The Quarterly Journal of Austrian Economics

VOL. 18 | NO. 4 | 387–408
WINTER 2015

# The Efficient Market Conjecture

Ricardo E. Campos Dias de Sousa and David Howden

*ABSTRACT*: Although commonly misconstrued as a statement concerning the "correctness" of prices, the Efficient Market Hypothesis (EMH) is a statement about their informational content. The aftermath of the recent recession has brought renewed skepticism to EMH, even leading some to redefine it as the "inefficient" market hypothesis. We demonstrate that such a course of action is misguided, as it changes the nature of the input (i.e., the market) but not the truth value of the statement (i.e., whether markets are efficient). We outline further several logical fallacies of the Hypothesis which negate its usefulness. We conclude by showing that the EMH was never a hypothesis and as such is best considered a conjecture. As a conjecture, it is increasingly difficult to reconcile with market behavior in both theory and practice.

*KEYWORDS*: efficient markets, informational efficiency, EMH, equity returns

*JEL CLASSIFICATION*: B53, G14

Ricardo Emanuel Campos Dias de Sousa (ricardodiasdesousa@gmail.com) is a Ph.D. candidate in economics at Rey Juan Carlos University, Madrid, Spain. David Howden (dhowden@slu.edu) is professor of economics at Saint Louis University, Madrid Campus.

We thank an anonymous referee for helpful comments on this paper. All remaining errors are our own.

## 1. INTRODUCTION

The Efficient Market Hypothesis (EMH) has just passed its fifty year anniversary. During this time, it has undergone some fundamental changes since its original exposition in Fama (1965). Originally formulated as a response to the supposed predictive power of technical market analysis, Fama laid a framework to explain that a price had no memory of prior prices (Fama, 1965, p. 34). Under this exposition, Fama continued a loosely Chicagoesque tradition of modeling prices as random walks—mutually exclusive events unrelated to previous data points.[1] Within five years, Fama defined more completely what conditions were necessary for the EMH to obtain, as well as what implications followed from the hypothesis (Fama, 1970). The Hypothesis was transformed to the now commonly accepted statement concerning the informational content of prices in an efficient market: "a market in which prices always 'fully reflect' available information is called efficient" (Fama, 1970, p. 383).

These two tenets taken together—the randomness of price movements and the completeness of the past information contained in them—have led adherents of EMH to advocate passive investment strategies. With future price changes randomly arising from as yet unknown information, investors would do better investing in a general market index rather than analyzing trends as efficient prices would already contain the content and meaning of any relevant and available information.

Any hypothesis must conform to two criteria. The first is that it must take the form of an "if-then" statement. The causal relationship specified in the statement is then able to be proven, usually empirically (if a testable hypothesis exists), or logically (in which case the hypothesis would really be better stated as a tautology). In contrast, conjectures are those statements unable to meet a rigorous logical proof or which cannot be formulated in a provable form. Conjectures are useful to the extent that they are a best guess of how the world works, but are forever limited to

[1] Although there were scattered attempts to demonstrate the randomness of future stock price changes throughout the 20th century, Cootner (1962) is notable for bringing the theory academic rigor, thus making it palatable for financial economists to integrate into their own models.

being mere estimations. Although stated as a hypothesis, EMH cannot be logically proven nor can it meet any rigorous empirical test without serious reservations. As such, it is a conjecture about how the economic world works, which goes far in explaining why it has proven to be so controversial over the past 50 years.

In this paper we address the shortcomings of the EMH. Section 2 outlines why it cannot be considered to be a testable hypothesis, mainly because any proof of its validity requires a pricing model. The failure of actual prices to coincide with the pricing model can be either because of an erroneously specified model or because EMH is not valid. Section 3 outlines the historical assaults on the EMH fortress, and gives examples by way of apparent mispricings in financial markets and realized abnormal market returns which suggest that there are flaws with the conclusions of EMH. Section 4 gives a more rigorous proof for why EMH cannot be a correct description of markets by way of an exposition of the conflicts in its internal logic structure, instead of by relying on empirical results by way of pricing models. Section 5 concludes by noting that even though the hypothesis is better described as a conjecture, the EMH is difficult to reconcile with actual market phenomenon. Furthermore, any useful conclusion that could be derived from EMH is already better described through alternative equilibrium constructs. As such, the efficient market hypothesis is not only incorrect, but unnecessary.

## 2. A TESTABLE HYPOTHESIS?

Any relationship between information and price movements, although easily alluded to, is difficult to establish empirically. Indeed, to prove that stock prices, at every moment, "fully reflect" all available information is impossible, as even EMH proponents can attest (Fama, 1970, p. 384). A market that objectively prices subjective information would have to come into existence to allow measuring the speed in which this information would then be reflected into stock prices. As financial markets do not allow for this, economists had to search for something to measure. They found a solution in stock price movements themselves, in place

of information flows.[2] If no strategy could be devised *ex ante* that *always* leads to abnormal returns *ex post*, then this would imply that all information is fully priced and all price movements are random (as no consistent abnormal returns could emerge from random movements except by chance). Thus, a hypothesis about whether prices fully reflect all available information turned into a discussion to determine if investors could follow strategies that allowed them to obtain *ex ante* abnormal returns.

