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The Capital Asset Pricing Model and the Efficient Markets Hypothesis: The Compelling Fairy Tale of Contemporary Financial Economics

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Abstract: The Capital Asset Pricing Model and the Efficient Markets Hypothesis, two central aspects of the theorizing of contemporary financial economics, have been subject to a barrage of specific criticisms but remain resilient and indeed centerpieces of the theorizing and highly influential policy advice of leading contemporary financial economists. This article seeks to bring together all of these various criticisms to show that while the closely related twin theories might be able to withstand many of the specific criticisms taken individually, when all are taken together in a critical philosophical assessment, the verdict on them is damning; they are clearly empirically falsified (in the Popperian sense) and harbor, moreover, some highly challengeable if not incoherent presumptions regarding human rationality. It will be concluded that their persistence, despite these manifest defects as central theories of financial economics, is due to the ideological role they play in the mythology of Market Fundamentalism. The originality of the article lies not so much in the long list of criticisms of the twin theories (since these are well rehearsed); it lies in taking all of these criticisms together and seeing them through an epistemological and political philosophical perspective.

Keywords Capital Asset Pricing Model (CAPM); Efficient Markets Hypothesis (EMH); financial economics; ideology; market fundamentalism; political myths; risk preferences; (rational) expectation formation; rationality in human decisions

JEL Classifications E44; G11; G12; G14

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INTRODUCTION

The field of Financial Economics theorizing for the past 50 years has been dominated by two related theories: the Capital Asset Pricing Model (CAPM) and the Efficient Markets Hypothesis (EMH). These theories have also had a certain influence on much mainstream neoclassical economic thinking, and they have certainly exercised an influence on policy making in relation to financial markets as part of a politico-economic credo that has come to be known as Market Fundamentalism or as Neoliberalism (*Ultralibéralisme* in France and other continental European states).

Yet despite their continuing influence, these theories have been subjected to sustained criticism both in terms of the falsification of most of their key predictions in empirical tests and in terms of the defensibility of certain of their key theoretical presumptions. The purpose of this article is to conduct a critical reflection on the upshot of the long line of specific criticisms of the twin theories and to conduct a philosophically informed assessment of the ultimate significance of these criticisms. It will be shown that the two theories (CAPM and EMH) are intimately related to each other (in effect, EMH presupposes at least some version of CAPM); that each has had a poor record in terms of empirical testing insofar as financial markets persistently falsify their predictions; and that when we delve more deeply into the theoretical underpinning of the theories, these turn out to be economically implausible and even incoherent and in any case philosophically highly challengeable. In particular, they operate with a conception of human rationality and of expectations that is unbelievably narrow, not to mention the fact so strongly put forward by behavioral economists that human decisions and actions in the face of uncertainty (and so in particular decisions regarding investment in financial markets) are often driven more by emotional waves of optimism and pessimism rather than by cool-headed rationality. We will thus be led to conclude that the CAPM and EMH are both today indefensible as theories and that there is a crying need to replace them with a sounder theoretical framework for financial economics.

The fact that this replacement of CAPM and EMH has not occurred in mainstream financial economics teaching, research, and policy advice (despite the valiant efforts of the behavioral economists from Keynes through Schiller to Minsky, to name but a few) leads on to a reflection on the reason(s) for this resilience. We will suggest that one key reason is ideological; any political philosophy or political economy worth its salt needs its mythical foundation, an inspiring story outlining a supposedly ideal view of the world to inspire and galvanize the supporters of the ideology in question. CAPM and EMH provide that mythological foundation for Market Fundamentalism—hence their resistance to replacement at all costs. They constitute an article of faith for the Market Fundamentalist faithful.

The argument will be developed in the following steps. First of all, the CAPM will be briefly outlined, paying particular attention to some of its remarkably simplifying assumptions. The refinement of the model through different iterations will be noted, as also the influence of persistent falsification of its predictions on the development of the theory. Since none of this is particularly original, we will move quickly to an epistemological assessment of the overall impact of the barrage of different criticisms and the defenses of the theory offered in response. The EMH will then be examined in a similar vein, and the indissoluble

linkage between the two theories will be demonstrated. This will lead in to an epistemological assessment (based on Karl Popper's falsificationist methodology) of the so-called joint hypothesis problem that presents itself when EMH is tested insofar as it presupposes CAPM. Our eventual verdict on CAPM and EMH will be that it is long since time that they should be discarded as theories in financial economics. The fact that this has not happened it is suggested is in view of their mythical function within the ideology of Market Fundamentalism. The article will conclude with a call for economists to develop more sophisticated conceptions of human rationality as a prelude to developing more adequate theories of financial markets (and we would see behavioral economics as making a crucial contribution here) and for economists to be more honest about the hidden value judgments motivating their research agendas.

THE CAPITAL ASSET PRICING MODEL (CAPM)

The Capital Asset Pricing model (CAPM) was first introduced in financial economics in 1964 by the work of William Sharpe (Sharpe 1964), who built on some of the earlier work on risk preferences by Harry Markowitz to create a new theory of "Capital Asset Prices, a theory of market equilibrium under conditions of risk." This was quickly followed by the contribution of John Lintner (1965) and taken together their work is regarded as the starting point and the earliest version of CAPM. The essential theoretical insight of the model may actually be expressed in quite a simple idea and related equation. An investor considering assets to buy in the process of portfolio choice will (at least if they are rational in Sharpe/Lintner terms) seek an expected return on an asset a defined as follows:

$$rae = rf + \beta ae(rme - rf)$$

where rae = return to be expected on the asset a and so this is to determine market price that the investor will be prepared to pay for the asset; rf = return on a risk free asset; βae = expected potential volatility of the price of a in relation to volatility of asset prices in the market as a whole; and rme = average overall expected return of the market as a whole.

One of the earlier criticisms of this model focused on the notion of a risk-free rate of return. What asset could be deemed to be entirely risk-free so that its return could be taken to represent rf ? That particular problem was addressed in a revamped version of CAPM put forward by Fischer Black (1972) in which the assumption of the existence of a risk-free asset available in unlimited amounts to investors is replaced with the assumption that there can be unrestricted short sales of risky assets. If there is no readily usable risk-free rate, then what we need is some way of estimating return on zero beta assets (that is to say, assets that are unaffected by systemic developments and whose volatility is therefore insulated from overall market volatility), and the Black model uses the assumption of potentially unlimited short sales of risky assets to estimate this return on a zero beta asset.

The subsequent criticisms of CAPM can be readily subdivided into those that focus on the poor performance of the theory in empirical tests and those that are focused on the theoretical

assumptions (although the two may be related, crudeness in theorizing may lead to a poor predictive record in practice).

CAPM IN EMPIRICAL TESTS

Ever since its appearance in 1964, the CAPM has been subjected to extensive empirical testing to see if its predictions regarding asset pricing in financial markets are corroborated. I will simply summarize the main results of the testing process here and refer the reader interested in the detail of these tests to Fama and French's frank and comprehensive summary in their 2004 review article on CAPM (Fama and French 2004). They document how, in the earliest tests of the Sharpe/Lintner model, the theory's key predictions were in effect falsified and how in Black's reformulation (see previous) the theory initially appeared to predict better but that in further tests in the late 1970s and early 1980s the CAPM again appeared to be clearly falsified. This led Fama and French to conclude from a review of the CAPM's performance in empirical tests carried out in 1992 (Fama and French 1992) that by that date in view of "the synthesis of evidence on the empirical problems of the CAPM. . . . It was generally acknowledged that the CAPM has potentially fatal problems" (Fama and French 2004: 36).¹ In short, they concluded that by 1992 the CAPM in its early variants had been conclusively falsified in empirical tests.

When faced with such definitive falsification, a scientist must reject the theory as stated and at the very least reformulate it in a distinctively new format (which then in turn must be subjected to severe empirical tests), or they must formulate an entirely new theory (an Einstein moment). This much is simply to recall the central insights of Karl Popper's seminal contribution to the methodology and philosophy of science (Popper 1972: ch 1). The only other alternative (one that is often attractive to economists) is to give up any pretense at empirical relevance and to say that the theory is a description of a possible and ideal world that can then serve as a regulative ideal or criterion for policies.² This latter type of stratagem for CAPM we shall examine in Theoretical shortcomings section below.

