



EFFICIENT MARKETS IN CRISIS

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A belief that markets are efficient is blamed for instigating the crisis we are in and lulling us into complacency as the crisis was approaching. But the debate about the role of such belief in the crisis is unfocused for two reasons. First, a lack of a common definition of market efficiency precludes a common language. Second, efficient markets are conflated with free markets.

The ambitious definition of efficient markets is their definition as rational markets, where security prices always equal intrinsic values. The modest definition of efficient markets is their definition as unbeatable markets. Bubbles cannot occur in rational markets but they can occur in unbeatable markets. I argue that a belief in market efficiency cannot bear responsibility for our crisis since most investors do not believe that markets are either rational or unbeatable.

Free markets are markets where government places little or no imprint on the financial behavior of individuals and organizations and on markets through regulations and direct intervention. Many advocates of free markets believe that such markets are also more efficient than markets which are not as free. But free markets are distinct from efficient markets. Highly regulated markets can be no less efficient in the sense of rational markets or unbeatable markets than lightly regulated markets. I argue that a belief that free markets are always superior to regulated markets and lightly regulated markets are always superior to heavily regulated markets does bear some responsibility for our crisis. Regulations that would have limited the types of mortgages offered to homeowners would have helped stem the crisis or mitigate it. So would have limits on the degree of leverage employed by banks and homeowners alike.

Yet not all regulations and government interventions bring unmitigated benefits. We have no precise measures by which we might distinguish real bubbles from illusory ones.

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Governments which aim to pop real bubbles run the risk of plunging us into recessions by popping illusory ones. The challenge we face is the challenge of seeing an opaque future as clearly as possible, knowing not only that foresight is not as clear as hindsight but also that we would be judged in the future as if it is.



1 Efficient markets in crisis

The efficient markets hypothesis is on trial again, this time accused of facilitating the financial crisis which still engulf us by misleading its adherents into docility. “How did economists get it so wrong?” asked Krugman (2009). Some of the blame, he wrote, belongs to the belief that markets are efficient. “In short, the belief in efficient financial markets blinded many if not most economists to the emergence of the biggest financial bubble in history. And efficient-market theory also played a significant role in inflating that bubble in the first place.”¹ Krugman defined efficient market theory as the claim that “financial markets price assets precisely at their intrinsic worth given all publicly available information.”

The trial of the efficient markets hypothesis drags on for two reasons. First, there is more than one definition for efficient markets. It is hard to bring the trial to conclusion in the absence of a common definition. Second, efficient markets are conflated with free markets. My purpose is to assess the role of the belief that markets are efficient in the crisis by distinguishing among the definitions of efficient markets and distinguishing efficient markets from free markets. I set aside the term ‘efficient markets,’ using it only to examine four other terms it packs: rational markets, informationally efficient markets, random-walk markets, and unbeatable markets. I begin with brief definitions of the terms.

Rational markets are markets where securities’ prices always equal their intrinsic values.

Informationally efficient markets are markets where *changes* in securities’ prices are always equal to *changes* in their intrinsic values. (Rational markets are necessarily informationally efficient, but informationally efficient markets are not necessarily rational markets.)

Random-walk markets are markets where past securities’ returns contain no information about future securities’ returns other than the parameters of their distributions (e.g. mean and variance).

Unbeatable markets are markets where investors are unable to generate consistent positive alphas from securities, once costs are accounted for.

Free markets are markets where, in their extreme form, government imposes no restrictions on the economic actions of individuals or organization. In their moderate form they are markets where government places few such restrictions.

Krugman’s definition of efficient markets corresponds to their definition of rational markets. Krugman went on to fault financial economists for rarely attempting to discern whether indeed “markets always get asset prices right” by investigating “whether asset prices make sense given real world fundamentals like earning.”

2 Rational, informationally efficient, random-walk, and unbeatable markets

Eugene Fama introduced the term efficient markets in the mid-1960s and started the great enterprise of testing the Efficient Markets Hypothesis. Fama defined market efficiency in a 1965 article, “Random Walks in Stock Market Prices.” He wrote: “An ‘efficient’ market is defined as a market where there are a large number of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants.” (p. 56). This definition describes only conditions facilitating market efficiency, not what it entails. But Fama tells us what market efficiency entails soon afterwards, “In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value.”

