

## **Recognizing the Limitations of Market Efficiency**

### **ABSTRACT**

**Fluctuations in stock market values are nothing new. And yet they are frequently a surprise to investors. In approaching the task of explaining these fluctuations, it is important to be mindful of the limitations of market efficiency, while recognizing the value that the principle holds in discouraging wasteful financial engineering by corporations. Empirical research does not provide support for the strongest hypothesis of market efficiency and no risky market, however efficient, can provide predictable returns.**

### **Crashes in an Efficient Market**

The bellwether Dow Jones index peaked at 14,198 during the trading session of October 11<sup>th</sup> 2007. On March 9<sup>th</sup> 2009, the index reached a trough of 6,547, less than half of that peak value. At the time of writing, in February 2010, it's back up to around 10,500. Let us take the modern viewpoint that the Dow Jones index is an estimate of the present value of the future cash flows of the 30 businesses that comprise the index. How can we reconcile these widely different answers (to what seems like a pretty simple question) with the idea of an "efficient" market taught in many business schools and business departments?

Actually, surprisingly easily. Or, more precisely, it depends what you mean by an efficient market. The simplest definition of an efficient market is that it is one that offers rapid trading for the assets traded (stocks and shares in this case) and quickly available liquidity (cash) in exchange for them. Effectively, the trader who wants to "get out" (of either a long or short positions) will get a price from the efficient market, but he might not like it. We like to observe that modern efficient capital markets rapidly adjust in response to new information, and this is often the case (for example, in the observed rapid negative reaction to disappointing earnings announcements made by firms). But we also observe markets going up and down in response to little or no information, and under or overreaction when there is information.

The modern finance definition of an efficient market is due to the University of Chicago's Eugene Fama, who introduced the concept of a market that is not only efficient

as a means of trading (i.e. a price discovery tool) but also efficient in its ability to impound available information into price. Fama established the concept of information efficient markets, in which “prices always ‘fully reflect’ available information” (Fama (1970)). Fama later broadened his definition of an efficient market to one where “the market *correctly* uses all available information” (Fama (1976), my italics), but it is worth noting that when researchers attempt to *test* whether the market is efficient, they are usually testing whether profits can be made by trading using available information (for example, detailed accounting analysis of companies), which more speaks to Fama’s first definition of market efficiency. This way of testing is logical, since it is a way of testing whether any information has been “left out” of the market’s process of price determination. But the tests cannot tell if the market correctly uses the information to determine the best estimate of value, but merely that our current analytical methods cannot do any better. And it is clear that new information, unknown at the time the market price is determined, cannot be included in the market price.

### **Using the Benefit of Hindsight**

With the benefit of hindsight, we can test whether market price has been correctly determined as a measure of long term value, by observing price changes during periods such as 1997-2001 and 2007-2009. The wide swings in prices during these periods show that, for example, many internet stock prices in January-February 2000, were very poor measures (far too high) of the ultimate value of those firms. While it may seem “unfair” to “judge the market” on the basis perhaps of things that were not known, it is important to go through this process for two reasons. Firstly, we need to put the recent stock price

falls and rises into historical context, and see that there have been plenty of previous examples of such rises and falls. Secondly, it is important to note very specifically that, while an orderly market determines price in a way that is quick and difficult to fault, the market *does not have foresight* of future value. The estimates of value that are provided are vulnerable to change due to new information and are also vulnerable to systematic errors which, while they do not provide any clear profit opportunities (and therefore do not contravene market efficiency), can lead to stock prices (and the prices of other assets, such as houses) being much inflated compared to the long term value, for significant periods of time.