In the spirit of seeking to delineate an improved formulation of CAPM for purposes of further empirical testing, Fama and French (1993, 1996) in the 1990s developed the three-factor model. The methodological background to this development is of particular interest for this article. Already in 1973 Robert Merton had developed in theory an intertemporal version of the CAPM (Merton 1973) in which the investment decision was seen as depending not exclusively on β_{ae} , and thus not simply on the expected asset price at the end of a single decision period, but rather on a range of future state variables reflecting future consumption and investment opportunities at the end of the decision period. The challenge for empirical testing is to define these other future state variables that may be relevant *and* to measure them unambiguously for purposes of empirical testing. Fama and French's (1996) reformulation attempts just such a definition of readily measurable state variables but in a curiously ad hoc statistically motivated manner. Rather than departing from an a priori reflection on what might in fact be relevant future state variables for a rational investor, they build on one of the most evident falsifications of the CAPM to date—namely, the clear and repeated

evidence that the prices of certain definite types of stocks are out of line with what simple CAPM predicts. For example, stocks of high-growth firms (with low book to market ratios) are systematically higher in price than CAPM would predict, while stocks in distressed firms (high book to market ratios) are systematically found to be lower than what CAPM would predict. It has also repeatedly been found that average returns of small firms (measured by market capitalization) are higher than CAPM would predict. Fama and French then take these very same variables that emerge from the falsifying studies—namely, firm size and book to market ratios—and use them as the relevant state variables that are needed to reformulate CAPM in Merton's sense. This results in the so-called three-factor CAPM where asset prices are predicated on β_{ae} , firm size, and book to market ratios.

This stratagem involves what methodologically we can characterize as a blind instrumentalist move, and it is highly questionable at an epistemological level. In effect, Fama and French are saying that they do not really know or have any good explanation for why size and book to market ratios should be so crucial in asset pricing, but when they use these as relevant state variables in a Merton type model, they improve the predictive power of CAPM. This is an argument of which the great instrumentalist economist Milton Friedman³ would be proud, but this author has already developed a detailed epistemological criticism of Friedman's instrumentalism at length elsewhere.⁴ But at least we can say that Fama and French are aware of the crudeness of the stratagem without actually articulating their reservations on an epistemological level—to quote them: “the higher average returns on small stocks and high book to market ratios reflect unidentified state variables” (Fama and French 2004: 38), and even more clearly expressing their embarrassment:

From a theoretical perspective the main shortcoming of the 3 factor model is its empirical motivation. The small-minus-big and high-minus-low explanatory returns are not motivated by predictions about state variables of concern to investors. Instead they are brute force constructs meant to capture the patterns uncovered by previous [empirical] work on how average stock returns vary with size and the book to market ratio. (Fama and French 2004: 39)

While the three-factor model does somewhat improve the predictive record of CAPM (not surprising, given the instrumentalist manner of the reformulation), Fama and French by the time of their 2004 work admit that even the three-factor model still faces falsification in many empirical tests as a result of what appears to be a momentum effect. That is to say that assets that in the previous 3 months to a year have performed well tend to continue to do better even if the CAPM suggests today lower prices for these assets, and vice versa assets that have done poorly will tend to be underpriced by comparison with what CAPM would suggest today. Bearing in mind that in a Popperian methodology any one definitive failure of prediction replicated over a number of empirical tests constitutes a falsification of the theory, once again we have to conclude that CAPM even in its Fama and French three-factor reformulation is falsified. Since this outright falsification is potentially linked with Keynesian animal spirits (Keynes 1936: 161) as a possible explanation for the observed momentum effect, this suggests fairly clearly a move into behavioral territory in seeking to reformulate the theories of asset price formation in the real world (waves of optimism and pessimism, etc.).⁵

To be fair to Fama and French, they not only acknowledge these empirical failures even of the three-factor CAPM, they warn of the resultant dangers of using the CAPM in practical applications—for example, in fund management or appraisal of fund managers' performance. To quote them: "We warn students that despite its seductive simplicity, the CAPM's empirical problems probably invalidate its use in application" (Fama and French 2004: 44).

Before we leave the discussion of the empirical failures of CAPM, we should of course note one other line of empirical critique that was initiated quite some time ago by Richard Roll (1977). Roll's argument has been repeated in various critiques of CAPM since⁶ without ever really having been properly dealt with (at least in the view of this author). Roll asked the pointed question of what we are to consider and include as assets in the average market portfolio that is used to estimate both overall average market return and overall market volatility. He also raised the question of how broadly the net is thrown in terms of *types* of asset when making the fateful CAPM calculation. To take a very simple example, are we to include potential investment in human capital or (for a business) in reputation and good will as part of the overall portfolio choice? If so, average returns on such assets would also have to be included in calculation of *rme*. That may be possible, but we will be a long way from the initial intent of Sharpe, Lintner, and Black, and it will pose a major challenge to the empirical testing of CAPM because of the difficulty, nay ambiguity, of what is to go into the calculation of *rme* for purposes of testing. Indeed Roll himself concluded from his critique that CAPM would in reality be untestable.

Roll's point has often been interpreted as an empirical one; in short, the problem is just about how are we to estimate *rme* of the basic CAPM formula in our empirical tests? But in the view of this author, while this is certainly an empirical challenge, there is also an underlying theoretical problem. The CAPM seems to involve a very compartmentalized view of portfolio choice by a typical investor in that the focus is entirely on financial market assets and, in early empirical tests at least, on assets in U.S. financial markets. But today when loanable funds flow relatively freely throughout the world (and in some regions such as the EU there is complete freedom of movement of capital), surely the average market portfolio used to estimate *rme* and β s must at least be based on some kind of average return on an international portfolio of assets. But how international does this portfolio need to be? And does every investor look to the same international portfolio when estimating average market return available? For example many investors will have views that could be based on ethical convictions or differing assessments of political risk, which will lead them to exclude certain types of asset or certain countries from their consideration of investment options, and this perforce affects their view of the average market return available to them.

Let us recall that CAPM requires that all market decision makers estimate the same overall expected market return, and so they must all be looking to the same average market portfolio. In the end, therefore, Roll's critique suggests that in addition to the manifold empirical problems of falsification, CAPM also harbors some serious problems of theoretical incoherence. In the next section, we will see that these go well beyond those already identified.

THEORETICAL SHORTCOMINGS

Probably the most fundamental theoretical problem with CAPM is one that immediately leaps to the attention of a critical philosopher but that has been barely noticed in the critiques by economists of CAPM: At the heart of the model there is a colossal equivocation. Is this a theory about how investors *actually* make their decisions about asset pricing (the prices they are prepared to pay for specific assets on a market), or is it a theory about how investors *should* or *would ideally* make their asset pricing decisions if they were entirely rational? If that second alternative seems a bit loaded, one could at least ask: Or is it a theory about what sorts of asset pricing decisions would lead to a market-clearing equilibrium? However, since it is a short step from demonstrating the possibility of a market-clearing equilibrium to presuming efficiency, and so in some sense Pareto optimality provided there is perfect competition, demonstrating equilibrium properties of asset markets (which in the case of financial markets perhaps converge reasonably closely perfect competition)⁷ is in effect to demonstrate that actors in those markets are behaving in an optimal manner. They may not of course specifically intend to produce optimality,⁸ but that is the overall resultant of their actions. In this second interpretation, we can see already a hint of the inextricable linkage between CAPM and the Efficient Markets Hypothesis (EMH) to be discussed in Section The Efficient Markets Hypothesis (EMH).

Since we have already seen that despite repeated efforts at reformulation the CAPM to this day has a very poor predictive record in relation to actual market behavior by investors, this suggests that if the model is to be defensible it must be as a description of ideal or at least economically efficient asset pricing decisions in ideally functioning financial markets. This is more or less the conclusion that Fama and French reach in their seminal review article (Fama and French 2004), and not coincidentally, this is the same Eugene Fama who developed the EMH. But if the CAPM is a description of some kind of ideal superefficient world, then the whole basis of critique shifts away from questions of empirical corroboration/falsification of the theory to questions of a much more philosophical nature. For example, would the world as described by the CAPM really be ideal, and if ideal, how feasible in principle would it be for investors ever to act in accordance with CAPM? On these philosophical questions CAPM does not fare well. The fundamental picture it portrays is one of decision makers in financial markets who are fixated on maximizing financial return while minimizing risk. Despite the longstanding celebration of material greed (and so maximization of financial return) as a beneficent motivating force by a long line of classical and neoclassical economists since Adam Smith, many thinkers today would question this fixation to suggest that perhaps there is a lot more to human well-being than simply the pursuit of material or financial gain. There are factors fundamental to human well-being that money simply cannot buy (love, true esteem, spiritual balance, and peace with oneself and others, etc.), and as economic development proceeds, these become ever more important as factors in human well-being. It is precisely this growing significance of nonmaterial factors in human well-being that new macro-level indices such as the Social Progress Index or the World Happiness Report seek to capture.⁹ But if human beings are motivated by more than just material/financial gain, then this will inevitably affect at least some of their investment

decisions, which may now include all manner of ethical and/or self-actualization motives.¹⁰ Apart from this, there is also the other well-known limitation of the classical argument for the supreme efficiency of markets—namely, that it remains silent on the question of the equity of the distribution of wealth and especially on equality of opportunity produced in a *laissez faire* market system.

