The Efficient Market Conjecture

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Abstract: Although commonly misconstrued as a statement about 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 change 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 further outline 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 actual market behavior.

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The Efficient Market Conjecture

The Efficient Market Hypothesis (EMH) is approaching its fifty-year anniversary. During its lifespan it has undergone some fundamental changes since its original exposition in Fama (1965). Originally formulated as a response to predictive methods in technical market analysis, Fama laid a framework explaining why successive price changes were independent. Under this exposition, Fama continued a loosely Chicagoesque tradition of modeling price changes as random walks – mutually exclusive events unrelated to previous data points.[2] Within five years, Fama defined more completely what the EMH implied as well as its causes (Fama 1970). The Hypothesis would become the now commonly accepted statement concerning the informational content of prices: "a market in which prices always 'fully reflect' available information is called efficient" (Fama 1970: 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 already embody the content and meaning of any relevant and available information.

Any relationship between information and price movements, although easily hinted at, is very hard to establish empirically. Indeed, to positively prove that stock prices, at every moment, "fully reflect" all available information is impossible, as even EMH proponents can attest (Fama 1970: 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. Financial markets do not allow for this. In its place, economists had to search for something

[2] 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 theories.

to measure and turned to stock price movements themselves (in place of information flows).[3] 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 movement is random as no consistent abnormal returns could emerge from random movements but 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 it cannot explain simple prima facie counter-evidence – prolonged abnormal returns by certain investors (Warren Buffett, for example) or seasonal abnormalities such as the Monday or January effects. Yet it is not fair to say that the only reason empirical tests on the EHM were performed on investment strategies and their returns was the rivalry between technical and EMH advocates. That 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, and rather because prices (and especially financial prices) are readily available to verify or negate the EMH (Ross 1987: 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 a frame on how efficient the market was depending on what sort of strategies would allow for abnormal returns. Fama (1970: 383) would do so by dividing market efficiency in three subsets. Weak, in which no abnormal returns could be found from historical prices, semi-strong in which no abnormal returns could be obtained from publicly available information and strong where not even private or "inside" information would give any investors an ex-ante advantage.

The Assault on the EMH Fortress

[3] Incidentally, this bifurcation between price data and information data plagues much financial literature. Howden (forthcoming) analyzes the efficacy of insider trading laws by way of looking for abnormal equity returns instead of tracing the flow of information being reassigned from one individual (or group) to another.

In order to test the EMH, an underlying model of how individual stocks are expected to perform must be used. The Capital Assets Pricing Model (CAPM) gave EMH advocates that opportunity, though 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 solidly when tested out of sample) is sufficient, but the CAPM is generally used due to its shared or similar assumptions with the EMH, namely that all information is available simultaneously to all investors. 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% decline in the Dow Jones Industrial Average on October 19, 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 studies were plagued by narrow analyses of episodes selectively chosen to invalidate EMH (such as the 1988 stock market decline). Echoing Ronald Coase's famous dictum on torturing data, Burton Malkiel (2003: 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". (As we will see, Malkiel fails to observe 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: 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 2003:80). 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 (for example, 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.[4]

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 a very-long run (his study went back to 1926) smaller companies' equity persistently generated larger returns than larger companies' did. (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. (Malkiel (2003: 64) ventured 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). Seeing the problem as a lack of independent variables in the CAPM, Fama and French

[4] McKinnon (2013: chap. 5) views the crisis as predicated on destabilizing carry trade flows, with investors trying to take advantage of interest rate differentials. In the largest bust of the crisis, Iceland witnessed what appeared at the time to be healthy capital inflows throughout the 2000s which suddenly reversed in 2008 as the carry trade came to an end (Bagus and Howden 2011a).

(1993) suggested a three-factor asset pricing model (including price-to-book-value and size as measures for risk) as the appropriate benchmarks against which anomalies should be measured. As cracks in the CAPM edifice started to be revealed, this became the preferred solution – multi-factor models to improve predictive power.[5]

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 predicating 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 the 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: 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: 384).[6] 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 is not a testable proposition and cannot even be considered as tentatively true. Indeed, as Campbell *et al*. (1997: 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.

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[5] 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 agreement 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 fully accounts for the risk-return tradeoff in stock prices, nor explains certain anomalies of continual abnormal returns.

[6] 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 outside of a model specified by EMH they are meaningless (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 to test realized returns against. 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:

> In 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: 395)

One conclusion is that as long as there is a profit to offset the cost of gathering information the market could reach an equilibrium. 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 collect a rent), which leads them to conclude that any equilibrium must be one which contains an "equilibrium degree of desequilibrium" (Grossman and Stiglitz 1980: 393). One implication is that market efficiency will be determined by the costs of gathering and processing relevant information (Lo and MacKinlay 1999: 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 2004; 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 move randomly lacking information as yet to occur that will affect them, 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.

