

Economists' Hubris – The Case of Asset Pricing

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This article is the second in an Economists' Hubris series of papers that examines the practical applicability of different economic paradigms. The first article focused on the world of mergers and acquisitions. Here we examine asset pricing, supposedly one of the most important contributions of the finance discipline to the world of economics and business. Indeed, the entire field of finance is reliant on the assumption that assets can be correctly priced.

Prior to the seminal works of William Sharpe (1964) and John Lintner (1965), there was no generally accepted basis for evaluating the price of assets, particularly of the rapidly proliferating range of financial instruments. Sharpe and Lintner developed a way to quantify and to incorporate risk into a general equilibrium model of asset prices which became known as the Capital Asset Pricing Model (CAPM). Their simple yet beautiful models made it possible for investors to compare the expected payoffs of different assets to their inherent risks through a concept of risk-adjusted return.

The beauty of their models and their ease of application has ensured very wide acceptance of CAPM in business decision-making about the value of investing in financial assets. Most business school graduates are inculcated with these approaches and their more complex intellectual descendants.

Sadly, despite the beauty and brilliance of CAPM and its derivatives and developments, they have failed all scientific tests as useful tools for predicting financial asset returns. The implications of this failure are profound; basically, one of the most important foundations upon which the finance discipline is based, namely pricing via arbitrage, turns out to be simply illusory. Arbitrage works to establish pricing only if you can establish a reliable fundamental value.

These are strong words. In response to the previous article, many academics argued that deterministic theories (such as CAPM) could be effectively replaced by behavioral economics. There is indeed a parallel theory of behavioral finance, and we will dedicate a section of this paper to that field. One should note, however, that while behavioral financial economists are tolerated, they are neither universally respected nor accepted by the true partisans of modern financial theory. The number of awards and the academic recognition bestowed on behavioral finance articles is in no way comparable to those given to 'pure' finance papers. Finally, we will illustrate that although behavioral finance questions many of the precepts and results of the deterministic models, it neither necessarily invalidates them nor provides any particularly workable and predictive alternative.

A short review of CAPM and its nearest peers

While it is hard to state with any degree of certainty when the first scientific risk-adjusted asset-pricing model was developed, few can deny that CAPM is generally credited with

introducing the concept that risk measurement in general equilibrium is key to pricing financial instruments. CAPM was born from Harry Markowitz's portfolio optimization model [Markowitz (1959)]. It essentially takes Markowitz's assumption that (identical) investors combine mean-efficient portfolios with borrowing and lending to achieve the most efficient portfolio depending on their risk appetite and shows that, as in equilibrium, every asset has to be priced so that someone is willing to hold it. If one accepts this premise, then there must be a simple formula that can be used to determine the risk-adjusted return of any financial asset. The argument is contingent on there being sufficient investment alternatives that asset-specific risks are, in the limit, diversified away. Then, all assets can be valued by their volatility relative to that of the market as a whole, called their Beta.

In its original version, it depended also on investors being able to borrow and lend at the risk-free rate. In 1972 Fischer Black developed a version of CAPM that did not assume the existence of risk-free borrowing or lending. In our view, this merely solved a minor difficulty. Deeper problems, such as the assumption of homogeneity and stationarity of investor anticipations (or, more appropriately, of the reality that these expectations reflect), have been little treated in academic work. In our judgment academic work has focused on the analytically tractable rather than what actually happens in markets.

To return to the practical, Fama and French (2004) provide an interesting overview of the tests undertaken. In their conclusion, they state: "The version of the CAPM developed by Sharpe (1964) and Lintner (1965) has never been an empirical success. In the early empirical work, the Black (1972) version of the model, which can accommodate a flatter tradeoff of average return for market beta, has some success. But in the late 1970s, research begins to uncover variables like size, various price ratios, and momentum that add to the explanation of average returns provided by beta. The problems are serious enough to invalidate most applications of the CAPM. For example, finance textbooks often recommend using the Sharpe – Lintner CAPM risk-return relation to estimate the cost of equity capital. The prescription is to estimate a stock's market beta and combine it with the risk free interest rate and the average market risk premium to produce an estimate of the cost of equity. The typical market portfolio in these exercises includes just U.S. common stocks. But empirical work, old and new, tells us that the relation between beta and average return is flatter than predicted by the Sharpe – Lintner version of the CAPM. As a result, CAPM estimates of the cost of equity for high-beta stocks are too high (relative to historical average returns) and estimates for low-beta stocks are too low [Friend and Blume (1970)]. Similarly, if the high average returns on value stocks (with high book-to-market ratios) imply high expected returns, CAPM cost of equity estimates for such stocks are too low."