Getting down to more specific theoretical limitations of CAPM, seen as an ideal of an efficient financial market one central assumption made by the theory is that investors are risk-averse and therefore that they need a higher return as a “reward” for taking greater risks. This idea is so completely ingrained in the thinking of writers on finance and financial economists in general that it is never questioned; it is for them a pure axiom. For example, the taking of interest on loans is routinely defended as a reward for taking risks. Yet in economic theory it has long been recognized both in the mainstream and in behavioral approaches that people’s attitudes to decision making when faced with risk are a good deal more complex than the simple idea of universal risk aversion suggests. Even Harry Markowitz himself (building on earlier work by Friedman and Savage) had developed the theory of expected utility maximization as an explanation of decision making under risk and uncertainty and, in that theory, it is recognized that if people’s risk preferences give rise to rising marginal utility of income over certain ranges (large gains from current position in particular), they will in such cases be *risk lovers* rather than risk averters. For people with such preferences over certain ranges of income and wealth, it is perfectly rational to gamble even when the odds are loaded against them (Markowitz 1952). It might be retorted that that is all very well for playing big lotteries or sessions in casinos but that financial markets are not superlotteries where everyone is gambling; rather they are populated by much more conservative folk. Well, ahem, maybe. The financial crisis of 2008 has put paid to that picture of financial markets as essentially conservative risk-averse institutions; remember that the CAPM requires that *all* (or virtually all¹¹) rational actors in the financial markets be risk averse. Not only is that idea false, if people have the sorts of risk preference described by Markowitz, then for financial markets to operate in a universally risk-averse manner would be a direct violation of Pareto efficiency! It behooves financial economists to remember that in the great neoclassical discussion of efficiency and optimality in resource allocation, tastes are an exogenous given and so “*de gustibus non disputandum est*”!¹² This argument is only strengthened by the subsequent work of such behavioral economists as Kahneman and Tversky (1979) in their studies of how people make choices in the face of risk. The idea that people’s attitude to risk can be summed up as simple risk aversion is completely exploded in such work.

Another crucial theoretical assumption made in all versions of CAPM is the convergence of market expectations—that is to say, that all (or let us say almost all, for the real world is never frictionless) investors have essentially the same set of expectations about how the market will evolve in the future. It is these convergent expectations that determine the *rme* variable that is central to the model’s formula.¹³ But this is a highly challengeable assumption that is completely at variance both with epistemological considerations and with what we know of human psychology; hence it has no place even in a model of supposedly ideal or efficient market functioning for human beings. The psychological objection is perhaps the

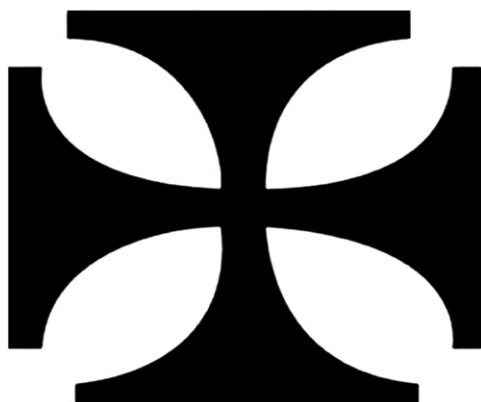


FIGURE 1 The Constructivist Flower/Leaves Cross Picture

easiest to see and has been widely emphasized in behavioral economics: People form their expectations of the future on the basis of a whole range of considerations—some coldly rational and some more purely emotional—and while certainly there are herd effects present, it is simply a total distortion of human reality to say that we all form the same expectations of the future.

Actually lurking behind the idea of closely convergent expectations is an epistemological misconception, one that has been particularly propagated among economists in the so-called theory of rational expectations. It is almost universally held by economists, and in particular by defenders of CAPM, that if all agents have access to the same information regarding assets and their underlying background, they will form the same expectations regarding the future prospects for those assets. In the economic theory of rational expectations, this attainment of the same expectations on the basis of the same information is of course assisted by using relevant economic theory to work out the likely prospects.¹⁴ But what if there are differences of view about relevant economic theory? Economics as a discipline is well known for its bitter internal controversies, which can hardly be said to have been put to rest today. This is actually an instance of a much more fundamental epistemological point: If two people are given access to exactly the same information, this does *not* mean that they will form the same expectations regarding the future. To assume so implies a completely mechanistic conception of human cognition that was exploded by Immanuel Kant more than two centuries ago. Kant's fundamental insight, which is expressed in our own day as the "constructivist" insight in epistemology, was that in every act of human cognition the human mind (or human subject) is actively construing the raw data of sense perception into a constructed picture or structured account of the phenomena under observation or study. The simple flower/leaves/Maltese cross diagram (see Figure 1) serves to illustrate this very clearly. When one looks at the diagram, one can see a depiction of a flower, or of leaves opened out, or of a Maltese military cross, or perhaps even other things. What is happening is that one's mind or subjectivity is taking the raw data of the senses and actively constructing these to be different

things. Intriguingly one cannot see at any one instant all three possible construals; the mind has to shift between them.

This example is of the utmost simplicity, but the point it illustrates has been central to all epistemology since Kant, and it is of paramount importance to our discussions here of expectations in CAPM. It implies that *even if all agents in financial markets had access to the same information, they would not necessarily form the same expectations*. In fact, given both the general creativity of human beings in construing the world and the sharp differences of interpretation of the economic realm in particular in the different schools of political economy, to expect that human agents (even with the same information available to all) would reach the same set expectations regarding future developments of the economy and of financial markets is quite ridiculous. We will have occasion to return to this point when discussing the EMH in Section Theoretical Shortcomings of EMH.

Another related theoretical flaw in the CAPM relates to the estimation of the β (beta) of the asset being priced—that is, β_{ae} in the CAPM formula. This is the expected volatility of the specific asset in relation to the (expected) volatility of the market as a whole. This latter today we would perhaps call expected systemic risk. But how are we to estimate the *expected* systemic volatility of the market as a whole (i.e., of an average “market portfolio” of assets), and how are we then to estimate the *expected* volatility of the specific asset we are seeking to price correctly? In fact, in the CAPM, the expected market volatility and the expected volatility of the specific asset under consideration are extrapolated from past experience, and so in effect the future is expected to be like the past. In the presentations of CAPM this point is hidden away or even obfuscated in the statistical definitions and machinations in terms of variances and covariances that are used to estimate expected β s. There is nothing theoretically wrong with the statistics per se, but what is often hidden from view in the discussion is that the variances and covariances being used are *expectational* variables that are constructed as simple extrapolations from past data regarding the market as a whole and the specific asset (or assets similar to it). They assume that the future will be like the past. In the absence of a hotline to God, no doubt many people—and many investors in particular—would say that that is their best shot at constructing expectations, but epistemologically the assumption that the future will be like the past is indefensible.¹⁵ Even in the philosophy of the hard sciences—at least since the time of David Hume—this presumption that the future will always be like the past has been known to be problematic (the logical problem of induction), and the seminal contribution of the great 20th-century philosopher of science Karl Popper was to recognize that the problem of induction is unsolvable for science: hence the turn to falsificationism (Popper 1972). If even in the hard natural sciences we cannot presume that the future will always be like the past, how much more is this the case in the human sciences, where we are in the presence of creative innovative human beings who are capable not only of generating supreme technological transformations and progress but also quite probably climate change (in which case the future really will not be much like the past)?

The previous discussion suggests that the whole treatment of expectations in the CAPM is indefensible a priori at the purely theoretical level and therefore warrants rejection of the

model on grounds of theoretical incoherence or even impossibility before even proceeding to test it empirically.

THE EFFICIENT MARKETS HYPOTHESIS (EMH)

In the course of the previous discussion of the CAPM, we saw that, in the face of its tribulations in empirical testing, it could be retained as an idealized theoretical model that outlines how people would price assets in financial markets if they were rational and well informed, and the resulting set of asset prices being those produced by (nearly) perfectly competitive financial markets in which all transactors are well informed will be *efficient* or Pareto optimal. This kind of conclusion regarding the efficiency of free markets in general in the allocation of scarce resources goes right back to Adam Smith; it has been formalized mathematically in the work of neoclassical economists on general equilibrium theory.¹⁶ It is clearly implicit in those discussions of CAPM that tend to defend the model as a normative ideal. This is then the bridge to the Efficient Markets Hypothesis (EMH), and the EMH was developed initially by none other than . . . Eugene Fama.

