

*Editor's Comments on "Empirical Implications of Efficient Market Models"*

Chris Robinson, Finance Editor

I think this paper is tremendously-important, and should make every one of us think more carefully about what we assume when we use the current finance "knowledge" in the classroom or in our own research.

As we accumulate more 'knowledge' in an area of science, we forget some of the earlier-acquired parts of that 'knowledge.' I put 'knowledge' in single quotation marks, because we only think we know; there exists no reality that is ultimately knowable, understandable and agreed upon by everyone. We forget the assumptions/beliefs/philosophies that underlie our 'knowledge.' In a more direct sense, we forget the specific choices about what to believe that subsequent 'knowledge' relies upon as its foundation. Such a process of forgetting is both natural, and necessary. If we are to remember every single foundational fact/assumption upon which our current understanding is built, and to recall it every time we try to think about something, we will think very slowly indeed!

As scientists, one of our important tasks is to continue to remember what went before, lest we fail to learn from it. The field of finance has placed very little value on remembering its own past, and particularly the choices that were made. For example, if Markowitz had chosen to work with semi-variance instead of variance, would we have a very different view of asset pricing models today? Everyone knows that alternative choice is perfectly reasonable and defensible, and yet we do not see any research today pursuing it.

Bob James takes us back to another seminal choice in finance and economics, the definition of conditional probability. Let me quote from his conclusion:

Ironically, Samuelson's (1965) seminal article *Proof That Properly Anticipated Prices Fluctuate Randomly* and Malkiel's (1990) famous book *A random walk down Wall Street* may be among the most damaging publications in the efficient market literature. Samuelson's article led economists to believe that expectations follow martingales while Malkiel's book led the general population to believe that asset prices can follow random walks over time. Both martingales and random walks are stochastic processes that necessitate a fixed probability space. If Bayesians are correct and information affects probabilities, neither stochastic process is useful for describing expectations or asset prices.

Our belief in relatively efficient markets requires that we trust a large empirical literature showing prices change quickly in response to all public information. When we find a market that doesn't correspond to this belief, we call it inefficient. Of course no such model is perfect, and we acknowledge that there are a variety of "anomalies," but they don't affect our belief that we can use a conditional model to determine the efficiency of a market.

The problem that Bob James explains lies in the nature of the conditional probability. If the probability space itself is fixed, then we can rely on all the research of efficiency, leaving aside the issue of testing market efficiency and a return-generating model simultaneously. However, if every new observation isn't merely further evidence of the same process, but causes us to change our expectations for the distribution of the process, then none of this literature can tell us about efficiency. This Bayesian approach to statistics and probability theory has been around for a long time, but finance chose to take the fixed probability space road, presumably because it is easier to get neat results. Personally, I find Bob's arguments convincing, that Bayesian revisions to probability spaces are more likely to be the underlying behaviour of investors reacting to new information.

You could say that all Bob does is take us back to the future, since Keynes argued this long ago. That misses the point. We cannot continue to follow a path blindly, when we know the choice that put us on the path is not necessarily the best choice. If I could commission research to follow up Bob's paper, I would look in three directions:

- A redevelopment of the theoretical models in finance, using Bayesian probabilities for reaction to information. This is a very challenging task, and I have no idea where it would lead or if we can arrive at neat, compact models like the ones that currently dominate the finance field. For example, I have been wondering for a long time how valid it is for us to take a mean value of a time series of returns of asset classes for use in personal finance planning. If every period's drawing is from a different distribution, and investors react to the observations by adjusting their view of the future probability space, the way we analyze personal finance problems is not valid.
- A re-investigation of market efficiency using empirical tests that allow for Bayesian revisions of the probability space.
- A more direct investigation of investor beliefs to see how they form probabilities and whether they assume a fixed probability space or revise their estimate of the space with new information. Perhaps researchers in "behavioural finance" are already starting to address this third point.