That EMH has become one of the most heavily scrutinized hypotheses in finance may give fuel to its detractors who claim that it cannot explain simple counter-evidence—prolonged abnormal returns by certain investors (e.g., Warren Buffett) or seasonal abnormalities such as the Monday or January effects. Yet it is unfair to say that the only reason empirical tests on the EHM were performed on investment strategies and their returns was the primeval rivalry between technical analysts and EMH advocates. This rivalry was not the reason but rather the motivation. The reason the Hypothesis has been so heavily scrutinized has little to do with its controversial conclusions, but because prices (and especially financial prices) are readily available to verify or negate the EMH (Ross, 1987, p. 30). With the abundance of financial price data, it is possible to test every single investment strategy one could conceive, both in and out of sample.

All that remained from the information side was to frame how efficient the market was depending on what sort of strategies would allow for abnormal returns. Fama (1970, p. 383) did so by dividing market efficiency into three subsets: 1) weak, in which no abnormal returns could be found from historical prices, 2) semi-strong, in which no abnormal returns could be obtained from publicly available information, and 3) strong, where not even private or "inside" information would give any investors an *ex ante* advantage. Thus, a general statement concerning the informational efficiency of prices was transformed into a testing procedure for market pricing within the framework of three sets of conditions.

[2] Incidentally, this bifurcation between price data and information data plagues much financial literature. For example, despite claiming to be about unfair informational advantages, economists assess the efficacy of insider trading laws by looking for abnormal equity returns instead of tracing the flow of information being reassigned from one individual (or group) to another (Howden, 2014).

## 3. THE ASSAULT ON THE EMH FORTRESS

In order to test the EMH, an underlying model of how individual stocks are expected to perform must be used. The Capital Asset Pricing Model (CAPM) gave EMH that opportunity, although the Hypothesis does not state that the CAPM is the required model to test it. In theory, any model that fits the existing data (and behaves consistently when tested out of sample) is sufficient, but the CAPM is generally used due to its shared or similar assumptions with the EMH (e.g., that all information is available simultaneously to all investors, no transaction costs, etc.). Thus, the existence of a model that determined ex ante expected returns of investment strategies provided an opportunity for a new generation of economists to try to invalidate the EMH. The simplest approach was to find a mechanical investment strategy that would consistently obtain abnormal returns given the expectations of the CAPM.

The aftermath of financial crises, such as the 23 percent decline in the Dow Jones Industrial Average on 19 October 1987, often led the popular press to proclaim the death of EMH. In its place a new cottage industry emerged to disprove its central tenets. Unfortunately, as with earlier attempts to empirically prove the existence of informationally efficient markets, many of these contrarian studies were also plagued by narrow analyses of episodes selectively chosen to invalidate EMH (such as the late 1987 stock market decline). Echoing Ronald Coase's famous dictum on torturing data, Burton Malkiel (2003, p. 72) criticized the opponents of EMH, stating that "given enough time and massaging of data series, it is possible to tease almost any pattern out of most data sets." (Malkiel fails to observe, however, that the statement runs both ways.)

Extreme market volatility on its own is not sufficient to refute EMH. After all, "EMH does not imply that asset prices are always 'correct.' Prices are always wrong, but no one knows for sure if they are too high or too low" (Malkiel, 2012, p. 75). The Hypothesis lays no claim to the correctness of prices, though it does imply that no arbitrage opportunity can exist in an efficient market, or if they do appear from time to time, they do not persist (Malkiel, 2003, p. 80). Still, if one were to view EMH as being a statement solely concerning informational inclusiveness but not about the "correctness" of the inclusion, it is tenuous whether the Hypothesis

has any empirical relevance. As a purely logical statement, it is easily refutable by relaxing the assumptions (and as we shall see, even without relaxing the assumptions the Hypothesis is problematic). As an empirical claim, without making a statement about the correctness of the information included in a price there is no way to test EMH (e.g., by comparing market prices to those predicted by a pricing model such as the CAPM).

Some investment strategies earning abnormal returns have proved durable, yet succumbed eventually to normalcy. Cochrane (1999), for example, assaulted EMH by way of the upward-sloping yield curve. Bond returns were predictable to the extent that an upward sloping yield curve provided a profit-earning spread by borrowing short-term and lending long. Alternatively, foreign exchange returns were predictable as money invested in countries with higher yields could earn abnormal returns under periods of exchange rate stability; the now infamous "carry trade" found intellectual justification. They are also widely recognized as instigating the economic collapse and credit crunch of 2008.

