception of past events according to the actual outcome of these events. Therefore, the answers given by respondents can be biased toward what they think would have been the right course of action if they had been given the same choice today instead of reflecting the actual decision that would have been made in the past. This is called hindsight bias.

Focusing on developing these types of national surveys should gain supreme importance among policy makers because they give insight into individual and household decision-making process, central to policy design and implementation. For example, identifying these biases had contributed much to the design of the 401 K plans in the US. Had they not known the pension savers' behavioral biases, it would have been very difficult for them to design the plan with special attention to these biases targeting them in a way that contributed to increasing the participation rate, for example, after using decision framing by automatically enrolling the participants rather than giving them the choice to participate or not to participate (Mitchell and Utkus, 2004).

Conclusion

Looking at the history of behavioral finance, which is rather short compared to other sciences, I find myself inclined to believe that behavioral finance is not a replacement to traditional finance in any way. It is just a different view of the issue. It builds on traditional finance in many ways, but with more tolerance to other scientific views that helps it to give better understanding of financial decisions.

It is similar to CAPM, one of the main pillars of traditional finance. Many extensions have been offered to the theory to improve its predictive power and eliminate some of the anomalies that could not be explained by its framework. However, these extensions did not destroy the original model, which in my view is rather powerful and—to our good luck—simple. All these asset pricing models can coexist in pretty much the same way as can behavioral and traditional finance coexist.

Revisiting the behavioral life cycle model gives support to this principle. The life cycle model of saving behavior was reused in the behavioral finance context to accommodate for individual behavioral biases that weren't considered in the original model. In addition, the model was adapted to fit the investment context as well giving

insight into individual decision making when it comes to investing among different asset classes and how that relates to demographic factors, financial resources, and socio-psychological factors.

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