

Buttonwood | Robert Merton and the effect of time on portfolio choice

A Nobel prizewinner on when investment horizons matter

FINANCE THEORISTS are, as everybody knows, unworldly people who can scarcely tie their shoelaces, still less change a car tyre. Robert Merton confounds this stereotype. As he talks amiably at the London office of Dimensional Fund Advisors (he is the firm's "resident scientist"), you sense that here is a man who could fix a flat in no time. He would probably deliver a cheerful lecture on the importance of the correct tyre pressure while he was tightening the wheel nuts.

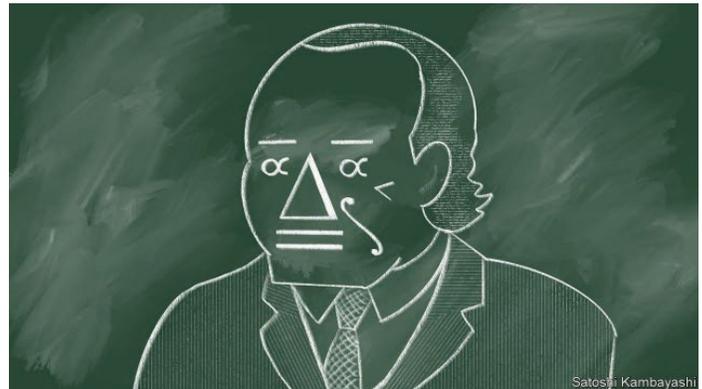
Mr Merton has always had a bent for engineering, whether financial or mechanical. He bought his first stock aged ten and completed a risk-arbitrage trade (on a takeover by Singer, a maker of sewing-machines) aged 11. He rebuilt his first car aged 15. In 1997 he won the Nobel prize for economics aged 53—a career high. A year later, a career low: LTCM, the hedge fund he co-founded, imploded. These markers of the passing years matter. For Mr Merton's specialism is the mathematics of time applied to finance.

His first paper on the subject was published almost exactly 50 years ago. Its title—"Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case"—is forbidding. The ten pages of equations that follow are daunting. But for Mr Merton, the equations are tools, no different from a car jack. They allowed him and subsequent researchers to clarify an important question: when does time horizon matter in investing and when does it not?

To start to understand the paper's importance, go back more than half a century to the birth of modern portfolio theory. Finance theory had been mostly a collection of stories and rules of thumb. Some was useful ("sell down to the sleeping point"). Little was rigorous. A new generation of scholars changed this. Their first step was to assume that investors seek the highest returns for a given amount of risk. Stocks are riskier than bonds. The issue for portfolio choice is how much of this risk to bear. That will vary. Each person should indeed hold as much as is compatible with sound sleep.

In this new, formalised set-up, investors decide once and for ever how to divide their financial wealth. But real-life investing is a movie, not a snapshot. Time is a factor, on top of risk appetite. Mr Merton wanted to go further and discover how investors, faced with an uncertain future, should decide at each moment on their mix of risky and safe assets. The folk wisdom of the time said that young people should hold a riskier portfolio than older ones, because the passing of time makes stocks less risky. That turned out to be wrong—or, at least, it was not quite right.

In two papers published in August 1969, Mr Merton and his mentor, Paul Samuelson, showed that time horizon should make no difference to portfolio choice. But the result holds only if risk appetite is unchanging and stock prices are unpredictable. Alter these assumptions, as future researchers would, and the results change. Mr Merton's use of continuous-time mathematics created a valuable template. Finance theorists were able to apply the same toolkit to solve related problems, says Hugues Langlois of HEC Paris, a business school. The best example is the Black-Scholes model for pricing financial options, for which Mr Merton was awarded the Nobel prize, along with Myron Scholes.



A lot of finance theory that came later would tease out the circumstances in which time horizon really does matter. The reckoning changes, for instance, when wealth is looked at in the round to include non-tradable human capital—knowledge, skills and abilities. Sitting in a London office, Mr Merton gives an illustrative example.

Say, a young person's human capital, which determines his future earnings, is 90% of his lifetime wealth, with the balance in stocks. And say that for an almost-retired person the proportions are reversed. If the stockmarket crashes by 40%, the young person has lost only 4% of his wealth. But the nearly retired person has lost 36%, which is much more serious. For older people, having all their financial wealth in stocks is not a sensible risk to take, says Mr Merton. Human capital is low-risk. If you have lots of it, you can take more financial risk.

The best lifetime strategy is a complex problem to solve, even for brainy people such as Mr Merton. But he hopes that, with the passage of time, the pension industry will create more user-friendly products. Cars are easy for their users; the complex work is done by designers and engineers. Pensions should be the same. Needs drive innovation, says Mr Merton. "That is why I'm an optimist."

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