The efficient market defined by Fama in these words is better named ‘rational market,’ using Fama’s description of the “rational profit-maximizers” who drive this market. The name is also apt following Miller and Modigliani (1961) who described rational investors as investors who “always prefer more wealth to less and are indifferent as to whether a given increment to their wealth takes the form of cash payments or an increase in the market value of their holdings of shares.” Rational investors assess stocks by the intrinsic values of these stocks.

J. Williams (1938) illustrated the intrinsic value of a stock in a ditty he included in his otherwise very serious book, *The Theory of Investment Value*. Williams placed a stock side by side with a cow and a hen.

*A cow for her milk,
A hen for her eggs,
And a stock, by heck, for her dividends*

The intrinsic value of a cow is the present value of the proceeds from its milk. Rational farmers care about no more than these proceeds and are unwilling to pay for a cow any more than its intrinsic value. In a rational cow market the price of a cow is always equal to its intrinsic value. Similarly, the intrinsic value of a stock is the present value of its dividends and rational investors care about no more than that. In a rational stock market the price of a stock is always equal to its intrinsic value.

Fama noted that the intrinsic value of a stock can change across time because of new information, but his examples of what constitutes information are telling. Each affects future dividends and their present value. “The new information may involve such things as the success of a current research and development project, a change in management, a tariff imposed on the industry’s product by a foreign country, an increase in industrial production or any other *actual or anticipated* change in a factor which is likely to affect the company’s prospects.” (p. 56, italics in the original).

For the sake of clarity I will refer to the type of information in Fama’s examples as ‘intrinsic value information,’ distinguishing it from ‘sentiment information’ which relates to a company and its stock but does not affect its intrinsic value. Beauty is sentiment information. In rational cow markets, beautiful cows do not sell for a penny more than ugly cows which produce identical amount of milk. The names of companies are sentiment information. In rational stock markets the price of the stock of Computer Literacy, Inc. would not have increased by a penny in the dotcom years of the late 1990s when its executives did nothing more than changing its name to FatBrain.com.

While intrinsic value is well defined, it is not easily measured. Fama added that “in an uncertain world the intrinsic value of a security can never be

determined exactly.” This is because in an uncertain world traders do not always agree on the intrinsic value of an individual security. Moreover, Fama went on to anticipate a behavioral-finance point emphasized later by Black (1986) as a central point in “Noise,” namely that the actions of disagreeing traders *cause* deviations of prices from intrinsic values.

Shefrin and Statman (1994) described the effects of intrinsic and sentiment information on prices by the image of two groups of drivers at the wheel of a car. Prices equal intrinsic values if all drivers are intrinsic information drivers. Intrinsic drivers incorporate new intrinsic information into prices correctly and instantaneously, such that prices change, often radically, but remain equal to intrinsic values. However, sentiment drivers pull the wheel left or right even in the absence of new intrinsic information. For example, they might pull right when they are mostly exuberant and left when they are mostly fearful, creating discrepancies between prices and intrinsic values. Changes in sentiment information are no easier to foresee than changes in intrinsic information, making it difficult to see whether discrepancies between prices and intrinsic values are about to narrow or widen.

Next, Fama introduced the term ‘random-walk markets’ and explained its link to ‘rational markets.’ While the actions of traders cause prices to deviate from intrinsic values, prices deviate *randomly* from intrinsic values. ‘Random-walk markets’ are, therefore, not necessarily ‘rational markets’ since in ‘rational markets’ there are *no* deviations of prices from intrinsic values. Deviations of prices from intrinsic values must be random rather than systematic because of competition or, more specifically, because of the power of arbitrage. As Fama wrote, “If the discrepancies between actual prices and intrinsic values are systematic rather than random in nature, then

knowledge of this would help intelligent market participants to better predict the path by which actual prices will move towards intrinsic values. When the many intelligent traders attempt to take advantage of this knowledge, however, they will tend to neutralize such systematic behavior in price series.” (p. 56). Fama went on to describe ‘random-walk markets.’ “Most simply, the theory of random walks implies that a series of stock price changes has no memory—the past history of the series cannot be used to predict the future in any meaningful way. The future path of the price level of a security is no more predictable than the path of cumulated random numbers.”