The EMH grew out of Fama's reflections on the meaning of efficiency in financial markets, reflections in turn based on the work of the French mathematical economist Louis Bachelier on the theory of speculation dating back to 1900 (Bachelier 1900). In his initial work on the topic (Fama 1965a), Fama proposed quite a specific definition of efficiency for financial markets: The market will be efficient (or have an efficient vector of asset prices) when "on the average competition will cause the full effects of new information on intrinsic values (of assets) to be reflected instantaneously in actual market prices" (Fama 1965b: 56). We can readily recognize here two of the fundamental requirements of optimality in resource allocation of neoclassical general equilibrium models: the requirement that there should be perfect competition and that all transactors should have perfect information at least in matters relating to the market in question. But Fama's intention is to propose much more than just a sketch of an ideal of efficiency in financial markets: It is to suggest that apart from occasional and very exceptional circumstances, financial markets are always in reality efficient (on this definition). Clearly this latter claim must be empirically testable.

It is well known that the EMH comes in three variants known as the weak form, the semi-strong form, and the strong form.¹⁷ What is less well appreciated is that the EMH—in particular in its empirical prediction that markets will be efficient—presupposes some variant or other of CAPM. After all, how are we to make the step from the perfection of available information postulated in EMH to the asset-pricing decision unless we also have a theory of how investors/transactors in financial markets actually make their pricing decisions? For Fama, clearly CAPM provides the missing link from information availability to actual market prices, and to his credit, he has always admitted this linkage. When we read his meticulous work on CAPM and EMH, the intimate link is clear enough. For example, he has emphasized "that the hypothesis that prices properly reflect available information [and so are "efficient" in EMH terms] must be tested in the context of a model of expected returns like the CAPM" (Fama and French 2004: 40) [brackets mine].

While of course it would be possible to imagine other asset-pricing models than CAPM, which could be combined with EMH, the fact of the matter is that Fama has used CAPM for this purpose, and indeed the efficiency predictions of EMH are probably quite sensitive to the use of CAPM rather than other models of asset pricing. It would be hard (but not impossible) to imagine that a radically behavioral theory of asset pricing combined with the informational assumptions of the three variants of EMH would lead to the same conclusion of efficiency and implicit optimality.

Bearing in mind that all three variants of EMH in fact presume the CAPM as a basis, we may briefly recall their central assertions.

1. The *weak version*: Asset prices (formed as in CAPM) already embody all relevant *past* information perfectly (and *all* traders have this information). It would follow that investors or market analysts cannot hope to make better returns than the market average by technical analysis of past asset price trends. Moreover, there are no long-term trends from which investors can earn higher returns through their detection because it is held that all such past information is completely publicly available and incorporated into the asset prices. In short, this is the famous prediction that asset prices will vary in the manner of an entirely random walk whose randomness in turn reflects the emergence of news entirely unpredictable from past experience from time to time (e.g., radical innovations with strong commercial potential). But apart from those periods, markets will be dormant most of the time and will show significant trading activity only for periods after the emergence of relevant news (or if there is significant insider information asymmetry; see the following under the semistrong version). A corollary implication is that it is difficult but not impossible for traders or fund managers to outperform the average market portfolio performance. All have the same information regarding the past, and so analysis of past trends cannot be a way to outperform the market, but an analysis of “fundamentals” for an asset might enable some investors to predict in advance new movements in the random walk and so profit from these if they act quickly and with foresight. Any other traders who may outperform the market significantly do so only on the basis of insider information (a valuable source on those “fundamentals”), criminal schemes (such as Ponzis), or through a run of sheer good luck.
2. The *semistrong version*: This holds that asset prices (formed as in CAPM) will reflect all relevant past information *and* in addition all publicly available current information immediately it becomes available. Hence market prices will react immediately and smoothly to any relevant news that emerges, and the only way for an investor to outperform the market will be through having insider information, which is current information relevant to certain asset prices that is not publicly available to all. The empirical prediction/implication of the semistrong version is also quite strong: Market trading will occur only in brief frenzied bursts when relevant news appears, while most of the time the markets will be dormant or trading just on insider information asymmetries. Another prediction as noted previously is that only an agent with insider information (or an amazing run of luck or a criminal scheme such as a Ponzi) can outperform the market.

3. The *strong version*: This holds that asset prices (formed as in CAPM) will reflect all relevant past information, will react immediately and smoothly to any relevant news that emerges, and will also instantaneously and immediately embody all insider information that certain special groups may possess. The implication and empirical prediction of the strong version of EMH is bizarre, for it would mean that, if it were true, there would be no trading on financial markets—or that any trading that occurs is ill informed and irrational. Moreover, it would predict that no trader or fund can ever outperform the market except by sheer good luck.

It will probably be apparent that EMH simply does not predict accurately the actual behavior of financial markets. This means (as we saw before with CAPM) that, if the theory is to be retained by financial economists, it must in some sense describe a theoretical ideal that may have use as a guideline for policy making or for market practitioners (such as traders). As with CAPM, we now proceed to a critique of EMH in the first place as a theory that purports to describe actual financial markets and then as a theoretical ideal of sorts.

EMH IN EMPIRICAL TESTS

The EMH—at least in its strong and semistrong variants—can be seen by the most casual observer of financial markets to be blatantly falsified, but that has not prevented the hypothesis from being subjected to a huge amount of empirical testing, and this in itself is welcome since it is preferable to have rigorous tests as a basis for falsification of theories than just casual observation. It would be tedious and unoriginal to present here the results of all of these empirical studies in detail; the interested reader can be referred to such works as Fama (1991); Drennan and Berry (1995); Chan, Gup, and Pan (2003); and Lui and Chong (2013). From this extensive literature it can be concluded that indeed the EMH in its strong and semistrong version is falsified outright in empirical tests; stock markets and asset markets in general just are not dormant all, or most of the time nor is trading concentrated exclusively in short frenzied bursts (although these can occur). Moreover, the weak version, while appearing to have some degree of corroboration, in the end is also fairly clearly falsified by the evidence already mentioned in the context of CAPM regarding momentum effects in stock markets (Jegadeesh and Titman 1993, 2001).

Perhaps even more telling is the copious evidence that asset markets in general and for centuries have been subject to huge bubbles and subsequent bursts, the most prominent recent example being the asset price bubble that built up in the early 2000s, especially in the United States, only to burst spectacularly in the financial crash of 2008.¹⁸ These speculative booms and bursts could be seen as the momentum effect in an acute form, and they lead to huge volumes of trading (very far from the idea of largely dormant markets) that can hardly be justified on the basis of a cool analysis of all past information, as weak EMH requires.¹⁹ Economists know very well that these bubbles are not just occasional aberrations; ever since the tulip bulb bubble in the 1630s, in Holland asset markets have manifested regularly such

explosive speculative booms followed by devastating busts in various asset markets and in asset prices.

This brings us to an interesting apparent stalemate in the discussion of empirical tests of EMH. In the face of the incontrovertible evidence of asset price bubbles and bursts, Fama and other defenders of EMH have suggested that these are somehow irrational episodes and that while decision makers in the markets may have access to all of the relevant past information (at least), the problem is that they do not translate that information “correctly” into their asset pricing decisions. In short, they do not price assets in accordance with CAPM. This possibility has come to be known in the literature as the “joint hypothesis problem,” and Fama himself is fully aware of this (see the quotation from Fama in Section The Efficient Markets Hypothesis (EMH)). This problem is *methodological*, but we will argue that it is not actually a ground for stalemate but rather for more rigorous and imaginative testing of component hypotheses.

In the elaboration of a Popperian falsificationist methodology of science in the latter 20th century, this potential problem in application of a strict falsificationism was fully recognized: It is often described as the Duhem-Quine thesis and was dealt with in some detail in the work of Imre Lakatos (Lakatos 1970: 91–196). Whenever a scientific theory is subjected to empirical testing, it is not just one simple general theory with its resulting prediction(s) regarding the real world that is being tested; invariably there are also related hypotheses/theories being presumed, and these are therefore also under test in the same experiments/observations. These other theories Duhem and Quine referred to as auxiliary hypotheses, and they can cover anything from simple hypotheses regarding the mechanics and reliability of observation instruments (or of statistical data) to complex related theories from the same field or from related disciplines (the latter being particularly relevant when dealing with interdisciplinary problems such as climate change). Relating this to our discussion of empirical tests of EMH, the “joint hypothesis problem”—the conjoint testing of EMH and of CAPM that is inevitably involved since EMH adopts CAPM as its model for asset pricing—is in fact no more and no less than an instance of the methodological problem that is posed by the Duhem-Quine thesis.

