EXHIBIT 33

Eugene F. Fama, Efficient Markets, and the Nobel Prize



Gene's bottom line is always: Look at the facts. Collect the data. Test the theory.

By John H. Cochrane May 20, 2014 CBR - Finance Share This Page

In 1970, in "Efficient Capital Markets: a Review of Theory and Empirical Work," Eugene F. Fama defined a market to be "informationally efficient" if prices at each moment incorporate all available information about future values. Informational efficiency is a natural consequence of competition, relatively free entry, and low costs of information. If there is a signal, not incorporated in market prices, that future values will be high, competitive traders will buy on that signal. In doing so, they bid the price up, until it fully reflects the information in the signal.

Much of the confusion about "efficiency" reflects simple ignorance of this definition. Fama used a common word to define a precise phenomenon apart from the word's colloquial meaning. Researchers define terminology this way all the time—"efficient" estimators in statistics, "Pareto-efficient" allocations in economics, and so forth have precise definitions. But people

who don't know those definitions can say and write nonsense about the academic work.

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An informationally efficient market need not process orders efficiently. An informationally efficient market can have economically inefficient runs and crashes, so long as those crashes are not predictable. To say "the crash proves markets are inefficient" or "markets are inefficient; finance academics did not foresee the crash" is a classic reflection of this ignorance. The main prediction of Gene's efficient-markets hypothesis is exactly that stock price movements are unpredictable! An informationally efficient market is not supposed to be clairvoyant. Steady profits without risk would, in fact, be a clear rejection of efficiency.

I once told a reporter that I thought markets were pretty efficient. He quoted me as saying that markets are "self-regulating." Here is somebody with no clue about the definition of the term (although I had explained its definition). Informational efficiency means one and only one thing: prices reflect available information.

A simple theory and complex facts

The efficient-markets theory did not become famous because it is complex. The greatness of Fama's contribution lies in the fact that efficient-markets became the organizing principle for decades of

empirical work in financial economics. This empirical work taught us much about the world, and in turn affected the world deeply.

When you think of Fama, don't think of Einstein, churning out equations in the solitude of the Swiss patent office. Think of Darwin, who also saw that a simple principle—evolution by natural selection—organized and gave purpose to a vast collection of facts. Fama is really most famous for putting all the facts together, personally collecting a lot of finch beaks, and figuring out how the curiosities collected by others fit in to the framework, in often challenging and unexpected ways.

Furthermore, though the principle is simple, its implications are often surprising, subtle, and remain controversial to this day. Efficiency implies that simple trading rules (e.g. "buy when the market went up yesterday") should not work. This is a testable proposition, and an army of financial economists, including Gene, checked it. The surprising empirical result is that trading rules, technical systems, market newsletters, and so on have essentially no power beyond that of luck to forecast stock prices. This is not a theorem, an axiom, a philosophy, or a religion: it is an empirical prediction that could easily have come out the other way, and sometimes does.

Similarly, if markets are informationally efficient, fundamental analysis performed by investment firms has no power to select stocks, and professional active managers should do no better at picking stock portfolios than monkeys with darts. This is a remarkable proposition. In any other field of human endeavor, seasoned professionals systematically outperform amateurs. But other fields are not so ruthlessly competitive as financial markets.

Many studies checked this proposition. It's not easy. Among other problems, you only hear from the winners. Nobody writes articles celebrating the worst-performing mutual fund manager. You need to collect data from the losers, too, and separate luck from skill.

These studies found, surprisingly, that the data are much closer to the efficient-markets prediction than anybody thought. Professional managers do not systematically outperform well-diversified passive investments. This could easily have come out the other way. It would have been lovely had it come out the other way. Academics who earn our salaries teaching MBA students would be delighted to instruct them that better knowledge and training lead to more profitable investment management. Too bad the facts say otherwise.

If markets are informationally efficient, corporate news events such as earnings announcements should be immediately reflected in stock prices. Now, actually checking stock-price reactions to corporate events is also not as straightforward as it sounds. But Gene and his coauthors provided the standard solution to all of the empirical difficulties that survive to this day. The immense event-study literature followed, allowing academic accounting to measure the effect of corporate events by the associated stock price movements.

The practical implications of the finding that markets are surprisingly efficient are enormous. The rise of the index fund owes much to efficiency. Without efficiency, we might all be invested with high-fee active managers who promise us higher returns at someone else's expense. Standard procedures in accounting, regulation, and law now routinely presume that asset prices are the best measure of value.

Are markets completely efficient? No, and Gene said so in his very first article. Efficiency, like all perfect-competition supply-and-demand economics, is an ideal, which real-world markets can only approach. Empirical work can find only how close to or far from the ideal a given market is.

Bringing science to finance

Too much finance is ex post storytelling, with not much more content than "markets went up—the gods must be pleased." More than a theory, efficient-markets was the banner for bringing scientific method to the study of financial markets. Rather than ask, "What are Warren Buffett's three secrets of success?" or interview the latest soothsayer, researchers started to collect clean data, and examine theories systematically and objectively. Gene was the leader of this movement, and set the methodological standard for how academics do empirical research.

Perhaps the best way to illustrate the empirical content of the efficient-markets hypothesis is to point out where it is false. Event studies of the release of inside information usually find large stock-market reactions. Evidently, that information is not fully incorporated ex ante into prices. Restrictions on insider trading are somewhat effective. When markets are not efficient, the tests verify the fact. A theory that can be rejected is a real theory.

These are only a few examples. The financial world is full of novel claims, especially that there are easy ways to make money. Investigating each anomaly takes time, patience, and sophisticated empirical skill. One has to check whether the gains were not luck, and whether the complex systems do not generate good returns by implicitly taking on more risk.

For nearly half a century, Gene Fama's efficient-markets framework has provided the organizing principle for empirical financial economics, and continues to do so. A new round of studies is examining again the abilities of fund managers, focusing on new ways of sorting the lucky from the skillful in past data.

Gene's bottom line is always: Look at the facts. Collect the data. Test the theory. Like astronomy, every time we look, the world surprises us totally. And it will again.

John H. Cochrane is the AQR Capital Management Distinguished Service Professor of Finance. This piece is adapted from a longer post on his

blog, The Grumpy Economist.

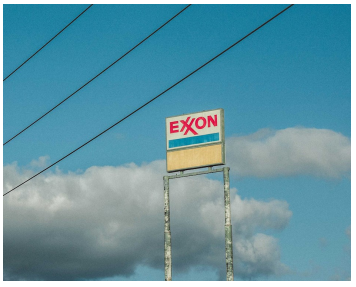
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