The process of competition, arbitrage, or neutralization is the central theme of Lo and MacKinlay’s (1999) book “A Non-Random Walk down Wall Street.” The process begins with a deviation from random walk such as the phenomenon of momentum, where successive price changes display positive or negative correlations rather than a zero correlation. If the correlation is positive “intelligent market participants” earn positive alphas as they buy such stocks and sell them a few days or weeks later at higher prices. To be sure, the buying action of these intelligent market participants increases prices in the early days, eroding the opportunities to earn positive alphas and driving the correlation between successive price changes to zero.

Lo and MacKinlay wrote that “financial markets *are* predictable to some degree, but far from being a symptom of inefficiency or irrationality, predictability is the oil that lubricates the gears of capitalism. Indeed ... price discovery is neither instantaneous nor costless, and frictions play a major role in determining the nature of competition and the function of markets.” (p. 4). This theme is also central in Lo’s (2004) more recent ‘adaptive markets hypothesis,’ “in which the dynamics of evolution, competition, mutation,

reproduction, and natural selection determine the efficiency of markets and the waxing and waning of financial institutions, investment products, and ultimately, institutional and individual fortunes.”

So far in his article Fama (1965) has not introduced explicitly the costs of “intelligent traders attempt to take advantage of this knowledge” of deviations of prices from intrinsic values. Fama introduced these costs later in the article, proposing a way to ascertain whether securities’ markets are indeed efficient in the sense of ‘rational markets’ or ‘random-walk markets.’ Suppose that an analyst believes not only that securities’ prices deviate from their intrinsic values, as in a non-rational market, and not only that these deviations are systematic, as in a non-random-walk market, but also that he/she is able to identify them in foresight. The analyst can demonstrate his/her ability by selecting securities to buy or sell which consistently outperforms randomly selected securities of the same general riskiness.

As we evaluate the ability of the analyst we must take into account the fact that each of us has a 50 percent chance of outperforming a random selection by the toss of a coin even if we have no insights into discrepancies between securities’ prices and their intrinsic values. Fama noted further that the bar of evidence of an analyst’s insights is higher than the 50-percent mark. “Moreover,” he wrote, “not only must the analyst do consistently better than random selection, but he must beat random selection by an amount which is at least sufficient to cover the cost of resources (including his own time) which are expended in the process of carrying out his more complicated selection procedures.” (p. 58).

While Fama used the language of market efficiency throughout his article, he has now implicitly introduced a third term, ‘unbeatable markets.’ The first term is ‘rational markets,’ where market price always equals intrinsic value. The second

term is ‘random-walk markets,’ which are not rational in that prices deviate from intrinsic values but these deviations are random. The third term is ‘unbeatable markets’ where prices might deviate from intrinsic values systematically rather than randomly, but where the cost of exploiting these deviations to ‘beat the market’ and generate positive alphas is so high that those who seek to generate positive alphas end up generating zero or negative alphas.

Warren Buffett illustrated the distinction between ‘rational markets’ and ‘unbeatable markets’ and the confusion which arises when they are lumped into ‘efficient markets.’ Buffett was considering bonds of Citizens Insurance, established by the state of Florida to cover hurricane damage and backed by state taxes. Berkshire Hathaway, his company, received three bids, one at 11.33%, one at 9.87% and one at 6.0%. “It’s the same bond, the same time, the same dealer. And a big issue,” said Buffett. “This is not some little anomaly, as they like to say in academic circles every time they find something that disagrees with their [efficient market] theory.”²

Buffett used the term ‘efficient market’ where the term ‘rational market’ would have been more precise. The story of the Citizens Insurance bonds is, as Buffett noted, an anomaly, contradicting the hypothesis that the market for these bonds is rational. The intrinsic value of each Citizens Insurance bond is identical to the intrinsic value of every other Citizens Insurance bond at every moment since all Citizens Insurance bonds are identical in every feature. The fact that the bonds are selling at different prices contradicts the rational markets hypothesis since three different prices cannot all equal one intrinsic value. Two of the prices, and perhaps all three, must be different from intrinsic value.