But whereas Fama and French describe the problem as a “timeworn impasse” (Fama and French 2004: 40), for philosophers of science, while challenging, this is not an insuperable problem. Logically when a prediction that is made on the basis of more than one hypothesis is contradicted in empirical tests, it means that *at least one* of the component hypotheses is false, and of course it is well possible that more than one of the component hypotheses or even all of them could be false. Hence when a falsification occurs, at the very least we need to reformulate in some way or other the string of component hypotheses that make up the theory. There is no magic formula that can be applied blindly when carrying out this reformulation, and that is precisely where the creative genius of the great scientists comes into play. Essentially what we face is not a methodological impasse but a need to conduct new empirical tests in which we (1) seek to single out where possible individual component hypotheses of our original theory for independent tests on their own where feasible (for example, an independent test of the accuracy of a measuring instrument could be devised); and (2) seek to reformulate the original theory modifying one by one the component

hypotheses and testing the reformulated theory again after each modification of the component hypotheses. This is painstaking and time-consuming work when dealing with complex theories, but it is the stock in trade of the daily work of hard scientists, and as Popper noted, from time to time the reformulation may take the form of an entirely new understanding of the core theories, as with Copernicus or Einstein. But one thing is clear: The Duhem-Quine joint hypothesis problem is not a methodological impasse but an invitation to more detailed and painstaking empirical testing.

In the particular case here, one obvious way to address the impasse would be to seek empirical tests of CAPM that are independent of the EMH framework and presumptions. But as we saw in Section Theoretical Shortcomings, the CAPM even in its own reformulated versions (such as the three-factor model) continues to perform badly in empirical tests, and in the light of momentum effects as well as of evidence on animal spirits, it is simply falsified as a theory of how people actually price assets. This is not *per se* fatal for EMH, but it does mean that EMH must be able to demonstrate the accuracy of its predictions without relying on CAPM. Thus an equally obvious way of dealing with the joint hypothesis problem would therefore be to test EMH directly without presumption of CAPM. That has not to my knowledge been attempted to date, but given the nature of the predictions of EMH in all of its variants regarding financial market activity as already reviewed and the fact that these predictions are almost totally at variance with what we observe daily in those markets, it seems very unlikely that a revamped asset pricing model would be able rescue EMH's dismal predictive record. It would seem fair to this author to consider that EMH has itself been directly falsified in empirical tests and should therefore be abandoned as a theory of actual financial markets.

THEORETICAL SHORTCOMINGS OF EMH

If the EMH appears to be decisively falsified, then if it is to continue to be entertained as a useful part of the theorizing of financial economists, it must be because it in some sense describes a worthwhile ideal of how financial markets could and indeed ought to function in an ideal world. In short, EMH may have a useful role as a normative regulative criterion for economic policy making and supervision of financial markets. In this section, it will be argued that even as a theoretical ideal, the EMH has some severe shortcomings. The first shortcoming of the EMH at a theoretical level has been pointed out by Philip Pilkington in a recent work that echoes some of the themes of this article (Pilkington 2016). A central prediction of the EMH is that traders in financial markets all have access at least to all past information regarding assets (weak version) and in the semistrong version to all currently emergent information simultaneously. Hence in the weak version if any individual trader or fund appears to be outperforming the market, this can be on the basis of fundamental analysis that allows some traders to be able to predict news before it emerges (publicly) (e.g., the future path of the commercialization of radical innovations), or else it is only because of a run of sheer good luck or the result of insider information/criminal activities. In the semi-strong version the only way in which a trader or fund can outperform the market is by sheer

good luck (or again by insider information/criminal activities). Pilkington points out that there appear to be shades of pure tautology in these assertions. Anybody who does better than the market average is just being *defined as* lucky, and anybody who does worse as unlucky. Put another way, the statistical distribution of portfolio returns is being assumed to be normal, and any trader who is below the average of the distribution is unlucky, and any who is above the average is lucky. But in that case the assertion that investors who outperform the market are just lucky has become tautological and the EMH as a result empirically untestable as a theory. It collapses into a trivial statistical tautology. Perhaps it could be rescued by theorists defining in advance (in the weak version of EMH) what they mean by an investor skilled in fundamental analysis and one who is simply lucky in a manner that is identifiable *independently* of actual portfolio performance (and so in advance of the empirical tests), but none of the theorists of EMH have to date attempted anything like this. So, as things stand, the suspicion of a trivial statistically driven tautological assertion hangs over EMH.

Suspicion of the possible triviality of the definition of efficiency used in EMH leads us into a more searching critique of the somewhat unusual way the term is being used in EMH literature. To be clear about this, let us quote Fama's seminal work (Fama 1965b) launching EMH:

An "efficient" market is defined as a market where there are large numbers of rational, profit "maximisers" actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value. (Fama 1965b: 56)

Fama has stuck with his definition through thick and thin: For example, in his (Fama 1970) work he says that "A market in which prices always 'fully reflect' available information is called 'efficient'" (Malkiel and Fama 1970: 383); and a similar brief definition recurs in his (2004) article (Fama and French 2004: 40).

It must be remembered that when economists speak of efficiency, ideas of optimality—at least in resource allocation—are never far behind, and in fact, the famous criterion of Pareto optimality is considered to be precisely a condition of efficiency in the allocation of society's scarce resources. Although Fama never himself uses the term Pareto optimality, there can be little doubt that this is precisely what he has in mind when he speaks of the efficiency of financial markets and asset pricing. He specifically says, for example, that "The primary role of the capital market is the allocation of ownership of the economy's capital stock. In general terms the *ideal* is a market in which prices provide accurate signals for resource allocation" (Malkiel and Fama 1970: 383) [emphasis mine].

Now as mentioned in Section The Efficient Markets Hypothesis (EMH), Fama's detailed definition of efficiency as just quoted in fact embodies two of the crucial requirements that

economists recognize for Pareto optimality: perfect competition (absence of abuses of dominant position) and perfect (or near perfect) information with negligible transactions costs. Viewed as an outline of an ideal financial market—as opposed to a description of real-world markets—Fama’s EMH theory does therefore correspond to a certain extent with the Paretian ideal of efficiency. But I say “to an extent” because there is one hugely important element that has been recognized by economists as also essential for markets to produce a Pareto-optimal allocation of resources that is completely missing from all of the various treatments of EMH as a theoretical ideal—externalities. For any market to produce a Pareto-optimal efficient allocation of resources, it must also take into account any externalities of consumption or production that are being generated and duly correct these. It would be a brave theorist indeed who would argue that all investors in contemporary financial markets take into account all of the externalities their actions are generating (the classic example being environmental effects but socially damaging impacts can also occur).²⁰ Certainly there are some “ethical” investors and funds who explicitly seek to take into account these externalities as part of the information that is relevant to their investment decisions, but to say that all investors take account of all relevant externalities is patently false. Hence there is a huge omission in the EMH definition of the ideal of an efficient market, and as such, even as an outline of a theoretical ideal of efficiency in the sense of Pareto optimality, EMH must be rejected.

A second fundamental flaw in EMH conceived as a theoretical ideal as opposed to a theory that describes reality arises in relation to the presumed implications of all agents in financial markets having access to the same (near-perfect) information: It is presumed that this will lead them to have a set of completely convergent (or nearly convergent) expectations regarding the future prospects of all market assets, which will therefore lead to a single definitive set of asset prices. There is a fundamental epistemological flaw in this presumption that we have already discussed in Section CAPM in Empirical Tests. To presume that if we give human agents the same current information that they will all reach the same set of expectations regarding the future implies a mechanistic conception of human cognition that completely ignores the central discoveries of constructivist epistemology since Kant as well as of the psychology of perception (see discussion in Section CAPM in Empirical Tests). For once we recognize that people with exactly the same current information may reach widely divergent expectations regarding the future, there can be no definitively unique and “efficient” set of asset prices in financial markets. If all is functioning smoothly with well-informed agents, low transaction costs, and perfect competition, we may expect a vector of “equilibrium” asset prices to emerge, but it will be nothing other than the resultant of an array of widely divergent expectations that will be shifting from day to day as people modify their constructions of the future. Of course, these modifications of construction of the future implicit in the changed expectations of people may sometimes be the resultant of new information becoming available (as EMH allows), but it could also be the resultant of purely emotional reactions and so-called gut feelings,²¹ as has been suggested by behavioral theorists, or it could even be the resultant of a more mature critical reflection on underlying theoretical frameworks being used by people to construct their world view. To take an example: If climate change skeptics proceed to a deeper more mature study of the relevant theories and evidence and upon critical reflection decide that there may after all be a serious problem of

anthropogenic climate change, that study will alter, perhaps radically, their construction of the future and thus their expectations. Needless to say, some of those changed expectations may profoundly affect their expectations of future asset performance.