Other effects were persistent enough to puzzle the supporters of the EMH, such as the January effect (Rozeff and Kinny, 1976; Reinganum, 1993). More recently, Jegadeesh (2012) has found evidence of predictability in individual stock returns by way of a significant first-order serial correlation in monthly returns. The most famous anomaly is probably the size effect. Keim (1983) found that in the very-long run (his study went back to 1926), equities of smaller companies persistently generated higher returns than those of larger companies. (Fama and French [1993] found similar results in an analogous study.) The preferred solution, according to Fama and French, was that beta was perhaps not the best proxy for risk and that size could add some predictability to returns.[3] Seeing the problem as a lack of independent variables in the CAPM, Fama and French (1993) suggested a three-factor asset-pricing model (including price-to-book ratio and size as measures for risk) as the appropriate benchmarks against which anomalies should be measured. As cracks in the CAPM edifice formed, this became the

[3] Malkiel (2003, p. 64) offered that some sort of survival bias could be acting upon the data and that any abnormal returns from such strategies were only transient, but accepted Fama and French's central conclusions.

preferred solution—multi-factor models to improve predictive power.[4] Paradoxically perhaps, this predictive power was not an affront to EMH. Rather it defined "predictability" within the context of the factors under study. Prices still followed a random walk to the extent that the influences on these factors could not be known in advance, and hence predicted.

This paradox of building a model that predicts return based on expected risk (as in CAPM) on the random returns that EMH provides for poses a problem. Since the only way to test EMH is by using an asset-pricing model, there is no way the hypothesis can be rejected (Cuthbertson and Nitzsche, 1996; Campbell *et al*., 1997, p. 24). "The definitional statement that in an efficient market prices 'fully reflect' available information is so general that it has no empirical testable implications" (Fama, 1970, p. 384).[5] In its place, the problem could be and generally is attributed to the failure of the model testing it, and not due to the hypothesis under examination. Lacking a valid asset-pricing model to test the hypothesis, EMH (at least in its current form) is not a testable proposition. Indeed, as Campbell *et al*. (1997, p. 24) conclude:

> [A]ny test of efficiency must assume an equilibrium model that defines normal security returns. If efficiency is rejected, this could be because the market is truly inefficient or because an incorrect equilibrium model has been assumed. This joint hypothesis problem means that market efficiency as such can never be rejected.

[4] These cracks continue to show, albeit under various guises. In testing the appropriateness of Fama and French's preferred beta-augmenting factors of a firm's market capitalization and book-to-market ratio, Griffin (2002) finds the coefficients to provide a better fit with country-specific data instead of cross-country analyses. In a more recent test of their original hypothesis, Fama and French (2012) found a similar result whereby local factors were more predictive than global ones. To improve on the deficiency of not thoroughly identifying the appropriate factors, other models with additional factors have been created. Carhart (1997) provides one such example which includes a momentum factor. However, none of these models accounts fully for the risk-return tradeoff in stock prices, nor explains certain anomalies, e.g., persistent abnormal returns.

[5] While modern tests of EMH use some form of CAPM to gauge efficiency, Fama was not clear on what type of model would be necessary. As a result, later reports by Fama that an empirical test either confirmed EMH or was incorrect are unsubstantiated to the extent that they are meaningless beyond a model specified by EMH (Leroy, 2004).

This line of criticism levied against EMH is reminiscent of Grossman (1976) and Grossman and Stiglitz' (1980) work on market efficiency. The reasoning in Campbell *et al*. (1997) boils down to the requirement of a functioning and accurate pricing model against which to test realized returns. Grossman and Stiglitz (1980) reckon that any level of informational efficiency must be gauged relative to the ability of the market to absorb new information. This ability to absorb information decreases as the level of information incorporated increases because of the increasing marginal cost of information gathering. Under this reasoning,

> [i]n the limit, when there is no noise, prices convey all information, and there is no incentive to purchase information. Hence, the only equilibrium is one with no information. But, if everyone is uninformed, it clearly pays some individual to become informed. Thus there does not exist a competitive equilibrium. (Grossman and Stiglitz, 1980, p. 395)

One conclusion is that the market could reach an equilibrium only if there is a profit to offset the cost of gathering information. Grossman and Stiglitz correctly observe that in order for information to reach the market someone must gather it, and identify that function as being performed by an entrepreneur (to earn a rent), which leads them to conclude that any equilibrium must be one which contains an "equilibrium degree of disequilibrium" (Grossman and Stiglitz, 1980, p. 393). One implication is that market efficiency will be determined by the costs of gathering and processing relevant information (Lo and MacKinlay, 1999, pp. 5–6) and that a fully efficient market will not incorporate all available information.

Yet this approach too runs into difficulties as an affront to EMH. There cannot be a premeditated search for information cognizant of its costs and benefits, because the entrepreneur in question does not know in advance what the benefits are (Huerta de Soto, 2008). As a critique of EMH it commits the error of *petitio principii*. By assuming that one can assign a cost to information sought, one also rules out EMH at initiation. Since EMH states that prices can only change due to the arrival of novel information, it is also impossible that one could estimate a cost for this as yet unknown information. As such, any approach to disprove EMH must take a different line of attack that does not itself rely on the knowledge of future information relevant to price formation.

## 4. LOGICAL CONTRADICTIONS

For EMH to prevail, one of two assumptions concerning price formation must hold true:

1. All relevant information must be interpreted by *all* market participants in the same way, or
2. A sufficient critical mass of market participants must interpret relevant information in the same way.