Fama and French go on to conclude that: the "CAPM, like Markowitz' (1952, 1959) portfolio model on which it is built, is nevertheless a theoretical tour de force. We continue to teach the CAPM as an introduction to the fundamental concepts of portfolio theory and asset pricing, to be built on by more complicated models like Merton's (1973) ICAPM. But we also warn students that despite its seductive simplicity, the CAPM's empirical problems probably invalidate its use in applications." Were this teaching approach applied in engineering schools, we might have many fallen bridges.

Fama and French do suggest some alternatives that they feel mitigate a number of the problems that CAPM faces, such as their own three-factor model [Fama and French (1993, 1996)]. Their approach, like the Arbitrage Pricing Theorem developed by Stephen Ross (1976), lives within its own theoretical world. Try to introduce any aspects of market reality and these models also fail to have predictive value. Indeed, some of the reasoning is

curiously circular. Fama and French (2004) suggest that because the relationship between CAPM's expected return and Beta is simply the set of minimum variance conditions that hold in efficient portfolios, any portfolio that falls on the efficient frontier that can explain the differences in expected returns would be suitable for purpose. But they have no way of finding such a portfolio except to apply CAPM.

The list of real issues that have not been addressed by this academic work is long. To us, these are central:

- Why should anticipations be either homogeneous or stationary? Without these assumptions it is impossible even to decide on the appropriate data series to use in any empirical tests or applications.
- We have many partially connected financial markets; should the theory apply to each separately or to some aggregate?
- The models work only if 'all assets' are traded in the markets. But no tests of these models attempt to incorporate 'all assets' and instead settle for sub-components like the S&P 500 or the equivalent. Even within the parameters of CAPM and its descendants, there is no logical reason for the models to be predictive if fitted to sub-components.

It is no wonder that none of the academic models are usefully predictive for the prices of financial assets (or other assets!). None of these models is able to recalculate the betas, market rates, etc., when you work backwards. You cannot calculate the constituents of any of these models from the prices available in the market [Fama (1991)].

Moving on to application, even if we could construct models that give the 'cost of capital,' valuation requires us then to generate a series of future cash flows to be discounted by this rate. A large part of the sell-side of the securities industry has been trying this for decades with rather limited success. The analysts are unable to predict the effects of business cycles, the 'life cycle' of products and companies, and random events like wars, natural disasters, and game-changing innovations¹. No income stream based on the operations of a company can be treated as a perpetuity. While usefully suggestive, CAPM and its offshoots are definitively unproductive in making valuation or investment decisions.

Recognition of this failure has generated alternative strains of academic work. The first one we will consider is the options pricing model (OPM), developed by professors Black, Scholes, and Merton [Black and Scholes (1973), Merton (1973)].

The options pricing model

If one accepts that most assets, financial and real, have option-like attributes, OPM takes account of values and benefits which are typically ignored in other pricing models. However, all practical applications founder on the same considerations as the CAPM. The key elements in OPM are volatility, term, and exercise price, and in this concept shares are simply options sold to the equity holders by the bondholders. What is the term of this option, what is its volatility? Do we calculate using the history of the last 5 years or of the last 5 minutes? Or perhaps we should look at volatility in up-cycles and down-cycles separately, and so on. Do all market participants agree on the probability distribution of market prices into the indefinite future, or is the emerging valuation the product of

¹ Even for the valuation of simple fixed-income bonds, we have to rely on rating agencies for their assessments of risk prior to calculating their cost of capital. The events of the past couple of years have demonstrated that not only do rating agencies have difficulties allocating accurate risk weightings to the more complex asset-backed instruments and their derivatives such as CDOs, their ratings are also highly questionable even for the most vanilla of structures.

competing quantitative trading algorithms in the proprietary trading desks and hedge funds?