In fact, when we examine the epistemological presumptions of EMH, we realize that it not only ignores the constructivist insight in epistemology but also involves a very basic confusion (that is not just confined to EMH but quite prevalent in the Information Technology age of today) between perfect information and omniscience, perfect *knowledge*. This is not the place to enter into a detailed discussion of the distinction between knowledge and information or between knowledge and true belief (a great old epistemological chestnut); suffice it to say that for philosophers there is a distinction, and that for the EMH theory to produce a single common superefficient set of asset prices, it would require the presumption not just of perfect information but of *perfect knowledge*. And that is a fatal flaw in EMH as a theory, since no man or woman is omniscient, nor indeed—despite regular claims to the contrary throughout human history—has any man or woman had a hotline to God so as to be able to predict the future exactly.

Before concluding this discussion, it is only fair to note that Fama himself has occasionally acknowledged that people with the same information might not actually form the same expectations (Malkiel and Fama 1970: 387). But this is seen as a minor statistical anomaly: Most people will reach the same conclusions (especially if they have studied neoclassical economics), and while there may be outliers who disagree, they are no more than outliers on a distribution of expectations that is conceived as being statistically normal. In the view of this author, that is a wholly inadequate response that does not meet the epistemological challenge: Indeed it conceives of the problem purely in statistical terms. To consider expectations as being largely convergent around some mean value (1) adopts an essentially two-dimensional conceptualization of expectations as being simply above or below a mean value on a two-dimensional (normal distribution) graph; the multidimensional and essentially *creative* (because constructed) character of human expectations is being completely missed; and (2) if this average or mean value of expectations is then taken to be the basis of an efficient set of market prices of assets (as in EMH), we are stalked again with the specter of EMH as a vacuous tautology: Whatever set of asset prices the market comes up with on the basis of the mean expectations is deemed efficient and therefore Pareto optimal. To put the epistemological problem in all of this more brutally: What if the average expectations that emerge in financial markets are themselves seriously mistaken? And if so, how can the market be considered to be efficient and optimal? And lest readers may think that this is an outside possibility, please just consider for how long it was believed that the earth was flat, that the earth was the center of the universe—not to mention more poignantly the *average* expectations that were driving financial markets in the lead-up to the great financial crash and crisis of 2008.²²

The conclusion, which this author at least draws at the end of this critique of EMH, is that it is empirically conclusively falsified in all of its variants, and that as an outline of a possible theoretical ideal of how a financial market should work, it has very serious shortcomings. It cannot be said to outline an ideal of market efficiency or of Pareto optimality because it ignores questions of externality; its treatment of information and expectation

formation is epistemologically seriously flawed, and there is a real suspicion that in the end the theory is no more than a vacuous tautology asserting in effect that whatever set of asset prices a competitive market with informed agents produces is a priori or by definition efficient and optimal.

If we thus reject out of hand two theories that have played such a central role both in financial economics and in the political economy of finance (including in the policies and regulation of financial markets) for the past 50 years, an obvious question that arises is how two such defective theories (both empirically and theoretically) could have been entertained for so long and indeed continue to be entertained and taught in finance and financial economics courses around the world? This will lead us into some rather interesting philosophical territory.

THE IDEOLOGICAL FUNCTION OF CAPM AND EMH

In the case of both CAPM and EMH, we have found not only that EMH in effect presupposes the validity of CAPM so that we may take the two together as an interdependent theoretical nexus, we have also found this nexus to be unambiguously falsified in empirical tests, and if proffered instead as normative ideals of how a perfect financial market would or should operate, they harbor some very serious shortcomings, especially at the epistemological level. Yet CAPM + EMH continue to be enthusiastically entertained by their supporters, to be taught in finance and financial economics courses in business schools and to inform policy making in the financial sector and beyond in many countries. For example, enthusiastic financial deregulation such as was pursued in the United States, United Kingdom, and many other countries in the 1990s and early 2000s was inspired in part by a conviction that financial markets, if left to themselves to “self-regulate,” would produce an efficient, even optimal allocation of resources. The role of the state was at most to curb any abuses of dominant position that might emerge and to outlaw such abuses as insider trading, Ponzi scheming, etc. We may add that under the new Trump administration in the United States, the wholesale deregulation of financial markets is once again on the agenda (after a pause in the wake of the 2008 financial crisis) and is fairly explicitly based on a faith in the efficiency of totally deregulated financial markets.²³ Beyond the financial sector, the headlong drive toward privatization of state-owned enterprises in many of the same countries was based on a belief almost never questioned (at least in the mainstream of Economics) that deregulated private sector enterprises would automatically produce a greater level of efficiency in resource allocation than state enterprises, and this unshakeable belief was clearly buttressed by EMH.

For so problematic a nexus of theories to continue to exercise such an extensive influence in academic research, teaching, and practical policy formation, the only plausible explanation must be that they are performing an ideological function in some broader political economy or political philosophy. Political ideologies contain as essential building blocks or indeed keystones of their worldview certain theories that upholders of the political ideology cannot give up without jeopardizing the whole of the worldview in question. Such theories are playing much the same role as articles of faith in a religion: fundamental extrarational “axioms”

or revelations that the upholder of a religion must uphold and without which the religion loses most of its sense. The broader ideology of which CAPM + EMH arguably form keystones is not far to seek: It is what has come to be known as *Market Fundamentalism*, or in many continental European states as Ultraliberalism or Neoliberalism. This is a political economy, nay political philosophy, which comes in many variants but whose central principles are that market systems will always outperform *any* kind of state- or community-administered system for the allocation of a society's scarce resources, that individuals always know better than anyone else what is "best" for them and so that a system based on totally decentralized individual decision making and self-regulation in markets will succeed better than any other more centralized system to produce an efficient allocation of resources. Market Fundamentalists are therefore thoroughgoing individualists opposed in principle to any form of state or community role in the process of resource allocation. At most, the state should provide the apparatus of a legal and judicial system to enforce private contracts.²⁴

Market Fundamentalism has had a major influence on the political economy and practical policy making over much of the developed world and in some of the emergent economies in recent decades. Beginning with the individualism and radical antisocialism of the Reagan-Thatcher²⁵ era, the high tide of Market Fundamentalism was reached in the early 1990s with the fall of the old Soviet Union and the rapid transformation of the communist centrally planned economies into Western-style pure free market capitalist economies. The model adopted by most of these transformations was not that of the Nordic welfare states nor of the social market economy of many other EU states. It was a fairly thoroughgoing radically individualist form of capitalist market economy with a minimal role for the state reminiscent of the early days of 19th-century American capitalism. This has led some commentators to label the developments in the ex-Soviet bloc as cowboy capitalism. The influence of Market Fundamentalism on these transformations of old command economies to market systems will be evident, and it was indeed made fully explicit in the set of 10 policy guidelines summarizing the position of three of the dominant players in development policy and aid: the International Monetary Fund, the World Bank, and the U.S. Treasury. All three being located in Washington, DC, in the United States, this set of policy guidelines, which has had a huge influence on development policy advice and fulfillment of which has regularly been made a precondition of receiving development aid/loans from these institutions, came to be known as the Washington Consensus (Williamson 1990). Included among the 10 key principles are, for example, Privatization; Deregulation; and Guaranteeing Legal Security of Private Property Rights (Principles 8, 9, and 10 of the Consensus respectively).

But if Market Fundamentalism is thus being held out as an ideal for efficient politico-economic organization and development, we may ask in what precise sense is it ideal, and how are we to envisage realization of the ideal in practice? Here we come to the central ideological function of CAPM + EMH. The theories may be empirically falsified and harbor major shortcomings at a logico-philosophical level, but they lead to the conclusion that if people are acting "rationally" (i.e., in accordance with CAPM in asset markets) and if they are well informed, then the vector of prices that will be attained in those same markets will tend to be efficient, producing a Pareto-optimal allocation of scarce resources (EMH). Those well-informed individual investors know best, and so deregulated financial markets can be

trusted to produce an optimal allocation of resources. In short, if CAPM + EMH are valid, the case for Market Fundamentalism, if not made conclusively, is greatly strengthened.

