



The Price Is Right?

Has the financial crisis provided a fatal blow to the efficient market hypothesis?

BY RENEE COURTOIS

Business cycle fluctuations are costly, but they do come with a small upside for economists: They serve as a way to test how well prevailing economic theories hold up to reality.

The recent recession is no different. Some have suggested that the long-standing “efficient market hypothesis” (EMH) has been disproved once and for all by the financial crisis. The EMH says that financial market participants act as powerful information gatherers about an asset’s “true” value, such that an asset’s price will generally reflect all information available about that asset.

But if financial markets are efficient, critics argue, how could investors have gotten things so wrong as far as housing and securitization markets are concerned? Housing prices soared, and securities backed by risky subprime mortgages were sold throughout the financial system at prices that, as now seems apparent, didn’t reflect their true risk. “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,” wrote Nobel laureate Paul Krugman in a September 2009 article in the *New York Times Magazine*.

Krugman’s concerns represent one side of the divide over the EMH. The theory extends back to the birth of modern finance. Before the 1950s, the world had few workable models for how asset prices are determined, but this changed with the advent of computers. Statisticians began to study stock market prices, an obvious area in which to apply their new high-powered tools because the daily activity of stock markets provides exceptionally abundant data.

The EMH emerged from this research. Economist Eugene Fama first formalized the theory in his 1964 economics Ph.D. dissertation at the University of Chicago — although the hypothesis was intuited by some scholars long before economics itself became a discipline. The basis for the theory is the self-interest of investors: Because they want to earn a profit, investors will work fervently to expose and trade on even the tiniest bit of new information relevant to an asset’s intrinsic value, leaving no available information left unexploited. This means if there is something knowable about an asset, it will quickly be reflected in its price. The

more frequently trading activity takes place within a market — stock markets, for example, enjoy nearly constant price discovery through daily trading activity — the more likely the asset’s price is to reflect everything there is to know about its true risk and economic prospects.

Fama’s famous 1970 paper, “Efficient Capital Markets: A Review of Empirical Work,” helped set off the 1970s as the growth period of the EMH’s development. Economists showed how equity prices reflected information about economic fundamentals (like corporate earnings or, on the macroeconomic level, interest rates and consumption) consistent with the “rational expectations” paradigm that was beginning to dominate economic research at that time.

Efficiencies and Anomalies

Most of the early research found that stock markets do tend to meet a certain degree of efficiency. Fama’s 1970 work focused the EMH literature by defining possible degrees of market efficiency. In general, where the costs to markets of gathering information exceed the benefits of trading on it, a market will be inefficient in the sense that it will not reflect that information. This is largely why “strong form” efficiency — a market so efficient that an asset’s price even reflects private information held by CEOs and other insiders — is broadly acknowledged as being highly unrealistic.

However, in a “semi-strong” efficient market, stock prices reflect all information that is *publicly* available (think price histories, publicly available accounting reports, and other corporate announcements). A semi-strong efficient market would require significant skill on the part of traders to analyze and interpret information. The early research on market efficiency generally suggested that stock markets met this threshold. For instance, data indicated that investors were unlikely to “beat” the market as a whole and were better off putting their money in index funds that purchase the entire market rather than managed funds or individual stocks.

But by the mid-1980s, economists had increasingly uncovered “anomalies,” occurrences in which financial markets appeared to act in a way that was contrary to the EMH. Some economists found statistically important amounts of

predictability in stock prices. These can be exploited by simple trading strategies, which should not be possible in an efficient market that exhausts all profit opportunities. One of the most enduring anomalies is the idea of stock price momentum: that the same stocks which are doing well for a several-month period tend to be the same ones doing well over the next several months. The converse appears to be true for underperforming stocks. This pattern, too, is predictable. These anomalies cast doubt on the idea that a stock's price reflects all relevant and available information.

Why would markets leave information on the table with profit opportunities unexploited? Explaining this was a ripe area for research. "There are a number of psychologists and behavioral economists who started coming up with counter examples to standard efficient markets results," recalls economist Andrew Lo of M.I.T., who contributed to the early research on anomalies. "Things like loss aversion, herding behavior, mental accounting, probability matching. These are experimental results where they would take test subjects and give them various different kinds of gambles and these individuals would behave in a manner that was not consistent with efficient markets."

A key example is the phenomenon first documented by Harvard economist David Laibson: that people follow the path of least resistance when choosing whether to invest in their 401Ks. If enrollment is voluntary, they tend not to do it. But if enrollment is compulsory and opting out requires an extra step, they tend to stay invested. That is, people appear to irrationally make investment decisions based on factors other than their expected financial gains. By the mid-1980s, the field of behavioral finance had fully emerged, applying psychology to financial markets to understand how and why investors might sometimes make irrational trading decisions.

