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Review

Behavioral finance in financial market theory, utility theory, portfolio theory and the necessary statistics: A review

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ABSTRACT

We present an overview of behavioral finance's consistent role in portfolio theory and market theory through utility theory. Since Bernoulli, the subjective nature of utility has been increasingly generalized for questionable purposes. Behavioral finance is reverting back to the original intents of utility theory. We also examine the statistical methods used to determine their suitability for the task at hand. Given the heterogeneous population at the market and individual security level, we suggest that nonparametric nonlinear statistics are best suited for descriptive and inferential analysis of all possible investor preferences.

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1. Introduction

The major challenge facing behavioral finance is to evolve toward an integrated theory of financial market operations. This challenge has been issued by traditional finance theorists many times. Fama (2012) states that while behaviorists are very good at "story telling" and describing individual behavior, their jumps from individuals to markets are not validated by the data. The purpose of this paper is to suggest a path toward an integrated behavioral finance theory using utility theory and portfolio theory. Portfolio theory is important because behavioral theory

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tends to focus on individual behavior or psychology instead of group or organizational behavior with a focus on social psychology. Portfolio theory specifically concentrates on the nonlinear interrelationships between micro-units in order to build an integrated portfolio. Portfolios simply are not a linear sum of the parts. Instead of the traditional mean–variance portfolio theory, we propose the use of UPM/LPM portfolio theory based on partial moments which provides the benefits of nonparametric statistics and expected utility theory.

One issue is that the traditional approach uses mathematics to build financial theories. Unfortunately, mathematical models require boundary conditions (assumptions) in order to generate a closed form solution. The devil is in the assumptions—primarily the rational investors, symmetric information and no market cost assumptions. With those assumptions, we are able to generate beautiful closed form market models. Without those assumptions, we lose some of the simple beauty of mathematics but hopefully are able to derive a better understanding of markets. We still can use mathematics and statistics on closed form micro-models while making fewer assumptions. But in the end, we have to give up the vision of a mathematical theory of everything promised by the traditional approach.

This paper consists of a review of the relevant literature in market theory, utility theory, and portfolio theory. We hope to be able to provide a viewpoint that allows the integration of the three while achieving the benefits resulting from the study of behavioral finance.

2. Towards an integrated financial theory

An integrated financial theory requires a market theory, an economic utility theory, and a portfolio selection model. First let us look at the market theory. If a market is perfectly efficient with a Walras equilibrium for every Pareto optimum transaction in the market, we should have a stationary probability distribution, either normal or a Mandelbrot stable paretian. This type of a market is very easy to model mathematically and can easily integrate micro- and macro-behavior. Wiener (1948) was one of the first researchers to reject the rational investor assumption inherent in this efficient market theory. He asserted that rational investors would resort to lying, cheating and stealing in order to maximize their utility and society would react by placing them in prison. He also stated that financial institutions would not exist if everyone was rational, because a generic institutional portfolio would not be able to maximize utility for every member of the institution. Rational investors do not play well in a group. As a result, institutional economics theory will not include rational participants and for the most point this is true. If we follow the institutional theories of Coase (1937), March and Simon (1958), Cyert and March (1963) and Williamson (2002),[1] we see the concept of transaction costs and bounded rationality allowing organizations to exist within the financial markets alongside with a rejection of efficient market theory.

Now it is not binary so we do not have a choice between an efficient market and an inefficient market. There is a wide gulf in between. The area that is between inefficient and efficient markets is an effective market. Effective markets are quite complex and basically do the job as we do not have a better alternative (Marxism anyone?). Effective markets are the result of transaction costs, asymmetric information and bounded rationality resulting in dynamic homeostasis systems following the second law of thermodynamics that are going to not only generate non-normal distributions but also non-stationary distributions, i.e., the moments of the distributions are going to change over time.

CAPM, APT, or any general asset pricing models are classical (static) equilibrium models that have to rely on unrealistic assumptions in order to provide boundary conditions for a mathematical solution. The major assumption is one of linear or risk-neutral utilities. Unfortunately, Roll (1977) found that the mathematical model in the case of CAPM is not empirically testable. Not surprisingly, we do not have any empirical support for CAPM.[2] CAPM derives from Markowitz's modern portfolio theory (MPT) but adds a number of unrealistic assumptions to provide the boundary conditions for a closed-form mathematical solution. MPT does not make these assumptions. Thus MPT is more realistic but the result is a model that is limited to a smaller micro- state in order to maintain a closed-form solution. It does not provide us with a macroeconomic model of asset pricing in our capital markets. Thus, asset pricing and MPT are two different things. We do not use MPT as an asset pricing model because we have not made the assumptions to make the asset pricing model a closed form solution. Markowitz (2010) is on record as not supporting CAPM because of the unrealistic assumptions required for CAPM but not required for his MPT. The assumptions include: lending and borrowing at the risk free rate of return, unlimited borrowing, short-selling without margin requirements, homogeneous expectations and risk-neutral utility theory. When these assumptions are eliminated, the capital market line becomes nonlinear and requires utility theory in order to maximize investor utility. One negative result of the popularity of the CAPM is the elimination of expected utility theory and utility theory is at the heart of Markowitz's MPT.

Theories of markets operating in non-stationary disequilibria have been around for quite a while in the institutional/evolutionary/energy economics area of economic thought. First, we have the Coase–Simon–March–Cyert–Williamson behavioral theory in institutional economics. We also have the Fractal/Chaos theory model developed in the 1960s through 1980s by Mandelbrot (Mandelbrot and Hudson, 2004) and popularized by Peters (1991, 1994), the evolutionary theory of Georgescu-Roegen (1971) and Boulding (1981, 1991), the bifurcation market theory of

[1] We would be remiss if we failed to note that Coase, Simon, and Williamson are Nobel Laureates in economics because of their work in this area. Cyert and March (1963) wrote one of the first behavioral finance books.

[2] "Low vol" strategies are currently demonstrating the inverse relationship between risk and reward as postulated in CAPM.