The first criterion seems too strict to describe most market processes. Price formation occurs under conditions where both sides of the trade—buyers and sellers—disagree about the price, either because they disagree about the relevance or about the interpretation of the information at hand. In this way, EMH is an impossible standard because of a constraint placed on it by the market (Collier, 2011). Since price formation occurs through opposed interpretations of information, at least one-half of market participants must disagree with the importance of the information absorbed at any given price. For price formation to occur, it must be that either: 1) sellers think that new information is relevant for the price, or that it has been incorrectly interpreted to erroneously price the good in question, or 2) buyers think that information is important, or that it has yet to be fully incorporated into the good's price. Due to differing interpretations of information, EMH cannot hold as prices are deemed incorrect or inefficient by half of participants. In the case dealing with the relevance of information, EMH would not hold because the market has yet to fully incorporate the information into prices.[6]

The second criterion falls prey to a similar criticism. Markets are informationally efficient if only a critical mass of participants

[6] Alternatively, both sides could interpret the information identically, but differences in personal discount rates will invoke different actions. Consider two parties that believe the arrival of new information over the coming year will increase a share's price from $10 to $11. If one's discount rate is 9 percent, he will be a net buyer, while if the other's is 11 percent, he will be a net seller. We thank Rafael García Iborra for this insight. Interestingly, the only way two different investors can hold different discount rates in an efficient loans market is if they have different time-horizons for their investments. Yet, within the EMH framework the time-horizon is either irrelevant (when tests for abnormal returns are performed) or assumed to be the same for all investors (as it should hold true for all maturities).

factored the relevant information into prices previously. It must follow from this that either 1) the other market participants excluded from this critical mass lack the necessary information, or 2) this other group of participants disagrees with the relevance or interpretation of information. The first case will almost certainly hold true, and in and of itself is not a serious affront to EMH as it cannot seriously impair price formation. The latter is a more serious objection, and is closely aligned with the reasoning we gave previously to object to the first criterion.

The claim that a market is "efficient" if it fully incorporates all relevant information relies not only on the ability of the market to incorporate information but also on the interpretation of such information. If one group agrees with the relevance and impact of new information, and they trade on such information accordingly, then it follows that the market may be informationally efficient from *their* point of view. This efficiency is unique to them, however, as it is itself defined as consensus concerning the impact of information which, by inclusion in the group, members must agree with. The group which has refrained from trading on such information (or, has formed the opposite side of the trade from the group acting on new information) must disagree with either its relevance or importance (or both). The market will appear inefficient to this latter group in the sense that information was incorporated that has pushed prices away from the values they deemed appropriate (efficient) given the information at hand. Efficient prices for one group *requires* inefficient prices in the eyes of the other.

There could be recourse to a situation where everyone agrees with the impact of new information and acts accordingly. Positive news in the market concerning a good would cause *all* participants to attempt to purchase the under-valued good and push its price higher to its efficiently valued price. Yet since all units of a good must be owned by someone at any given time, it is not possible that everyone becomes a net purchaser simultaneously. If everyone's price assessment increases simultaneously, the price could only increase if some people sold upon higher offers. Yet the price could never get to its "informationally efficient" value if EMH held, as no one would sell at a price below the expected one (in which case no one would want to be a net buyer). Standard financial models treat the representative investor as both a potential buyer and seller at

the equilibrium (static) price. Coupled with EMH, such models are unable to explain why prices change without the arrival of new information (e.g., price gaps).[7]

Until recently (e.g., Collier, 2011) this constraint went rather unnoticed, most likely because buyers and sellers, in theory, do not have to disagree about the relevance or importance of information in order to trade (although it is also very unlikely, not to say impossible, that two individuals might actually possess the exact same information). This could happen either because they have differing ends or consider distinct time horizons and subsequent discount rates when making investment decisions. Yet, under the assumptions of EMH and the tests performed to verify the hypothesis all investors share the same goal (e.g., to outperform the market) and the time horizon and preferences are assumed equal to that of the representative investor.

This general flaw in the reasoning behind EMH can be summarized as a deficiency in the choice of relevant assumptions, leaving the subsequent theory with a logically coherent structure within only the narrow confines of its assumptions. Unfortunately, "the features typically omitted [by a model] are the very features that are crucial to understand how the market functions" (Long, 2006, pp. 3–4). While Long treats this as a general problem plaguing economic modeling, EMH is a case in point. By assuming market participants to be a homogenous group—in terms of their valuations and expectations—EMH achieves a definition of efficiency unable to obtain in reality. At the same time, it adds nearly nothing to our understanding of that same reality. Other important assumptions behind the hypothesis fare no better. If the assumptions that price changes are independent and that there is a distribution function for those prices were not relevant, they should have not been specified to start with.[8] Alternatively, one could view the assumptions as not essential to EMH, but rather to allow for the development of a pricing model

[7] Alternatively, indifference can never be demonstrated by action. Quite the contrary, every action necessarily signifies a *choice*, and every choice signifies a definite preference. Action specifically implies the *contrary* of indifference (Rothbard, 1956).