It's not investor irrationality that is at odds with the EMH, just that irrationality can easily bleed into asset prices. Savvy investors have incentive to identify and trade against investors who are ignoring fundamentals, driving asset prices back to rational levels. Under the EMH, "it's the smart money that matters," Lo explains. "Some people are crazy all the time, and all the people are crazy some of the time, but the smart money will drive out all these behavioral anomalies."

Indeed, behavioral economics has had a hard time turning documented anomalies and instances of irrationality into models that consistently explain movements in stock prices. Many anomalies disappear once you try to pin them down with a model. Since bouts of irrationality seem to exhibit themselves randomly in stock markets, they're hard to predict — which, of course, is

exactly what the EMH says about stock prices: You can't consistently predict them.

Behavioral economists aren't dismayed by this, however, since there's nothing in psychology that suggests people should under- or overreact in any *consistent* manner. "Of course, we do not expect [behavioral] research to provide a method to make a lot of money off of financial market inefficiency very fast and reliably," wrote Robert Shiller, one of the most prominent EMH critics, in a 2003 paper. "We should not expect market efficiency to be so egregiously wrong that immediate profits should be continually available."

Fama takes that as a small victory. He says behavioral economists have good evidence that people are sometimes systematically irrational. "All that stuff I think is great. The work that they do is really good in describing the kinds of biases that people have, and how it shows up in their behavior." But to argue that irrationality can be systematic enough to make prices predictable is something else, he says. "Most of them don't even make that jump. They don't think people can take advantage of whatever inefficiencies are there. And my opinion is, they're basically conceding that for all *practical* purposes, markets are efficient." In the absence of an alternative model for how asset prices might deviate from intrinsic values, much economic research implicitly assumes the EMH holds by using stock prices as a proxy for a firm's or market's true value.

The Bubble Debate

Even though assuming market efficiency is the dominant way of modeling asset prices, the debate still looms over whether this holds true for the economy as a whole — and no such debate is more alive than the one over the nature of asset bubbles. "[M]arket efficiency can be egregiously wrong in other senses," Shiller continued in 2003. "For example, efficient markets theory may lead to drastically incorrect interpretations of events such as major stock market bubbles."

Many economists have agreed that the recent run-up in housing prices was, in retrospect, unjustified by economic fundamentals — the common definition of an asset price bubble. One possible explanation from the behavioral camp is herd behavior, in which some financial market participants mimicked the actions of others.

The fact that everyone everywhere seemed to be profiting from the housing and securitization markets may have validated to both homeowners and investors the belief that house prices would continue to rise indefinitely. Herd behavior could have led both groups to dismiss the risks associated with mortgage and securitization markets and invest in them beyond the degree that fundamentals — such as their incomes,

Efficient Market Hypothesis:
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backed securities and other securitization products, on the other hand, information arguably is more opaque, and concentrated within a relatively small group

balance sheets, and other macroeconomic characteristics — would justify. (It should be noted that herd behavior is often witnessed in sell-offs too. “The fight and flight response has been very well documented as being a rather ancient part of our neurophysiology. All of us are hardwired with a very simple set of reactions to fearful events. If you smell smoke and you see a big fire in the room next to you, you will get scared and you will run as quickly as you can,” says Lo. “If you’re on the floor of the New York Stock Exchange and you just lost 20 percent of your wealth, you’re going to get scared and you’re going to want to run like hell, but that’s not really going to help your financial wealth.”)

But there can also be rational explanations for bubbles that are perfectly consistent with the EMH. The EMH says that investors’ financial decisions at a given time reflect their perception of economic fundamentals. Yet there is nothing in the EMH that says those perceptions are always correct. To the extent that information about an asset is not widely available or is costly to obtain and interpret, investors will form expectations absent that information. It could also be the case that investors fully suspect asset prices are inflated, but believe they can “ride” the boom a bit longer, causing them to rationally buy in. People’s perceptions also can be affected by policy: If people believe unsuccessful risks will be bailed out by government, then they will rationally take on more risk than fundamentals alone would justify. Short of being inside investors’ heads, rational bubbles are very difficult to distinguish from irrational bubbles.

The EMH says “that all the information that we have is reflected in prices,” Lo summarizes. “EMH critics might say that’s not true, because the very great risks were not in prices. But, again, an efficient markets type would say, ‘Well, maybe back then we didn’t have that information. Maybe back then we didn’t fully appreciate just how dangerous some of the toxic assets were. And so at that point in time, the best available information was incorporated into prices.’”

Both arguments may be right, according to Lo, but both also misconstrue the concept of market efficiency: It is an ideal, not something that either is or isn’t true. “It’s not that the EMH is wrong, it’s that it doesn’t always work. Markets are not *always* efficient *all* the time. Sometimes they are efficient, sometimes they are not,” he says.

