

How rational expectations affect the Efficient Market Hypothesis

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In this essay Conor O'Toole analyses the implications of the insights of the relatively new field of behavioural finance for the Efficient Market Hypothesis. The EHM relaxes the assumption of the uniformly rational economic actor and instead allows for varying degrees of rationality which can ultimately combine to result in a rational market outcome. O'Toole seeks to illustrate that although the simplifying assumptions of economics often comes under attack from those who say that the discipline's anti-behavioural stance invalidates its findings, in reality there is room to accommodate irrationalities without turning conventional thinking upside-down.

Introduction

"Man is neither infinite in faculties, nor in apprehension like a god. Nor is human fallibility shed at the doorstep of the stock exchange."

(Hirschleifer, 2007: 51)

One of the most topical subjects in financial economics is the discussion of the Efficient Market Hypothesis (EMH) which dates back as far as 1900¹, but was developed and popularised by Fama (1970) in an influential paper. Essentially, the EMH states that speculative prices (such as those of assets on stock markets) are inherently unpredictable, and follow what can only be described as a random walk (Samuelson, 1965). Despite initial empirical support, later studies concluded that "no minor tinkering with efficient-markets models seems likely to provide an intelligible reason why rational agents would exchange securities as much as real-world market participants do" (Leroy, 1989: 1,615). This article will attempt to explain the apparent disparity between this empirical validity and the theoretical ideal of EMH in terms of the basic paradigm behind the hypothesis – the assumption

¹ The first recorded mention of the subject was in Louis Bachelier's (1990a) thesis, which remained relatively undiscovered until Fama's work.

of market rationality. This assumption seems perfectly reasonable; however, any discussion of this model would not be complete without an analysis of those behavioural-based studies which advocate the reality of investor irrationality.

Rational expectations

The rational expectations approach to the EMH is based on the “assumption of perfect foresight” (Sheffrin, 1983: 13). It supposes that investors all act in concert so that market prices will adjust automatically to correct mispricing. If market participants do not act rationally, they will be weaned out of the market as “wealth must flow from foolish to wise investors” (Daniel, Hirshleifer & Teoh, 2002: 141). “The central idea of efficient capital market theory is that securities prices are determined by the interaction of self-interested rational agents” who all act in their own best interest to negate any arbitrage opportunities that may arise in the market (Leroy, 1989: 1613).

The EMH also assumes that all investors have access to perfect information which Fama (1970) further broke down into three different levels; The Weak Axiom assumes that current market prices reflect all past price information, meaning that there is no scope to make profits by examining historical data. The Semi-Strong Axiom states that prices reflect all publicly available information, meaning that traders cannot hope to profit in the market by using information that is available to the general public. The reasoning behind this is simple: if anyone can gain access to this information then somebody somewhere has already acted on this information by buying or selling accordingly. The Strong Axiom is the most extreme case where prices reflect all public and privately held information. This supposes that individuals cannot attempt to make a profit in the market even when armed with insider information (Fama, 1970).

Fama (1970) further identified some assumptions upon which the EMH is dependent. For example, it is assumed that “there are no transaction costs... all information is costlessly available to all market participants and all [participants] agree on the implications of current information” (Fama, 1970: 387). Such simplifying assumptions are convenient as they allowed researchers to examine stock prices based on fundamentals. By excluding the costs of operating in a market, prices will perfectly reflect a culmination of investor expectation. Sheffrin (1983: 7) explains that these “expectations will diverge from actual values only because of some unpredictable uncertainty in the system”. In this scenario, arbitrage will ensue to instantly bring prices back to their fundamental levels.

The ability of investors to act perfectly rationally is made theoretically possible by the liquidity of the market. The idea is that “the basic paradigm of asset pricing is in vigorous and productive flux” (Hirschleifer, 2007: 7). Every time a

trade is placed in the market, there has to be another person willing to take the opposite position, therefore, somebody will always lose whilst another gains.

Indeed, Barber and Odean (2001) found that traders who switched to online brokerages traded more aggressively yet subsequently performed more poorly. The authors conclude that greater liquidity encouraged bad trades. Therefore, even though perfect rationality should encourage investors to act in the same way, it can only exist if there are market participants who act irrationally - otherwise the markets would stagnate.