[8] Theory should be weary of undue assumptions that needlessly pigeonhole the item under examination (Kuhn, 1962). Alternatively, the assumptions should not be in contradiction to reality as any success of the resultant theory could only be accidental.

against which to test the hypothesis. Again, specifying assumptions to provide a path to test the hypothesis is not only unwarranted, but misplaced given the futility of the testing procedure due to the joint-hypothesis problem.

Price changes create information, in the sense that market participants must alter their consumption and production activities to maximize utility or profit as relative valuations between goods change. No price change, as a result, can be independent of another as a feedback effect will alter the existing price constellation. As any price change creates information in and of itself, subsequent price changes (in its own price or that of other goods) cannot be independent.[9] As any future price change will rely on a potentially uncertain (and unknowable) event, even if these price changes are random they will not be probabilistically so. If no probability distribution can be identified to govern these price changes, then probability theory is useless in estimating future prices. As a result, future price changes could be moving randomly (something in which EMH adherents would find comfort), though they would not necessarily be moving independently of other prices, and this dependence could not be modelled according to any price distribution. This latter statement is a direct contradiction to EMH and related work, and also negates the use of probability theory in analyzing and providing estimates of future price movements.

One deficiency in the EMH framework is the confusion between prices as *embodied* information, and prices as *being* information. For active market participants—whether buyers or sellers—prices are summary statistics of their assessment of information on the market. Most commonly, as summary statistics these prices represent information concerning supply and demand conditions, which include both current physical conditions as well as the market participant's expectations concerning the future (Hayek, 1945). Yet for those not intimately involved with the pricing process, that is to say anyone who is not actively buying or selling the good in question, the price becomes a piece of information in

[9] The lack of attention to relative price adjustments, endemic in much economic modeling, is due to the emphasis placed on two-good models (Bagus and Howden, 2012, p. 274 fn7). Since there is only one relative output price to equilibrate, other relative price effects are excluded. As a consequence, the complexity and interrelationships among multiple goods through their prices is often overlooked.

and of itself. While it is simple to think of these two groups as being concerned with the same thing, there is a distinction.

For participants actively engaged in the pricing process, the price that results from their actions is important to them only in the sense that it informs them of how close they are to their ultimate goal. Since the price itself is a summary of past actions by buyers and sellers, it cannot convey information concerning the future state of affairs. It is this expected future state of affairs that active participants are buying or selling to meet, in a bid to move prices to their own subjective assessment of what the future holds. In this sense, buyers and sellers are concerned with meeting unmet supplies or demands by monitoring for shortages or surpluses in the quantities of goods traded on the market, and are not directly concerned with the prices that these goods are correctly trading at (Hülsmann, 1997; Bagus and Howden, 2011, section 5).

For those participants not directly involved in the pricing process, the price becomes a summary of the past information concerning the good. The price is a form of information for this group, and represents the subjective assessments of those active market participants made objective through the embodiment of the price. These participants not involved in price setting may have no knowledge of any of the underlying information concerning the good or its value, though they will have an objective summary of these subjective assessments by others via a simple price (as in Hayek, 1945).

Note that from a market efficiency standpoint only one of these groups will consider prices to be accurate and complete summaries of the available information. The group of active participants—those transacting on information revealed through the market—are doing so precisely because the market *is not* efficient. At least, it is not efficient according to *their own* valuation assessment. Through their actions, they move prices to more closely align with the values they deem to be in accordance with their interpretation of the information. As long as active buyers and sellers are altering the price of a good, that price will forever be informationally *in*efficient. Inefficiency in this case would concern the lack of consensus concerning the true relevance for revealed information on price formation. With this line of reasoning, we can find much agreement with Mises's (1949, p. 338) emphasis on "false prices"

that exist in the eyes of individuals who are undertaking any purchase or sale decision at any moment in time.

Passive observers of price formation will, however, be in general agreement that the market is in a state of informational efficiency. If they did not believe that prices already fully and accurately summarized revealed information, they would actively trade on such knowledge to better align prices with their valuations.

Perhaps this bifurcation boils down to the distinction between objectively given information and subjectively derived knowledge. In this sense, information is that body of facts in existence at any given time, e.g., that the visual impression we refer to as "black" is defined as the absence of color, that Barack Obama was the President of the United States in 2015, or that water at sea level freezes at zero degrees centigrade. While these informational facts are mostly trivial, their relevance and potential impact on prices will change depending on the individual and the array of additional information at his disposal. This additional information specific to the individual makes the sum of information known to him highly subjective, and we may distinguish it from its objective source by referring to it as knowledge (Thomsen, 1992). To the active market participant, information revealed through the market is subjectively valued and traded on if relevant. The market could not, by this standard, be in a state of informational efficiency because each body of information known to an individual will be interpreted and valued distinctly. All prices being acted on by this group will be considered inefficient from an informational standpoint. EMH, to the extent that it describes any set of individuals, can only describe those individuals who act as passive receivers of information through prices, and who must deem these prices to be in a state of informational efficiency already as evidenced by their inaction in light of the new information. This description cannot explain how markets (that is, investors) act to reach such a state.