Because of the central role played by financial markets in the overall allocation of productive resources in a society, Market Fundamentalists have a huge interest in maintaining these keystone theories. For them they are not just any old theories theory that may be falsifiable; they are articles of faith.

Market Fundamentalism is not of course a religion; CAPM + EMH are not written down in some sacred book of purported divine revelations. Their status is rather more akin to that of a myth or fairy tale. In any myth or fairy tale there is a central normative message about some kind of ideal world being conveyed, but on the basis of a fictional story that is not literally true of the actual world, and it may harbor serious internal incoherencies (as in the Alice in Wonderland fairy tale).²⁶ Any political philosophy worth its salt will have some such associated mythology of an ideal or even idyllic state that serves to inspire and to buttress the power of the philosophy or political economy in question and to galvanize its followers in their beliefs and enthusiasm for the cause. And herein lies the significance of CAPM + EMH for Market Fundamentalism: They provide precisely the mythological foundation that is indispensable to Market Fundamentalism. Without the inspiring idealistic view of financial markets that the CAPM + EMH myth provides, the attractions of Market Fundamentalism would quickly melt away.

A CRITICAL SOCIAL THEORY PERSPECTIVE

If CAPM + EMH are nothing but a fairy tale—since if taken literally, they are quite simply falsified in the real world—we may consider that these pillars of the mythology of Market Fundamentalism constitute what Marx called “false consciousness.” For Marx and for the thinkers of the Frankfurt school of Critical Social Theory inspired by his thought, a central role of the human scientist is precisely to unmask the ideologies that underpin political economy and human communication more generally in our age and the human interests that underpin these (Habermas 1972). In particular, where an ideology is nothing more than a false consciousness, the critical social theorist has an epistemological responsibility to expose this falsity, thereby contributing to emancipation of human beings from the interests that would seek to enslave them or at least keep them quiescent (Geuss 1999).²⁷ Given the analysis of CAPM + EMH that has been developed in this article, we can clearly now see that (1) we can think of these as a false consciousness that needs to be exposed in the spirit of critical theorizing; and (2) specifically that this myth is a keystone of the political economy/political philosophical position known as Market Fundamentalism; and (3) perhaps more controversially, that this mythology serves the interests of a diffuse and ill-defined but today powerful, nay dominant, class that we may label as financial capitalists or simply financiers.²⁸

CONCLUSION

If the arguments outlined in the course of this article are even partially correct, then the implications both for CAPM and EMH taken individually and even more so for CAPM + EMH taken together as a keystone of the Market Fundamentalist ideology are devastating; they should quite simply be abandoned by economists and discarded once and for all by economic policy makers. Despite laudable attempts at reformulation in more plausible versions, they continue to have a disastrous predictive record in empirical tests, this being particularly the case for EMH, and in terms of Popperian methodology of science, the theories are quite simply falsified. Admittedly financial economists might wish to hold on to the theories, even if unrealistic, as an outline of a theoretical ideal of some sort, but even at that level we found upon a critical philosophical examination that both theories harbored some serious a priori shortcomings in respect of their conceptualization of human rationality and the formation of expectations; that CAPM is severely limited in its conceptualization of relevant assets (the Roll critique, etc.); that EMH seems to be operating with a severely restricted conception of optimality in resource allocation (which ignores externalities and related market failures); and that overhanging the whole EMH argument there is a suspicion of tautological definition of efficiency. Finally, it was suggested that if in the face of such strong empirical and theoretical counterarguments economists and policy makers continue to adhere to these twin theories (and the influence of faith in EMH is patently obvious in financial market deregulatory policies and in blanket privatization policies), this can be explained in ideological terms: CAPM + EMH form one of the keystones of the mythology of free market beneficence that is central to the ideology that has come to be known as Market Fundamentalism (or as *Ultralibéralisme* or Neoliberalism in continental Europe). It is very difficult for the believers in this ideology to give up their faith in CAPM + EMH since, if they do, then a crucial component of their argument for the superiority, nay optimality of the allocation of scarce resources in a free market system will fall away. Put briefly and bluntly: If CAPM + EMH fall, then the allocation of scarce resources in financial markets can no longer be presumed to be efficient and so in some sense optimal. Wholesale deregulation that lets the market deal with each and every aspect of resource allocation in a society will no longer seem automatically so plausible or inevitable. Moreover, the rather lazy assumption that privatization will always lead to greater efficiency in resource allocation than under state ownership will be undermined. Fundamentalists will no longer be able to argue that the pursuit of profit in private sector enterprises *automatically* leads to a higher or better quality of service than under public sector provision. It may—or then again, it may not—and so the efficiency argument for privatization cannot be made in any blanket manner drawing on EMH but must be made on a case-by-case basis.

If my recommendation at the end of this critical examination of CAPM + EMH is that they should for once and for all be discarded by economists and policy makers, an obvious question will be: What is to replace them? They concern, after all, a topic that is of central importance to the operation and management of any economy—namely, the functioning of its financial markets with their central role in the transmission of savings (loanable funds) into investment. The evolution of new and better theories in respect of financial markets is

no doubt a fertile field for future research. But actually we would not be starting from a *tabula rasa*. In the field of Behavioral Economics, there are many economists who have been seeking to move away from the narrow and highly challengeable picture of expectation formation and consequent decision making that we found in CAPM + EMH (see, for example, Minsky 2008; Schiller 2015). Moreover, psychologists working on the psychology of people's attitudes to risk (Kahneman and Tversky 1979) have made immense contributions that much of the economics and finance profession, while acknowledging the work, has struggled to take on board (as witnessed by the pervasiveness of the presumption of universal risk aversion). Even more radical critiques of the sterility and implausibility of contemporary financial economics have been or are being elaborated in the works of Steve Keen (2017) and Philip Pilkington (2016).

Promising steps toward the development of an understanding of financial markets and of human decision making in such markets are thus already under way, and this work deserves to be given a far more prominent role in the teaching and research of economics as a whole (both micro and macro) and in particular in financial economics. In the light of certain aspects of the epistemological critique developed in this article, it seems to me that one fundamental theme that should infuse such new research is the abandonment of the idea of a static equilibrium set of asset prices in financial markets determined by some average set of convergent expectations and even more so the obsession with the idea that these static (CAPM determined) asset prices are somehow efficient or optimal. Instead, future theorizing and research about financial markets, expectations, and asset pricing needs, in my humble view, to take on board the following key themes:

Decision making does not occur in discreet one-period steps, as presumed by much of the CAPM theorizing, but rather is a continuous process in continuous time.

1. Access to the same information does not mean that the same expectations will be formed. Rather there is an incredible variety of ways in which people interpret and react to the same information, and as the information is continuously updated, it will also be constantly reinterpreted and reexamined, leading to a constant evolution of expectations in continuous time. Once these two points are taken on board, we will be moving away from the idea of a static equilibrium set of asset prices toward the notion of a dynamic and constantly changing vector of asset prices within a highly complex dynamic ever-evolving economic system.
2. Hence my third suggestion that instead of the almost pathetically simplistic static equilibrium models beyond which so much of mainstream economics seems incapable of progressing, we need to develop our new theories within the framework of *general systems theory* and of *system dynamics*.²⁹
3. In such a systems dynamic framework, it seems to this author that economists will also need to rethink radically their fundamental regulative criteria of optimality in resource allocation, which at present are defined very much in terms of static equilibria. Optimality for a changing evolving entity cannot be defined, for example, in terms of some final static end state because there is no such state; rather notions such as survival,

sustainability of processes, and harmony within the wider system will predominate as criteria of optimality.

4. Finally, it seems to me to be imperative that economists give up the pretense at value neutrality that has dominated at least the mainstream of economic thinking since Milton Friedman's influential article on economic methodology (Friedman 1953: 3–43). Not only have we shown here the essentially ideological and so highly value-laden role of the CAPM + EMH nexus in contemporary economics, the point is actually a more general one. The great Swedish economist, Gunnar Myrdal, way back in his (Myrdal 1959) work reminded economists that there is no such thing as a value-neutral theory (despite the claims made for a purely positive value-free Positive economics by Milton Friedman.³⁰) Rather, all academic research and theorizing harbors at least some value judgments—for example, in the choice of topics to research value judgments are made about what topics it might be socially useful to research in a particular era. But if this is the case, then academic integrity would require that economists should give up the indefensible pretense at purely positive analysis and should at all times preface their research with a clear statement of their underlying value judgments. The presentations of CAPM and especially EMH would perhaps ring rather differently (and no doubt would be more widely challenged) if they were prefaced with an open admission of the underlying ideological presumptions of Market Fundamentalism.