Yet Buffett cautioned investors not to jump too fast from evidence that markets are not rational to

a conclusion that they are easily beatable. When asked “What advice would you give to someone who is not a professional investor,” Buffett said: “Well, if they’re not going to be an active investor—and very few should try that—then they should just stay with index funds. Any low-cost index fund.... They’re not going to be able to pick the right price and the right time.”

Fama (1970) developed the notion of efficient markets further in a 1970 review, “Efficient Capital Markets: A Review of Theory and Empirical Work.” He defined an efficient market: “A market in which prices always ‘fully reflect’ available information is called ‘efficient.’” (p. 383). Fama divided information into three subsets corresponding to three tests of market efficiency: weak, semi-strong, and strong. A public announcement of a forthcoming dividend belongs to the semi-strong subset, while private information available to corporate executives about tomorrow’s dividend public announcement belongs to the strong subset.

While the definition of market efficiency in Fama’s 1991 review is identical to its definition in his 1970 review, Fama’s (1991) scope in the review was narrower. He stepped away from rational markets, conceding that in markets where information is costly “the extreme version of the market efficiency hypothesis is surely false.” (p. 1575). Instead, Fama wrote, we can now focus “on the more interesting task of laying out the evidence on the adjustment of prices to various kinds of information.” We know these markets as informationally efficient markets, where a *change* in price is equal to a *change* in intrinsic value. But informationally efficient markets are distinct from rational markets. Consider a stock whose price exceeds its intrinsic value by 20 percent. That stock is not trading in a rational market since its price deviates from its intrinsic value. Now consider new intrinsic value information about an

unexpected increase in the dividend paid by the company. The price of the stock might increase by an amount equal to the increase in the intrinsic value associated with the new information. This market is informationally efficient but it is not a rational market since the new stock price remains higher than its new intrinsic value.

The distinctions between ‘rational markets,’ informationally efficient markets, ‘random-walk markets,’ and ‘unbeatable markets,’ reconcile five empirical observations which are difficult to reconcile without them. First, we have evidence that sometimes prices deviate from intrinsic values, so markets are not always rational. Second, we have evidence that changes in prices do not always equal changes in intrinsic values and that prices do change when only sentiment information changes, so markets are not always informationally efficient. Third, we have evidence that prices do not always move in random walks, so markets are not always random-walk. Fourth, we have evidence that managers of mutual funds and hedge funds find discrepancies between prices and intrinsic values, a prerequisite for generating positive alphas, so markets might not always be unbeatable. Fifth, we have evidence that, on average, investors who are the clients of such managers do not earn positive alphas. Instead, on average, they earn negative alphas. So markets which are beatable by money managers are not necessarily beatable by their clients. I provide here only examples of this evidence in the context of market bubbles.

Bubbles in securities’ markets occur when securities’ prices exceed their intrinsic values. We can consider negative bubbles as well, where securities’ prices fall short of their intrinsic values. We tend to focus on bubbles lasting several years, but bubbles lasting minutes or seconds qualify as well. Prices might equal intrinsic values at the onset of a bubble, but prices increase faster than

intrinsic values afterwards. The excess of prices over intrinsic values grows over time as the bubble inflates. At some point the bubble deflates, suddenly or gradually, and prices decline to their intrinsic values or even fall below intrinsic values into a negative bubble.

Bubbles cannot exist in rational markets since in such markets, by their definition, prices always equal intrinsic values. Still, reading Fair (2002) we can conclude that the prices of S&P 500 futures were often in bubbles, inconsistent with the rational markets hypothesis. Fair defined a large change in S&P 500 futures as a change of more than 0.75 percent during a five-minute period. If the rational markets hypothesis holds we would find no changes in prices in the absence of news related to changes in intrinsic values since price changes in the absence of such news indicate that prices did not equal intrinsic values before they changed, after they changed, or at both times.