This latter phenomenon is termed the asset price bubble phenomenon, because in “blowing up” and later almost instantly “popping”, the path of asset prices resembles the behavior of a bubble. There are many examples of this in history: the tulip bubble in seventeenth century Holland (see Dash (1999)), the South Sea bubble, the US stock market boom of the 1920s, the US growth stock craze of 1959-1961, the high-tech boom of the early 1980s (Shiller 1989), the biotech boom of 1989-1991 and the US house price boom of 2001-2005. During all of these periods, there were persons who believed that, the assets involved in the bubble were overvalued. But, the long and uncertain time frame of correction of the pricing anomaly, and the problem of “gamblers’ ruin” (when the gambler/investor runs out of stake money before his or her judgment can be proved correct), made it difficult to impossible for them to make substantial profits from their beliefs. Robert Shiller, the Yale economist who was one of the commentators that

suggested that the housing market was overvalued before 2006, sums up the problem very well:-

“some people seem to think that there is a theoretical argument (against bubbles....But) such fashions or fads may not create spectacular profit opportunities if the future paths of the fashions or fads are not very predictable...Consider those who, in the late 1950s and the early 1960s in the United States, thought that the bull market had gone on too long and that stocks were overpriced. Even if they knew that the market would eventually fall, there was no way for them to get rich quick from this knowledge. They had to wait years to be vindicated; they could not predict when the bull market would end.” (Shiller (1989))

However, belief that bubbles occur is not universal. For example, according to the New York Times’ Paul Krugman, in a 2007 interview Eugene Fama not only denied the existence of the house price bubble but declared that “the word ‘bubble’ drives me nuts.” (Krugman (2009)). With Fama’s theory having influenced a generation of finance professionals and finance professors, it is unfortunate that its creator seems to ignore some of the historical evidence.

The “air cover” that intellectuals such as Fama provide may serve as an additional factor in lengthening the duration of bubbles. Media coverage is also a factor. But we should not forget the power of positive word of mouth and, now, positive “word of mouse”. Shiller (1989) sums up the effects of this feedback loop: “As asset prices start to rise, the success of some investors attracts public attention that fuels the spread of enthusiasm for the market. New (often less sophisticated) investors enter the market and bid up prices.” We might add that misinterpretation of the efficient markets hypothesis may convince buyers that the “market knows everything” and therefore something that they don’t.

Finally, the observation of the inflated market price, in conjunction with the known “anchoring” bias that humans have, helps convince buyers that the asset price is a sensible one (simply because the mind is highly influenced by the last number we have heard, irrespective of its relevance. See Gardner (2008) for a highly accessible discussion on this topic or Tversky and Kahneman (1974) for the original work).

### **How efficient? Levels of market efficiency**

Fama himself, and other workers, have since posited different levels of market efficiency.

This list goes from the least restrictive definition of efficiency to the most restrictive:-

1. No arbitrage: no risk free profit opportunities exist in the market
2. Weak form market efficiency: current market prices impound all information from the time-series of previous prices
3. Semi-strong form: prices impound all information from analysis of publicly available financial information (as well as from the time series of previous prices)
4. Strong form: prices impound all information from a painstaking analysis of all public and private information
5. “Perfect foresight” market efficiency (PFME): current market price is equal to the discounted future value of the company’s earnings or cash flows

The no-arbitrage (NA) concept predates Fama’s work. Arbitrage is the practice of buying and simultaneously selling *similar* securities to profit from relative mispricings, and it has always been believed that risk-free arbitrage opportunities would be competed away as

soon as they became visible to traders. However, that does not stop specialist firms from attempting to exploit temporary imbalances and differences in price between international markets, for example.

Although most researchers believe that the market does impound all useful information from previous prices (level 2 market efficiency, posited by Fama), this has not discouraged a large community of “technical” traders, who trade based on patterns in stock prices, such as stock prices trading between an upper (“resistance”) and lower (“support”) level.

Most current research focuses on whether the market is level 3 efficient, i.e. whether that analysis of accounting and other relevant non price data can help predict stock prices.

The jury is out. When looking at past data (“back testing”), researchers frequently detect seemingly anomalous returns, but funds (especially large funds) have mixed results when they attempt to trade based on these findings. There is little support for level 4 market efficiency and, since insider trading is illegal, little opportunity for a detailed study of how much money you can make doing it, but it seems fairly clear that advance knowledge of unexpectedly positive or negative news can be of benefit to traders.

Level 5 market efficiency is a “straw man” formulated by the author. In fact, we do not know what the future earnings are, so stock price is, at best, an estimate as to what the present value of future earnings are. Frequently, as shown by historical experience in previous bubbles and as confirmed by laboratory studies – asset prices hugely

overestimate any realistic estimate of future earnings or cash flows. In fact, Smith et al (1988) showed that bubbles were even been observed in laboratory settings where the student participants (who are given limited compensation to simulate trading rewards) are given concrete information about the distribution of true ending price. Bubbles were particularly common in experiments with first time traders.