What determines whether a market is efficient are factors like the degree to which information is available and the frequency with which price discovery takes place. The research on market efficiency has focused almost entirely on stock and traditional bond markets in which both of those conditions are likely to be met. In the market for mortgage-

of investors. And the market for a home clears only once every several years, Lo points out.

He suggests that engineers have a more constructive way of thinking about efficiency. Engineers evaluate engines relative to the ideal of being 100 percent efficient in terms of how much energy goes in for the output it produces. Of course, an engine of 100 percent efficiency is an unattainable fantasy — just like the idea that markets can be perfectly efficient. “I think that is changing, slowly,” Lo says, “but it will have to change a bit more before I think we have a more complete view of market dynamics.”

Concerning the recent episode, maybe it’s *who* seemed to be on the losing side of inflated asset prices that has intensified doubt over the EMH. Over the last couple of years it is the “smart money” Lo refers to — the large, savvy investors with lots of analytical tools at their disposal — that has seemed to take the largest economic hits. Yet it is the smart money that should have been able to identify and undo bubble behavior. “That’s exactly why the efficient market hypothesis has a bit of a black eye. It’s because what was supposed to have been the smart money ended up losing tremendous *amounts* of money over the course of the last couple of years. So it really calls into question the whole premise of efficiency,” Lo says.

The Price is Right, Except When It Isn’t

The stakes in this debate reach beyond academic dispute. If economists can find a way to identify and measure asset bubbles in real time, then they might be able to prick them before excessive damage is done.

The bursting of an asset bubble can be costly, as we have seen, but pricking a bubble before it inflates too high — for example, by the Fed raising interest rates — may bring about recession. Policymakers who are deciding whether to act must gauge whether the costs of a potential recession are greater than the costs of a potential asset bubble bursting. This gamble is highly uncertain, largely because policymakers would have to identify a bubble in real time and also gauge by how much prices are overinflated. Yet, if profit-motivated market participants can’t gauge when an asset bubble is occurring, should policymakers be able to do any better?

According to some EMH critics, policymakers and financial market participants didn’t give enough credence to the possibility that markets had gotten prices wrong. “Some economists took the fact that prices were unpredictable to infer that prices were in fact ‘right,’” wrote behavioral economist Richard Thaler of the University of Chicago in

the *Financial Times* in August 2009. As early as 1984, Shiller wrote that conflating the EMH with the idea that prices are right has been “one of the most remarkable errors in the history of economic thought.”

Under this view, the run-up in housing prices was dismissed by investors and policymakers alike with the efficient market rationale that markets have greater wisdom than individuals. Furthermore, critics claim the idea that markets always get things right may have pervaded the very aspects of modern finance that typically serve to dissuade excessive risk-taking, from abiding by generally accepted accounting standards to a casual approach to risk management.

Justin Fox, economics and business writer for *Time* magazine, thinks the EMH gradually evolved into the erroneous view that markets should not be questioned. According to Fox, there was a line of people believing that market-established prices literally are *correct*, and advocating that stance broadly. “That permeated the teaching of finance in business schools and in economics departments and elsewhere for a couple of decades,” according to Fox. He describes how he believes this evolution took place in his 2009 book, *The Myth of the Rational Market*.

In Fox’s view, this interpretation of the EMH engendered a complacent view of asset bubbles. Under the EMH “you basically don’t believe in bubbles. When a bubble is going on, you instead try to come up with all these rationalizations for why prices must be that high, because they *must* be that high for a reason.” In his experience observing the financial community, he believes there has been a natural tendency when markets are doing well for a long period of time for market participants to start believing in what prices are saying, rather than any other signals they are getting. “Anybody out there who’s saying, ‘This is crazy, prices of houses or tech stocks aren’t worth this much,’ is made to look stupid for year after year as the bubble grows,” he says. “Some elements of the EMH offered a theoretical basis for believing those things.”

But, according to Fama, the EMH does not preclude market mistakes. If the bubble can’t be easily pinpointed, that actually reinforces the EMH. “Bubbles are 20/20 hindsight, basically. In my opinion, a bubble means that you could predict when it’s going to break. I don’t think that was the situation,” he says. Indeed, many investors convinced that they had identified the end of the tech and housing bubbles lost a great deal of money prematurely trying to short-sell (placing a bet on a decline) in those

markets — and many, of course, remained optimistic and stayed in past their peaks.

Similarly, for policymakers it is not enough to know *whether* a bubble exists. Policymakers must also decide by how much prices are inflated, the likely magnitude of the potential fallout, whether the tools they have in their arsenal would be effective in reducing the bubble, and whether pricking the bubble could cause the very economic contraction they are trying to avoid. These questions rely on far more judgment than just whether prices are providing an accurate signal of an asset market’s true value.