Some advocates of EMH may object to this characterization of markets as inefficient for those who are actively engaged in the price formation process, and could respond by saying that investors only "believe," erroneously, that the market is inefficient. The objection is a serious threat to the assumptions of EMH, and has been somewhat addressed by relaxing the Hypothesis's domain. Malkiel, for example, allows for some degree of short-run

inefficiency that must eventually give way, stating that "while the stock market in the short run may be a voting mechanism, in the long run it is a weighing mechanism. True value will win out in the end" (2003, p. 61).

Yet what would make one think that the long run should behave any differently from the present? Unless there is a definite "Judgment Day" in the market, there will forever be a state of overlapping short runs grasping for that fabled end. Indeed, thinking that prices will converge in the long run to their informationally efficient state begs the question. Any long run is defined as that state where variables have fully adjusted to revealed information. Since an efficient market is defined as any whose prices fully reflect all information, this must by definition coincide with any market in its long-run equilibrium. To state that "true value," or correctly and fully incorporated information will bring long-run prices to their informationally efficient level is to assume what has to be proven. The question is really one of why any short-run price would be informationally efficient, which could only be the case if no one was motivated to either act upon it by changing his net demand for the good, or by changing his net demand for some other good in light of that price.

Under this rationale, EMH becomes at best a long-run hypothesis. It can define that state of affairs that would conceivably prevail if new information ceased and an equilibrium emerged. Yet as a theory aimed at describing the pricing process, this only opens the Hypothesis to deeper questions.[10] While describing an equilibrium state with the full incorporation of information already achieved, EMH leaves no explicit room for an entrepreneur (or even a Walrasian auctioneer, for that matter).

If an individual can be shown to have correctly forecast prices, the EMH explicitly states that this event will not disprove the hypothesis but is something that, given the assumptions, must be accepted. When coupled with the CAPM, a series of prices are obtained given the constraints considered (e.g., a risk-free interest

[10] As an equilibrium state the EMH is less than satisfactory than some alternatives (Howden, 2009). While assuming away those data that it is seeking to explain, the EMH leaves one with little understanding of what factors influence price formation which is, after all, the heart of the phenomenon under examination.

rate, and a given risk correlation between assets). These two theories taken together are reckoned to yield "correct" risk-adjusted prices and should be a better estimator of value than individuals.

Yet anecdotal evidence suggests that some degree of price estimation is possible. Investors who have obtained above average risk-adjusted rates of return for extended periods of time (e.g., George Soros or Warren Buffett) can only be accounted by EMH by one of three explanations: 1) either their abnormal returns must be "normal" returns that other investors should be tending towards, 2) the asset-pricing model used to generate the expected returns must be deficient, or 3) the magnitude of investors is so large that, applying the law of large numbers, it is possible for one individual to have a track record that consistently beats the market while investors on average will not.[11]

In none of these explanations is there room to incorporate an individual (we may call him the entrepreneur) exercising good judgment or foresight (Pasour, 1989; Shostak, 1997). Indeed, good entrepreneurs can be found in either arbitraging away market mispricings (Kirzner, 1973) or discovering new elements relevant for future price movements (Mises, 1949). Both of these entrepreneurial roles are excluded from the EMH framework. The Kirznerian entrepreneur explicitly cannot exist in the EMH world as no mispricings can exist by definition. The Misesian entrepreneur could be thought of as the one who unearths new relevant information and incorporates it into the price constellation, though this belief can only be partially admitted by the EMH in its weak form.

Assuming away the entrepreneur *could be* useful in developing EMH, but it takes the Hypothesis one step further from that which it seeks to explain. Market participants are actively searching for, uncovering and incorporating new information into the array of existing prices. That they are not randomly searching for information, nor is random information the only influence on existing prices, suggests that markets are neither informationally efficient nor following a random walk in price formation.[12] Alternatively,

[11] Bear in mind that over time the average performance of all participants is the average (ex-post) return of the market, so this argument cannot be falsified.

[12] Paradoxically, this result most closely obtains through the artificial fostering of insider trading laws on the market. By barring those intimately aware of the

the existence of two sides to any transaction—a buyer and a seller—suggests that informational efficiency cannot obtain in the sense that there is continual disagreement as to the correctness of current prices, as well as the relevance of new information.

The market is not efficient because it contains all relevant information in a more or fully-complete manner, but because it allows individuals to act in a socially-coordinated way. It is not that market prices gather all existing information. It is that individuals acting in those markets strive to do so and pay the cost if they are wrong.

If EMH is to be called into question today, the starting point should not be that markets or investors are irrational (as in, e.g., Farmer *et al*., 2012).[13] Likewise, holding actual market returns to a standard set by a pricing model assuming a hyper-rationality applying to all individuals (as in CAPM) also seems misplaced. A more fruitful approach is to accept that investors are rational within the confines of their knowledge, and that this has not changed over time (Statman, 2005).

When market returns shift dramatically and seem to affront the EMH fortress, it is neither the standard of efficiency nor the reputation of a market which is at stake, but rather the claim that markets are informationally efficient. Likewise, criticizing the EMH on the basis of asset price volatility is conceptually wrong, as efficiency says little about volatility and is instead concerned with the concepts of rationality and information (Szafarz, 2009).