The confusion about market efficiency, and whether the market has foresight, or even whether it has any *more* foresight than an individual trader, goes back to a fundamental understanding about value and price. That understanding is that, if you hold a company's stock *for ever*, the value you will get is the sum of its profits or cash flows which are, at that time, known with certainty. However, in Keynes's (1923) immortal words "in the long run we are all dead", and in the meantime we have to rely on guesses as to what those profits *will* be. As to whether the market has foresight to aid those guesses - it does not. As to whether the market has more foresight than an individual trader, that depends on which trader we are talking about.

### **What investors want from an efficient market, and what they get**

The underlying problem is that what academic researchers mean by an efficient market and what investors would like the market to provide them are very different. An "efficient market" sounds like it should be "good" for investors, but efficient markets can fall very rapidly, disappointing investors who depend on them to produce positive



returns. It is sensible to view the characteristics of an efficient market for risky assets are a fairly limited subset of what investors would like to see.

Characteristic desired by investors	Term	Efficient market characteristic?
Market provides a price	Price discovery	Yes
Ability to sell stocks quickly	Liquidity	Yes
No advantage for insiders	Information efficiency	Strong form efficiency – yes Weak form efficiency – no
Price is “correct”	“Foresight”	No
Market provides a steady return	“Predictability”	Not for risky assets

Two main themes should be noted here. Firstly, what investors want from the stock market, steady, high returns from stocks and stock prices reflective of future cash flows, cannot be delivered by a market in risky assets. Only risk free assets can deliver certainty, and risk free assets will have a (low) risk-free return. But secondly, it could be worse. As bad as the volatile and cruel efficient market in stocks and shares is, a volatile **and** inefficient market would be even worse. A market lacking in liquidity would prevent investors who need money from exiting, and a market which not offering price discovery would leave investors unaware even of at what price they are able to exit. And

although insiders can exert advantages in the stock market, since it is generally agreed that the market is **not** what is technically termed strong-form efficient, they do so at risk of criminal charges – a risk that tends to limit the influence of insider information.

### **Preserving the Strengths of the Efficient Markets Hypothesis**

The efficient markets hypothesis has strengths in that it discourages managers in commercial firms from engaging in purely “window dressing” financial activities to enhance published indicators – because an efficient market will “see through” those activities. This encourages managers to focus on managing operating assets, where their expertise conveys the most comparative advantage, rather than on spending excessive time and money managing market perception. However, as we move to a more nuanced understanding of how the efficient market works we must be mindful that some window dressing does seem to have an effect, although often only temporary (see, for example, Sloan (1996)). We should also be sure to stress that an efficient market does not guarantee a smooth ride for investors. Bubbles can and do persist for long periods of time.

## References

Dash, Mike (1999). *Tulipomania: The Story of the World's Most Coveted Flower & the Extraordinary Passions It Aroused* (Crown).

Eugene F. Fama (1970). "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* **25** (2) (May 1970), 383-417.

Gardner, Daniel (2008), *The Science of Fear: Why We Fear the Things We Shouldn't--and Put Ourselves in Greater Danger*, Dutton Penguin (New York, NY), 36-39 et seq.

Keynes, John M. (1923) *A Tract on Monetary Reform* (London: Macmillan).

Krugman, Paul (2009), "How Did Economists Get It So Wrong?", *The New York Times Magazine* (September 6, 2009) 36.

Shiller, Robert (1989), *Irrational Exuberance* (Broadway).

Sloan, R. (1996) "Do stock prices fully reflect information in accruals and cash flows about future earnings?", *The Accounting Review* **71**, 289-315.

LV10126

Smith, Vernon L., Gerry L. Suchanek, Arlington W. Williams (1988), "Bubbles, Crashes, and Endogenous Expectations in Experimental Spot Asset Markets," *Econometrica*, **56**,

No. 5 (Sep., 1988), 1119-1151

Tversky, Amos, & Daniel Kahneman (1974), "Judgment under uncertainty: Heuristics and biases", *Science*, **185**, 1124-1131.