Many have started to use OPM to value real investment projects. [Amram and Kulatilaka (1999), Tufano and Moel (2002), Copeland (2005), Cossin et al. (2005)]. While these efforts should be applauded because business decisions create and destroy options for future cash flows, there is a long step indeed from appreciating the logic of the situation and quantifying it in any useful way. Pablo Fernández (2005) provides a quite comprehensive overview of the other shortcomings of the model. It is hard to deny that determination of the elements that make up OPM is inherently subjective, useful as a mnemonic but not as a quantitative tool.

Given that deterministic models have failed to provide a satisfactory solution to the asset-pricing dilemma, some scholars have turned to a less rigid model of the financial world which attempts to incorporate psychological attributes of market participants. This combination of finance and market psychology has come to be known as behavioral finance.

Behavioral finance and asset pricing

While the history of behavioral economics, and even behavioral finance to some degree, can be traced back to the times of Adam Smith, Vilfredo Pareto, and John Maynard Keynes, many credit today's developments in the field of behavioral finance to the works of Werner F. M. De Bondt and Richard Thaler during the mid-1980s. De Bondt and Thaler (1985) investigated whether the stock market overreacts, and they found that indeed people do seem to overreact to a sequence of bad news. Markets do experience inefficiencies after all. The reaction from the academic finance community to this 'finding' was shock and outrage. Not only the methodology but the sanity of these pioneering researchers was questioned. Today, behavioral finance has achieved some official acceptance as a legitimate field of study. We may now ask whether it has achieved real parity with the deterministic approach and, even if it is so, whether it can help solve some of the problems that have humbled the more traditional models.

The answer to the first question is quite clear. Behavioral financial economists are still considered a fringe movement, not quite equivalent to traditional economists. Use the profession's own yardstick and look at how many behavioral financial economists have won awards for their papers or been invited to be keynote speakers at leading academic conferences. Interestingly, the best-known papers in this field are written by the most traditional of financial economists, such as Fama, Shiller, or Schleifer. Alternatively, one can compare the number of universities offering quantitative finance courses with those offering masters or PhD degrees in behavioral finance. It is reminiscent of how medical practitioners view those involved in homeopathic medicine. They acknowledge that homeopaths have something to add to the debate but feel they are unable to provide important solutions. A serious situation needs the real scientists to be involved, except that, unlike medical doctors, financial economists are not even remotely scientists.

The answer to the second question is more complicated. Some behavioral economists start from the traditional model and then argue that it needs to be amended. If one were to look at the section dedicated to the topic of behavioral finance in the most widely used textbook in corporate finance, namely *Principles of Corporate Finance* by Brealey et al. (2008), it would quickly become clear that behavioral finance is viewed as an implication of the essential imperfection of arbitrage [Shleifer and Vishny (1997)]. If investors were able to arbitrage without frictions, and without risk, then markets would be efficient and there would no longer be a need for behavioral finance. A frequently quoted example is a study

of the divergence in price between the shares of Royal Dutch Shell and Shell T&T [Froot and Dabora (1999)].

A more radical school of behavioral economists discards conventional economic thinking and builds a world view which allows anticipations to evolve and human behavioral biases to persist, and which explains the 'reflexive' nature of periods of stability and turmoil [Tversky, Soros, etc].

In line with this type of thinking, Feiger and Shojai (2003) provide an overview of some investor behavior studies and find that investors look for commentaries and ideas that reinforce their opinions rather than evenhandedly evaluate contrary arguments by others. They suggest that this explains why despite the clearly expressed analyses of leading commentators, markets moved in opposite directions at different stages of the dot.com boom and bust. They also acknowledge that because pricing models are questionable at best, it is not possible to use aggregate psychological data to determine asset prices. So far it has not been possible to derive any empirically effective pricing mechanism using behavioral finance.