To be sure, some large changes in the prices of S&P 500 futures were associated with news related to changes in intrinsic value, possibly consistent with the rational markets or informationally efficient markets hypotheses. For example, at 12:11 p.m. on August 17, 1990 it was reported that the "Pentagon recommended maybe calling up reserves" following Iraq's invasion into Kuwait. S&P 500 futures declined 0.89 percent within minutes. At 11:13 a.m. on August 21, 1990 it was reported that "Iraq's Aziz says ready to discuss Gulf situation." S&P 500 futures increased 1.08 percent within minutes.

Nevertheless, some equally large or even larger changes in the prices of S&P 500 futures were not associated with news related to changes in intrinsic values. For example, S&P 500 futures declined 3.22 percent in the 5 minutes following 1:59 p.m. on January 9, 1991, in the absence of any news. Fair wrote, "The results ... suggest that stock

price determination is complicated. Many large price changes correspond to no obvious events, and so many large changes appear to have no easy explanation. Also, of the hundreds of fairly similar announcements that have taken place between 1982 and 1999, only a few have led to large price changes.... And it does not appear easy to explain why some do and some do not." (p. 722). Moreover, Cooper *et al.* (2001) showed that sentiment information brings changes to stock prices even in the absence of intrinsic-value information. They found large increases in the prices of stocks of companies which changed their names to dotcom names during that late-1990s even though there was no change in their intrinsic values since the business of their companies did not change. For instance, Computer Literacy, Inc changed its name to FatBrain.com. This evidence is inconsistent with either the rational market or the informationally efficient markets hypotheses since both predict that prices do not change in the absence of news about changes in intrinsic values.

A demise of the rational markets and the informationally efficient markets hypotheses does not necessarily imply the demise of the unbeatable markets hypothesis, since knowledge that bubbles exist does not necessarily imply that investors can identify them as they occur and generate positive alphas by trading on them. Some, most notably Campbell and Shiller (1988), have argued that high *P/E* ratios and low dividend yields alert us to the presence of bubbles, but Goyal and Welch (2003) concluded otherwise. Fisher and Statman (2000) found that that *P/E* ratios and dividend yields provided little help in the task of forecasting short-horizon stock returns, and Fisher and Statman (2006) found that the total money accumulated from *P/E* and dividend-based trading rules for switching between stocks and Treasury bills rarely exceeded the total money accumulated by simply buying and holding stocks.

Lo and MacKinlay provided evidence of deviations from random walk, and so did Jegadeesh and Titman (1993) who documented momentum in stocks prices. Chen *et al.* (2000) provided evidence indicating that mutual fund managers can identify discrepancies between prices and intrinsic values. They found that stocks bought by active mutual fund managers had significantly higher returns than stocks sold by them. This is not only the evidence against the rational markets and informationally efficient markets hypotheses but also possibly the evidence against the unbeatable markets hypothesis if the alphas generated by these managers are positive even after impounding all costs, including the opportunity costs of the managers. Yet Malkiel (2003) reported that, on average, investors in active mutual funds have earned negative alphas. So markets which are beatable by money managers might not be beatable by their clients.

3 Efficient markets and free markets

While Milton Friedman is most closely associated with free market advocacy, Merton Miller was foremost in advocating free financial markets. He titled a 1994 keynote address “Regulating Derivatives: Enough Already!” and wrote: “But despite what I and most other economists, at least of the Chicago variety, see as the social benefits of these financial derivatives, they have, let us face it, also been getting a very bad press recently.” (p. 67). Miller went on to “emphasize that no serious danger of a derivatives-induced financial collapse really exists,” and that financial market disasters tend to be policy disasters committed by government entities, such as the Federal Reserve Bank, rather than by free financial markets. “A classic example,” he wrote, “has been the turmoil in the U.S. bond market since the spring of 1994 after our Federal reserve Bank suddenly nudged up short-term interest rates.” (p. 68).

Free markets can easily be conflated with rational markets since proponents of one are often also proponents of the other. But the two are distinct. Consider a rational market which is also free of government regulations of pollution emitted by power plants owned by utilities. Now imagine that the government enacts regulations limiting pollution, imposing fresh costs on utilities and reducing the intrinsic value of their shares. The market can remain rational if share prices drop instantaneously equal to the new intrinsic value, but the market is no longer as free as it has been.