Empirical evidence suggests that fundamentals based on “past, present, and future periods collectively explain less than 50 per cent of the annual variability in stock returns” (Lee, 2001: 241). This directly contradicts Samuelson’s (1965) assumption that price reflects the fundamental value of a firm. Even though the EMH “has proved instructive, it has also engendered an unfortunate tendency to attribute unlimited processing ability to decision makers” (Lee, 2001). Interestingly, Lee (2001: 98) suggests that “market efficiency is a journey, not a destination”. EMH is an important tool that can be used to make price predictions given a perfect world and enables profitable arbitrage trading by smart investors if prices reflect public information poorly (Daniel, Hirshleifer & Teoh, 2002). However, rational expectations do not allow for such widespread anomalies and so there must be an alternative explanation. A more credible hypothesis is that investors act speculatively; therefore, rather than rational expectations being responsible for market movements, it is “individual psychology [that] affects prices” (Hirshleifer, 2007: 6)

Psychology and the market

The idea of investor irrationality or imperfect rationality, as it is sometimes called, acknowledges that investors are not perfect and that rationality with its requirement for unrealistic mental abilities (Hirshleifer, 2007), is not the best indicator of how markets behave. Many studies have been conducted to try and explain investor rationality in an attempt to predict their expectations. Hirshleifer (2007: 8) points out what he believes are the future of finance theory:

“In the last few years, financial economists have grown more receptive to imperfect rational explanations. Over time I believe that the purely rational paradigm will be subsumed by a broader psychological paradigm that includes full rationality as a significant special case”

The author points to the duality of trading and the fallibility of individuals as indicators of why we cannot all possibly be perfectly rational.

There has been a significant amount of research attempting to explain the reasons why investors do not always think or act rationally. Such explanations are based on either an absence of relevant and complete information or on individual shortcomings. As Hirschleifer, Daniel and Teoh (2001) explain, investment decisions are often subject to various biases such as overconfidence and emotions. Investor irrationality and the apparent inefficiency of markets can generally be attributed to these imperfections. This also sheds light on the observation that investors often make unfounded and sometimes impractical decisions.

Heuristics and biases

As Hirschleifer (2007: 9) notes “there are biases that almost no-one is immune to” - even when it involves financial decisions that may be critical to an individual’s livelihood. For example, the allocation of capital within a pension fund can be critical to an individual’s decision to retire. “In [these] case[s] there can be widespread idiosyncratic mispricing which only becomes apparent *ex post*” (Hirschleifer, 2007: 9). While investors often believe they are making rational decisions, more often than not, this is not the case. As Leroy (1989: 1,611) points out that “the majority of trades appear to reflect belief on the part of each investor that he can outwit other investors, which is inconsistent with common knowledge of rationality”. Thus, one could infer from these observations that very few market participants make long-run profits in excess of the market index. Most investors are, in fact, not smarter than the rest and it is this unfounded overconfidence that fuels market inefficiency.

These observed biases are explained by certain mental heuristics which stem from working memory constraints. As all investors are subject to cognitive constraints, often the scope of information processing must be minimised. In behavioural psychology, ‘narrow framing’ is an example of such a mental shortcut “wherein the description of a situation affects judgments and choices” (Daniel, Hirshleifer & Teoh, 2002: 143). This causes investors to act without taking into account whether they possess all the available information about the market. ‘Mental accounting’ is an observable form of ‘narrow framing’, whereby investors process losses and gains separately. People seem to value gains more highly than losses which would explain the empirical observation that, investors have “an excessive propensity to hold on to securities that have declined in value and to sell winners” (Hirschleifer, 2007: 16). The rationality behind such behaviour is that investors want to lock in short-term profits while delaying losses into the long term.

There are a number of other biases to which investors are susceptible. For example, people tend to choose familiar and therefore local, investments (Huberman, 2001). This also touches on the ‘halo effect’ which is the tendency to

evaluate the characteristics of an individual more positively due to a more salient, but positive feature, of one's personality (Nisbett & Wilson, 1977a). When receiving information from a supposed reliable or familiar source, investors are subject to familiarity biases and availability effects which cause a "heavy focus on information that stands out...at the expense of information that blends in with the background" (Daniel, Hirshleifer & Teoh, 2002: 143). An illustration of this is the tendency for investors to focus on nominal monetary returns and therefore, succumbing to the 'money illusion'.