So we are left with the traditional pricing models, of which it can be said, in this area as in so many parts of modern economics, that economists try to make the real world fit their own models, rather than the other way round. When the models do not work, it is investors who are at fault.

Oddly, the fact that financial economics is neither a science nor of much real value to those who apply it in practice does not seem to be of much importance to those who spend their lives publishing articles in the journals which are mainly intended for the libraries that house them so that other academics can comment on them.

What then should be used and what should be taught?

Market prices are created through very complex interactions of institutions, rules, people, and information. Financial markets deal with values pertaining to futures which may be quite distant and much less likely to be understood than, say, markets for bananas or lettuce, whose value becomes predictably zero if they are not consumed rather quickly.

Classical economics has created very useful and suggestive ideas to help decision-making, among them:

- People tend to suffer more psychologically from the loss of a dollar than they benefit psychologically from the gain of a dollar (risk aversion requires compensation for taking of risk).
- Risk should be seen in a portfolio context, not asset by asset (thinking about what constitutes real diversification yields benefits).
- Prices will adjust so that all assets will be held by someone (making ridiculous assertions such as 'no one will want US government debt').
- The capital structure of a company redistributes its cash flow risk among classes of claimants.
- Many asset classes have the characteristics of options granted by the holders of other asset classes.

More recently, other ideas have been added to these:

- Statistical modeling of risk is of marginal value because the risks (and so, in a technical sense, their probability distribution) are endogenous to the system, given that events change the beliefs and actions of the participants.
- For a variety of reasons, from momentum trading strategies to an inability to rationally analyze complex systems, markets tend to oscillate violently.

- The automatic ‘circuit breakers’ provided by capital flow controls and a variety of other regulations have been greatly reduced since the late 1970s, allowing increasingly large flows of capital to amplify whatever problems the markets have.
- Moral hazard is easily created by government endorsement of rating agencies and backstopping of institutions and the financial system, and is very hard to control.

These are great accomplishments, worth teaching and probing and learning from. In the physical sciences, ongoing empirical work would be turned into theory that would be subject to further empirical test. Economists should act in the same way. Out of this could be generated a rich economic history replete with examples and ‘mini-theories’ which would apply to particular markets and would be very useful in decision-making. Indeed, this appears to be the approach that the U.S. Federal Reserve Bank has used, under economic historian Ben Bernanke, in struggling with an extraordinary sequence of events that almost collapsed the world credit system. The novel lesson from this crisis concerns the nature of liquidity, a concept that has no place or meaning whatsoever in the perfect markets of classical economics. Thinking about liquidity has certainly extended our own asset management activities. One hopes that it will become a central component of financial writing and teaching as the economics profession acts like the science endeavour it claims it has already become.

Conclusion and suggestions

In this, the second paper in the Economists’ Hubris series, we have examined the practical applications of the most widely known and accepted asset-pricing models. CAPM, while the most simple is the most brilliant, but simply not a tool that can be applied in practice. All current pricing models fail both as empirically useful tools and in terms of their underlying logic relative to observed asset-price behavior. We wonder why mainstream finance does not focus on this as one of its central challenges.

Behavioral financial economists do highlight the overreactions of the markets, but the academic discussion has drifted to the rather sterile question of why arbitrage does not take place the way academic thought suggests it should. To date, behavioral finance has contributed about as much to mainstream finance as homeopathy has contributed to neurosurgery.

What to use instead? In practice, people “in the business” use old standbys. The most commonly used is the price-earnings ratio (P/E). Another, less common, is the price-dividends ratio (P/D). The appeal of the latter is that dividends are actually paid whereas earnings are an increasingly esoteric accounting concept. All such “classical” measures are combined with various assumptions about mean reversion, specific to industries or overall market situations. In addition, “technical” measures of supply and demand for securities, based on available cash and indicators of momentum, are in broad use. Clearly, for considerable periods momentum has been a more fundamental driver of market movements than any other valuation logic. Think back to the dot.com bubble and the housing bubble.

It’s pretty unsatisfactory to leave things like this. However, as we survey the academic scene we see primarily pseudo-scientific approaches that are perfect for publishing theoretical academic articles but very imperfect for the real world.

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