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 functions. 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 because they disagree 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). Thus EMH holds markets to an impossible standard under this reasoning, and that since price formation occurs through opposed interpretations of information, that at least one-half of the market must disagree with the importance of information at any given price. For price formation to occur, it must be that either: 1) sellers think that information is not important for the price, or that it has been incorrectly interpreted to overvalue the good at hand, or 2) buyers think that information is important, or that it has yet to be fully incorporated into the good's price. Notice that 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.[7]

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

[7] 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% he will be a net buyer, while if the other's is 11% he will be a net seller. We thank Rafael García Iborra for this insight.

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 cash no one would want to be a net buyer).

Until recently (e.g., Coolier 2011) this constraint went rather unnoticed most likely because, in the real world, 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 the EMH and the tests performed to verify the hypothesis all investors share the same goal (e.g., to outperform the market) and time is either not considered or assumed to be equivalent for all, generally equivalent to the time-frame of the sample being tested.

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: 3-4). Long treats this as a general problem plaguing economic modeling, and EMH is a case in point. By treating market participants as a homogenous group – in terms of their valuations and expectations – it 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 fair 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]

Price changes create information, in the sense that as relative valuations between goods change market participants must alter their consumption and production activities to maintain utility. Any price change, as a result, cannot 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. And 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 EMH adherents would find comfort in), though they would not necessarily be moving independently of other prices and would not be 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 not only supply and demand conditions but also 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 and

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

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

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 can convey no 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 more concerned with meeting unmet supplies or demands by monitoring for deficiencies or surpluses in the quantities of goods traded on the market, and not directly with the prices that these goods are trading at (Hülsmann 1997; Bagus and Howden 2011b: 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 reckonings via a simple price.

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 more 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 be by 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' (1949: 338) emphasis on "false prices" as existing 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 didn't 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., the color we refer to as black is defined as the absence of color, Mariano Rajoy is the president of Spain in 2013, or 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 complex 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 by an individual will be distinct 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 them to be already in a state of informational efficiency as evidenced by their inaction in light of the new information. But it cannot then 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 believe that the market is inefficient while it is not. The objection is a serious threat to the

assumptions of the model so Malkiel, for example, allows for some degree of short-run inefficiency that must eventually give way, stating that "the stock-market, in the short run may be a voting mechanism, in the long run is a weighing mechanism, true value will win out in the end" (2003: 61).

Yet what would make one think that the long run should behave any differently than the here and now? 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 EMH is defined as any market where 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 incentivized to act upon it.

Under this rationale, EMH becomes 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 full information incorporation 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 this event will not disprove the hypothesis but is something that, given the assumptions, has to be accepted. When coupled with the CAPM, a series of prices obtain which should exist given the constraints considered (e.g., liquidity available, risk-free interest rates, 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.

[10] As an equilibrium state the EMH is less than satisfactory (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.

Yet there is anecdotal evidence to suggest 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 the market's future advance (Mises 1949). Both of these entrepreneurial roles are excluded in 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. Since EMH states that no future information can be rationally unearthed in advance – it must be unknown as, if it was, its importance would already be priced in – any semblance of rationality on behalf of the entrepreneur must be eschewed. In its place, any new information must be accidentally uncovered and acted on, with little cognizance as to where it came from or what its importance is in regards to the good in question.

This final statement may be an assumption useful in developing the Hypothesis, 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

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

existing prices, suggests that markets are neither informationally efficient nor following a random walk in price formation.[12] Alternatively, 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.

A new path for efficiency

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 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). Instead, the hypothesis part of the EMH is better described as a conjecture.

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[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 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 forthcoming). 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).

Conclusion

Although it makes a seemingly innocuous claim only about the informational efficiency of prices, the efficient market hypothesis is plagued with difficulties. Some of these problems lie in the logic behind its construction. Others are a result of the standard by which the efficacy of its claim 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 have disseminated it 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, as if they thought otherwise they would be actively trading to align them with their estimated values and thus 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, and this is unable to be tested for directly, the Hypothesis does not lend itself to empirical verification.

In light of the theoretical deficiencies we outline 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 nearly 50 years after its original exposition, and that ambiguous tests of its relevance plague the literature, bring doubts to those who see the EMH as intuitively flawed.

As a conjecture the EMH is misplaced. Logical inconsistencies internal to its formulation cast doubt that it could hold in isolated settings (such as a long-run equilibrium). The crisis has 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 the Hypothesis in terms of redefining how the market functions, it is better to refute it as the misplaced conjecture it is.

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