Further studies have revealed that investors do not always have the required knowledge of risk and how it relates to the market. Often decisions on risky bets are made without taking the big picture into account. A misunderstanding of how randomness works can also cause the phenomenon 'gambler's fallacy' (Mlodinow, 2008). This is the belief that the odds of an event with a fixed probability change depending on recent occurrences of the event. This can explain people's aversion to picking lottery numbers which appeared in the previous draw, even though logically they have the same probability of occurring again.

The news also plays an important part in investment decisions. Conversely, the EMH states that the news should not have an effect on price levels as any new public information is automatically absorbed by the market. However, this is not the case; "irrelevant, redundant or old news affects security prices when presented saliently" (Hirschleifer, 2007: 18). In other words, the manner in which information is presented to a person can be influential in decision making. "The media likes to report on what is new, and to paint what is new as important" (Daniel, Hirshleifer & Teoh, 2002: 169), however, these reports are only relevant to prices insofar as individuals deem them to be. Fundamentally, they have no value.

Often, in the market place, the speed at which decisions are made is overwhelming and it does not allow time for investors to rationally weigh the pros and cons of a decision. Hirschleifer (2007: 14) goes on to explain how "limited attention, memory, and processing capacities force a focus on subsets of available information". Agents integrate most information at face value and tend to overreact to information that is easily processed.

Emotions are also critical to the decision-making process. The time of the year, weather and a person's general mood all influence the way people invest on a day-to-day basis. The 'January effect' is a famous observation that share prices increase in January for no apparent reason (Keim, 1983). Individual emotions have no influence on companies' fundamentals, but the fact remains that such emotions affect investment decisions.

In summary, investors react to external and internal factors that cause irrational behaviour. "Noise Trading" was first coined by Black (1985) to explain why people do not act rationally when presented with information that may

ultimately prove to be value-irrelevant. The author used the term to “sanitiz[e] irrationality and render it palatable to many analysts who in other settings would not be receptive to such a specification” (Leroy, 1989: 1,612) Noise trading encapsulates the idea that investors will respond to the hype created by other market participants without due consideration of the implications of EMH. Furthermore, investors consistently come to believe that the market can be beaten by actively trading based on the information set available to them. By acknowledging that investors respond to specific stimuli, there may be ways of predicting their actions; “in making security selections smart-money investors need to consider the behaviour of noise traders, as well as fundamental valuation, in determining their own strategy. Smart-money investors need to consider ‘fashions’ and ‘fads’ in addition to ‘fundamentals’” (Lee, 2001: 246).

Conclusion

To conclude, although the EMH is a valuable theoretical approach, it is empirically evident that the actions of investors cannot be predicted due to each individual having specific preferences and levels of risk aversion. However, on the other side of the equation, the behavioural approach is also not devoid of criticism: “it is too easy to go theory fishing for factor structures and market imperfections to match data *ex post* [Italics added]” (Hirschleifer, 2007: 87). It is true that the markets are not always perfect; however, the ability of certain investors and institutions to make supernormal profits is dependent on the irrationalities of the multitude. As Lee (2001: 238) states:

“Ecologists coming upon the African Safari encountered large prides of lions. From the abundance of these predators, they inferred an abundance of gazelles, zebras, and other forms of lion prey. In the same spirit, the massive arbitrage apparatus we observe today attests powerfully to the continuing presence of substantial market imperfections. We cannot at once believe in the existence of lions, and reject the existence of the creatures that are essential to their survival.”

However, Shleifer (2000: 3) suggests, “the EMH does not live or die by investor rationality”. Rather, it is reliant on imperfect rationality to encourage sufficiently high trading volumes so investors’ net positions will cancel each other out randomly. When they do not, informed traders will arbitrage away temporary disequilibria, thus at the very least, the “EMH counsel[s] healthy scepticism in investment decisions” (Fortune, 1991: 18). It can thus be concluded that rationality

is not the only foundation for the EMH. As such, market movements will essentially rely on an amalgamation of rational theory and often, irrational practice.

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