NOTES

1. The quotation is from Fama and French (2004), where in that later review article they are referring back to the results of their earlier 1992 article on CAPM.
2. As noted earlier, the temptation to cast CAPM in this light has been prevalent among defenders and sympathizers of CAPM who never really make up their minds if their theory is supposed to describe actual financial markets or is their view about how an ideal or at least efficient financial market would price assets.
3. Essentially Friedman (1953) argued that in view of the fact that finite sets of empirical evidence can be consistent with a wide range of different theories and thus cannot verify definitively any one of the competing theories, we should give up the quest for truth in science and recognize that our theories are essentially more or less useful fictions of which we should only require that they be simple and should predict well enough over practical situations in which we are interested.
4. At an epistemological level, instrumentalism involves the abandonment of the quest for true insight, for a genuine understanding of what is happening in the world. In O'Sullivan (1984) it has been argued that this is not only obscurantist (putting science on the same footing as astrology, in effect), it is also potentially extremely dangerous and/or misleading as a guide to practical policy or therapy. The quest for truth may be challenging, frustrating, and of course intellectually demanding, but it is our only hope for a reliable practical approach, be it in engineering, medicine, economics, or psychology. The same argument in more abbreviated form can be found in Sargent (1987).
5. Keynes (1936: 161–62) introduced this famous description of the typical behavior of most decision takers in financial markets. It has been one of the key starting points of much subsequent work in the “behavioral” theories of Finance and of Economics.
6. See Fama and French (2004: 41), for example.
7. The conditions of perfect competition will be familiar from economics textbooks. Large numbers of transactors, ease of entry, essentially homogeneous products are all approximated in financial markets. The key deviation from the approximation of conditions of perfect competition in financial markets is in respect

of perfect information. This is replaced in CAPM by the notion of convergent (and rationally formed expectations).

8. This was of course the insight of Bernard de Mandeville and Adam Smith, eloquently and effectively generalized by Friedrich von Hayek, who argued that the unintended consequences of myriad individual actions are often hugely important in the human sciences and for Hayek one of the most important aspects of study for these sciences (Hayek 1967).
9. See *Social Progress Index* (Social Progress Imperative 2017), published by Social Progress Imperative (Washington, DC), and *World Happiness Report* (United Nations 2017), published by the United Nations.
10. Not only are there many individual investors who refuse to invest in certain sectors on ethical grounds even in the presence of higher prospective returns, today there are also investment funds that take explicitly ethical positions on various issues that in turn constrain their investment strategies to take into account more than the pure maximization of financial return.
11. Given the conceptualization and usual presentation of CAPM, the implicit assumption is clearly universal risk-aversion. But it might be possible to conceive of a world where the majority of people are risk averse with just a few oddball risk lovers and in which at a macro level CAPM's assumptions about risk aversion would be defensible. Unfortunately, neither the theory of choice in face of risk nor the empirical evidence supports such a conceptualization. Most people are both risk-averse in some situations and risk-loving in others, depending on their individual preferences and situations, and financial market actors are if anything more prone to gambling behavior than much of the rest of the population.
12. The origins of this Latin phrase are obscure, and it became a kind of proverb or wise saying in postclassical Latin. One early attribution of the phrase is to a comment made by Julius Caesar in respect of a dish he was served in Milano (*Mediolanum*).
13. If each investor has significantly different expectations and so operates with a different *rme*, then the model does not yield a definitive set of "correct" asset prices but rather a different asset price for each investor. This is certainly not what CAPM is about. It is rather an attempt, as we have argued, to define somehow a *single* market price for each risky asset that is somehow correct or efficient.
14. The theory of rational expectations was developed by John Muth in the 1960s and introduced as a centerpiece of macroeconomic general equilibrium models by Robert Lucas (1972). For a good summary of the theory, see Thomas Sargent (2008).
15. In his discussion of the formation of expectations in financial markets, Keynes speaks of this assumption as a widespread "convention" that prevails among investors—that is to say, a position that cannot be grounded on strict rational argument but which in a world of uncertainty may seem reasonable. "The essence of this convention—though it does not, of course, work out quite so simply—lies in assuming that the existing state of affairs will continue indefinitely, except in so far as we have specific reasons to expect a change" (Keynes 1936: 152).
16. The classic references are Arrow and Debreu (1954) and Arrow and Hahn (1983). These give the neoclassical line on optimality of general competitive equilibrium. It is worth noting that while the Austrian school has also defended market economies, they reject the premise of perfect information central to EMH and to most neoclassical work on efficiency of markets. They therefore see free market systems not so much as ideal as the best possible alternative for the organization of the economy in the context of inevitably imperfect information, the decentralization of decision making to strictly micro levels in a free market system they believe will always produce better solutions than any system of centralized economic planning. It is a nice question if that Austrian conclusion needs to be revisited in the era of big data and information overload.
17. For a brief and accessible summary, see Clarke, Jandik, and Mandelker (2001).
18. At time of writing, it looks as though the Bitcoin is another example of such a bubble but much more limited in its potential for macroeconomic mayhem than the real estate bubbles.
19. One might say that as the boom takes hold people are acting on the basis of an emerging trend of rising prices and so that this is consistent with EMH, although that would commit upholders of EMH to say that speculative booms and busts are manifestations efficiency in asset pricing in financial markets. That would be a rather strange but not impossible interpretation of efficiency. However, in any case, an analyst who has studied past experience carefully and in historical perspective (and so is taking into account *all* past information regarding an asset) would be led to buy and sell countercyclically in the boom/bust cycle (and of

- course this occurs in reality and can be very lucrative). But if everyone (or nearly) is well informed, they will, acting in accordance with EMH, all buy and sell countercyclical . . . and in which case there will not be a boom and bust (or a very limited and small cycle at most). In short, EMH cannot be consistent with asset price bubbles of the scale that we have regularly witnessed in economic reality over centuries, and so their continued existence falsifies the theory.
20. These considerations reflect what is known in the literature of business ethics as concerns of Environmental Sustainability and of Social Sustainability.
 21. I am feeling lucky today, etc.
 22. Of course there were some market operators whose expectations were correct, and they shorted and bet against the market. But the key point is that they were the exceptions. *Average* expectations in the market were way off.
 23. See, for example, the report in the *Washington Post* on this on June 12, 2017, available at https://www.washingtonpost.com/news/wonk/wp/2017/06/12/treasury-calls-for-scaling-back-banking-rules-citing-need-for-growth/?utm_term=.061d4c8ba578 (accessed August 25, 2017).
 24. In the case of one subschool of Market Fundamentalists known as *Anarcho-capitalists* (see, for example, Rothbard (2004) or Friedman (2014), an almost total abolition of the state is advocated. They envisage that the rule of law to enforce private contracts (and so private property rights in effect, obviously crucial to capitalism) would be outsourced to competing private sector entities rather than entrusted to a centralized state. This last rider about the rule of law to enforce property rights and contracts (which in some form or other is a central feature for all Market Fundamentalists) distinguishes the position from a more radical anarchism (literally no state or legal authority whatever) for which a high degree of equality at least of opportunity among all people is a central prerequisite. Indeed, for the radical anarchists such as Proudhon and Malatesta, to achieve such equality would eventually require the complete abolition of private property rights. This last contrast reveals the degree to which Market Fundamentalism is more about the defense of the interests of a dominant asset-owning class than about creating maximum freedom for each and every person in society. For a good summary of radical anarchist ideas, see Jun (2012). The influence of anarcho-capitalist Market Fundamentalism on American Republican party and British Conservative party politics with their widespread privatization drives (including even certain types of policing and of courts) as well as on the Washington Consensus (of which privatization is one of the 10 central principles) will be evident.
 25. Margaret Thatcher, British Conservative Prime minister throughout the 1980s, famously remarked that “there is no such thing as society.”
 26. Please do not get me wrong here; as most philosophers, I am a huge fan of this particular fairy tale!
 27. For reasons of space in the article, this description of the Frankfurt School is deliberately cursory. For the interested reader, Geuss (1999) offers an excellent succinct summary of the overall position of the school.
 28. In a recent work, an elaboration in more depth on the tentacular dominance of the interests of finance and financiers over wide areas of human experience from startups to sports and the subordination of all other interests to the financial is well outlined (see O’Sullivan, Allington, and Esposito 2015: ch. 21).
 29. The classic reference is to the work of Ludwig von Bertalanffy, who introduced and modeled mathematically a systems dynamic theory for understanding the evolution of biological organisms. He suggested extension of the approach to a whole range of other sciences, including the human sciences, in Bertalanffy (1950).
 30. Myrdal (1959). See, in particular, the succinct introduction by Paul Streeten for a brief summary of the argument.

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