## 5. CONCLUSION

Although it makes a seemingly innocuous claim only about the informational efficiency of prices, the Efficient Market Hypothesis

creation and importance of information (insiders) from trading on such information, it is up to outsiders to incorporate its importance into the price. Since outsiders have less knowledge concerning the relevance of information than insiders, prices will tend to be less informationally efficient as a result (Howden, 2014). Efficient in this sense would imply that information is not only fully incorporated into the price array but also rationally so, so as to foster correct prices given the facts at hand.

[13] A more extreme view can be found in blaming the EMH for causing the crisis (Fox, 2009).

is plagued with difficulties. Some of these problems lie in the logic behind its construction. Others are the result of the standard by which the efficacy of its claims can be measured. In this paper we have shed light on both of these aspects.

Any market with active price formation occurring will shield itself from any definition of efficiency by way of the diametrically opposed viewpoints of the participants. Those who are actively trading on new information are doing so because they feel the current prices are inefficient—inefficient in the sense that they do not contain all relevant information, or that prices have factored such information in an incorrect manner. Only those participants who are passive observers of the pricing process may be said to believe that prices are informationally efficient, because if they thought otherwise, they would be actively trading to align them with their estimated values and try to realize a profit opportunity.

Attempts to test the validity of the EMH are mostly misplaced as they define an abnormal return in terms of some other pricing model, commonly the capital asset pricing model. This testing procedure is misplaced as it relies on a model that is itself predicated on EMH. It furthermore suffers the deficiency that the correct price is what is tested for, and not the fullness of informational dissemination throughout the price complex. Since EMH only makes a claim about informational efficiency, something that is unable to be tested for directly, the Hypothesis does not lend itself to empirical verification. This is troubling because the defining characteristic of a hypothesis is that it takes either a testable form or can be stated as a tautology. Internal logical contradictions make the EMH unable to be proven as a tautology. The need for a pricing model to empirically test the Hypothesis leads the economist never to know if the pricing model is incorrectly specified, or if the EMH is incorrect.

In light of the theoretical deficiencies we have outlined in this paper, EMH is better referred to as a conjecture. Indeed, in the early stages of its development it was identified as a theory in search of evidence. The fact that the theory is still so widely disputed 50 years after its original exposition, and that ambiguous tests of its relevance plague the literature, bolster the doubts of those who see the EMH as intuitively flawed. Furthermore, any useful conclusion that the EMH could tell us is better described without theoretical or empirical difficulties by the concept of long-run equilibrium.

As a conjecture the EMH is misplaced. Logical inconsistencies internal to its formulation cast doubt that it could hold, even in isolated settings (such as a long-run equilibrium). The past few years have led to a rethinking as to how best to label EMH, with some claiming that it is really the *in*efficient markets hypothesis. Rather than recast EMH in terms of redefining how the market functions, it is better to discard it as the misplaced conjecture it is.

## REFERENCES

Bagus, Philipp, and David Howden. 2011. Monetary Equilibrium and Price Stickiness. *Review of Austrian Economics* 24, no. 4: 383–402.

——. 2012. Monetary Equilibrium and Price Stickiness: A Rejoinder. *Review of Austrian Economics* 25, no. 3: 271–277.

Campbell, John Y., Andrew W. Lo and A. Craig MacKinlay. 1997. *The Econometrics of Financial Markets*. Princeton: Princeton University Press.

Carhart, Mark M. 1997. "On Persistence in Mutual Fund Performance," *Journal of Finance* 52, no. 1: 57–82.

Cochrane, John H. 1999. "New Facts in Finance," *Economic Perspectives, Federal Reserve Bank of Chicago* 23, no. 3: 36–58.

Collier, Charles W. 2011. "An Inefficient Truth," *Critical Review* 23, nos. 1–2: 29–71.

Cootner, Paul H. 1962. "Stock Prices: Random vs. Systematic Changes," *Industrial Management* 3, no. 1: 34–105.

Cuthbertson, Keith, and Dirk Nitzsche. 1996. *Quantitative Financial Economics: Stocks, Bonds and Foreign Exchange*, 2nd ed. New York: Wiley, 2004.

Fama, Eugene F. 1965. "The Behavior of Stock-Market Prices," *Journal of Business* 38, no. 1: 34–105.

——. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25, no. 2: 383–417.

Fama, Eugene F., and Kenneth R. French. 1993. "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33, no. 1: 3–56.

——. 2012. "Size, Value, and Momentum in International Stock Returns," *Journal of Financial Economics* 105, no. 3: 457–472.

Farmer, Roger E. A., Carine Nourry, and Alain Venditti. 2012. The Inefficient Market Hypothesis: Why Financial Markets Do Not Work Well in the Real World. *NBER Working Paper* no. 18647.

Fox, Justin. 2009. *Myth of the Rational Market: A History of Risk, Reward, and Delusion on Wall Street*. New York: Harper Business.

Griffin, John M. 2002. "Are the Fama and French Factors Global or Country Specific?" *Review of Financial Studies* 15, no. 3: 783–803.