By now there is overwhelming evidence that Miller was exceedingly sanguine in promoting the benefits of free financial markets. But was he unduly harsh in doubting the benefits of government intervention? A government which is guided by experts who can be relied upon to identify bubbles as they are forming can do much good by popping them, perhaps by increasing interest rates. But what if experts cannot be relied upon? What about the cost of popping a bubble which does not exist by increasing interest rates and plunging the economy into a recession? Krugman believes that some experts can be relied upon to identify bubbles as they are forming. He scoffed at those who say “nobody could have predicted...” arguing that “It’s what you say with regard to disasters that could have been predicted, should have been predicted and actually were predicted by a few economists who were scoffed at for their pains.”

Krugman noted that “Some economists, notably Robert Shiller, did identify the bubble and warn of painful consequences if it were to burst. Yet key policy makers failed to see the obvious. In 2004, Alan Greenspan dismissed talk of a housing bubble: ‘a national severe price distortion,’ he declared, was ‘most unlikely.’ Home-price increases, Ben Bernanke said in 2005, ‘largely reflect strong economic fundamentals.’” Shiller

turned out to be right while Greenspan and Bernanke turned out to be wrong. But should we conclude that we can rely on Shiller or someone like him to identify future bubbles as they are forming? In his book “Irrational Exuberance,” Shiller (2000, p. 11) presented a scatter diagram associating high *P/E* ratios with low subsequent returns, indicating that high *P/E* ratios should alert us to the presence of bubbles. But a glance at the diagram shows that its points are indeed widely scattered. While the correlation between *P/E* ratios and subsequent returns is statistically significant, that correlation is far from perfect. A Federal Reserve Bank which identifies bubbles by *P/E* ratios and similar measures is likely to pop real bubbles, doing much good, or illusory bubbles, doing much harm. A belief that bubbles cannot exist is dangerous, but so is a belief that bubbles are easy to identify.

4 Conclusion

Blame for our crisis has been hurled at many, including bankers, homeowners, chairmen of the Federal Reserve Bank, secretaries of the Treasury, members of Congress, and presidents. Some of the blame has also been hurled at the belief that financial markets are efficient. Yet the debate on the role of that belief in the crisis is unfocused since the term ‘efficient markets’ has acquired many meanings and is sometimes conflated with free markets. My main aim is to distinguish these meanings so we might focus on the debate. My secondary aim is to assess the blame for the crisis assigned to the belief that markets are efficient.

It is difficult to lay blame for the crisis on a belief in any of the four forms of efficient markets when more than four out of every five mutual-fund dollars are in active mutual funds whose managers refuse to believe that markets are rational, informationally efficient, random-walk or unbeatable. And mutual fund managers are just one group

among many who refuse such beliefs, including hedge fund managers, security analysts, and individual investors who try to glean market-beating information from magazines and television programs. It is further difficult to lay blame for the crisis on a belief that markets are rational, informationally efficient, random-walk or unbeatable, knowing that crises occurred regularly centuries ago, long before the 1960s, when the efficient markets hypothesis was formulated.

Blame for the crisis does lie in the belief that free markets are necessarily rational markets. Indeed, both Ben Bernanke, the current chairman of the Federal Reserve Bank, and Alan Greenspan, its former chairman, agree. Testifying before Congress on 23 October 2008, Alan Greenspan said, “Those of us who have looked to the self-interest of lending institutions to protect shareholders’ equity, myself included, are in a state of shocked disbelief.”³ In free markets the Federal Reserve Bank sits by when banks hold huge amounts of securities tied to housing values and issue pay-option adjustable-rate mortgages which call for monthly payments of less than one-seventh of fixed-rate mortgages. In a speech delivered on January 3, 2010, Bernanke said: “The availability of these alternative mortgage products ... is likely a key explanation of the housing bubble.”⁴ The challenge we face is the challenge of seeing an opaque future as clearly as possible, knowing not only that foresight is not as clear as hindsight but also that we would be judged in the future as if it is.

Notes

- ¹ <http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html?pagewanted=print>.
- ² FORTUNE interview with Nicholas Varchaver Fortune, April 28, 2008 pp. 59–62.
- ³ Andrews (2008).
- ⁴ <http://www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm>.

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