Market Mistakes vs. Market Failures

Also lurking behind discussions of the validity of the EMH seems to be a latent debate over the desirability of relying on markets in general. When prices aren’t “right,” they could provide misguided signals and may therefore prevent capital from being allocated to its best uses. This idea caused John Maynard Keynes to complain that the capitalist system leaves the country’s investments in the hands of a “casino.” Few would advocate that markets be dissolved in favor of government-managed capital allocation, but those who view markets as a predominant source of harmful economic fluctuations might advocate a stronger role for policy in managing them.

For regulation to strike the right balance, policymakers must understand the difference between market mistakes and market failures. Market mistakes can be costly, as we have seen, but trying to avoid them might be a poor goal for policymakers. If such mistakes are indeed unpredictable, it would be difficult or impossible to form policy based on avoiding them. Market mistakes also are hard to identify in real time with enough certainty to thwart them. Intervening even when there is pretty good reason to believe things are out of hand is still exceptionally risky, which is why Fed policymakers have been hesitant to do it (although some Fed policymakers have proposed revisiting that stance in light of the fallout from the housing decline).

Market failures, on the other hand, involve some fundamental flaw in market functioning that policy might be able to improve. It is not obvious that the crisis reflected a fundamental market failure. It could instead have reflected a failure of regulation, for instance. A discussion about the validity of markets should include recognition that policy and regulation can play a role in the functioning of free

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markets and the forming of investor expectations in both positive and negative ways. Regulations like disclosure laws can help markets become more efficient by making information widely available. But a too-large public safety net that convinces market participants they will not have to bear all or most investment losses can induce investors to rationally take risks they otherwise would not have.

Financial market participants may have taken market efficiency for granted, as Fox believes. The only scenario that would be at odds with what the EMH really says would be one in which information had been accessible and market participants just didn't use it. Yet the vast majority of economists, policymakers, and financial market participants did not see the financial crisis coming, perhaps indicating that such infor-

mation about the true risk was not there for the taking. Or perhaps parties who ignored information about the risks were rationally responding to perverse incentives to do so.

Economists don't yet fully understand all the factors that might cause markets to occasionally get prices wrong. To explain this, you can favor behavioral theories on psychology and investor biases, errors of regulation, or perhaps just a pervasive difficulty of accessing information due to characteristics of the market in question. But none of these explanations are inherently at odds with the EMH. Studying the financial crisis with the benefit of hindsight will help economists, investors, and policymakers better understand the causes behind fluctuations in asset prices for which there is no easy explanation. **RF**

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Hoffer says, yet "there was not one word about credit problems during Cash for Clunkers." This may imply CARS participants had good credit, large down payments, or both. All are consistent with a higher income population.

Richmond, Va.-based CarMax lobbied Congress unsuccessfully to include used cars in the program. Had the program included used cars, it might have benefited the less-wealthy, who tend to be more active in the used-car market, Hoffer says. "It would have been more income-neutral."

Environmental benefits were a selling point for the program too. But they're not as straightforward as they appear. Many vehicles scrapped under the clunkers plan would have gone into the used-car market, so CARS removed older polluting cars from the road. All else equal, this should have reduced emissions. CARS participants enjoyed a 9.2 MPG increase in fuel efficiency, on average. This will certainly be a direct benefit to drivers of those cars: *Consumer Reports* estimates that will save owners \$720 apiece in annual fuel costs.

But scrapping the clunkers produces carbon, as do new car production processes. Perhaps more important, many of the clunkers likely were driven less than the new replacements will be. These owners now have more comfortable fuel-efficient cars that are cheaper to drive and thus likely to be driven more. This will eat into emission savings. Hoffer believes it could even produce more emissions for a number of cars, not less. The bottom line is that assessing the environmental benefits of CARS requires looking deeper

than just the car-for-car improvement in fuel efficiency.

Jaws of Life for the Auto Industry

Like any economic stimulus, CARS is likely to be more effective when there are idle economic resources, a description that certainly matched the economy in 2009. But it matters why resources are idle. By most accounts, the auto industry has faltered because its products are not highly valued relative to competitors. The program may have provided only a temporary reprieve to an industry facing a long-term structural decline. And since two of the Detroit Three were effectively closed for the summer, when the vehicles started selling, they couldn't take advantage of the sales momentum, Hoffer notes.

Moreover, the program used valuable economic resources to replace still-functioning cars. Destroying those productive assets represents a loss of welfare to society. That's why a true estimate of the program's net benefits must also subtract the value of the destroyed assets.

It is not easy to quantify this welfare loss. One could even argue that the cost is small, since the program affects a small number of cars relative to the total number on the road. But more important, if policy broadly used artificially low prices to affect individual decisionmaking in an attempt to subsidize industries precisely because they are not highly valued, then the distortions and unintended consequences could produce losses that may overwhelm the gains. **RF**