Grossman, Sanford J. 1976. "On the Efficiency of Competitive Stock Markets Where Traders Have Diverse Information," *Journal of Finance* 31, no. 2: 573–585.

Grossman, Sanford J., and Joseph E. Stiglitz. 1980. "On the Impossibility of Informationally Efficient Markets," *American Economic Review* 70, no. 3: 393–408.

Haughen, Robert A., and Josef Lakonishok. 1987. *The Incredible January Effect: The Stock Market's Unsolved Mystery*. Irwin Professional Pub.

Hayek, Friedrich A. 1945. "The Use of Knowledge in Society," *American Economic Review* 35, no. 4: 519–530.

Howden, David. 2009. "Fama's Efficient Market Hypothesis and Mises's Evenly Rotating Economy: Comparative Constructs," *Quarterly Journal of Austrian Economics* 12, no. 2: 3–12.

——. 2014. "Knowledge Flows and Insider Trading," *Review of Austrian Economics* 27, no. 1: 45–55.

Huerta de Soto, Jesús. 2008. *The Theory of Dynamic Efficiency*. London: Routledge.

Hülsmann, Jörg Guido. 1997. "Knowledge, Judgment and the Use of Property in Society," *Review of Austrian Economics* 10, no. 1: 23–48.

Jegadeesh, Narasimahan. 2012. "Evidence of Predictable Behavior of Security Returns," *The Journal of Finance* 45: 1540–6261.

Keim, Donald B. 1983. "Size-Related Anomalies and Stock Return Seasonality: Further Empirical Evidence," *Journal of Financial Economics* 12, no. 1: 13–32.

Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Kirzner, Israel M. 1973. *Competition and Entrepreneurship*. Chicago: University of Chicago Press.

Leroy, Stephen F. 2004. "Rational Exuberance," *Journal of Economic Literature* 42, no. 3: 783–804.

Lo, Andrew W., and A. Craig MacKinlay. 1999. *A Non-Random Walk Down Wall Street*. Princeton: Princeton University Press.

Long, Roderick T. 2006. "Realism and Abstraction in Economics: Aristotle and Mises versus Friedman," *Quarterly Journal of Austrian Economics* 9, no. 3: 3–23.

Malkiel, Burton G. 1973. *A Random Walk Down Wall Street*. New York: W. W. Norton and Co.

——. 2003. "The Efficient Market Hypothesis and Its Critics," *Journal of Economic Perspectives* 17, no. 1: 59–82.

——. 2012. "The Efficient-Market Hypothesis and the Financial Crisis." In Alan S. Blinder, Andrew W. Lo, and Robert M. Solow, eds. *Rethinking the Financial Crisis*, pp. 75–98. New York: Russell Sage Foundation.

Markowitz, Harry. 1999. "The Early History of Portfolio Theory: 1600–1960," *Financial Analysts Journal* (July/August): 5–16.

Mises, Ludwig von. 1949. *Human Action: A Treatise on Economics*. Auburn, Ala.: Ludwig von Mises Institute, 1998.

Pasour, Jr., E. C. 1989. "The Efficient-Markets Hypothesis and Entrepreneurship," *Review of Austrian Economics* 3: 95–107.

Reinganum, R. M. 1981. "Misspecification of the Capital Asset Pricing: Empirical Anomalies Based on Earnings Yields and Market Values," *Journal of Financial Economics* 12: 89–104.

Ross, Stephen A. 1987. "The Interrelations of Finance and Economics: Theoretical Perspectives," *American Economic Review* 77, no. 2: 29–34.

Rothbard, Murray N. 1956. "Toward a Reconstruction of Utility and Welfare Economics," In Murray N. Rothbard, ed. *The Logic of Action One: Method, Money, and the Austrian School*, pp. 211–255. London: Edward Elgar, 1997.

Rozeff, M. S., and W. R. Kinney. 1976. "Capital Market Seasonality: The Case of Stock Returns," *Journal of Financial Economics* 3: 379–402.

Rubenstein, Mark. 2002. "Markowitz's 'Portfolio Selection': A Fifty-Year Retrospective," *Journal of Finance* 57, no. 3: 1041–1045.

Shostak, Frank. 1997. "In Defense of Fundamental Analysis: A Critique of the Efficient Market Hypothesis," *Review of Austrian Economics* 10, no. 2: 27–45.

Statman, Meir. 2005. "Normal Investors, Then and Now," *Financial Analysts Journal* 61, no. 2: 31–37.

Szafarz, Ariane. 2009. "How Did Financial-Crisis-Based Criticisms of Market Efficiency Get it so Wrong?" *CEB (Centre Emile Bernheim) Working Paper* no. 09/048.

Taleb, Nassim N. 2007. *The Black Swan: The Impact of the Highly Improbable*. New York: Random House.

Thomsen, Esteban F. 1992. *Prices and Knowledge: A Market-Process Perspective*. London: Routledge.

Yang, Jae-Suk, Wooseop Kwak, Taisei Kaizoji, and In-Mook Kim. 2008. "Increasing Market Efficient in the Stock Markets," *European Physical Journal* B 61, no. 2: 241–246.