

Calculated Risk

**FISCHER BLACK AND THE
REVOLUTIONARY IDEA OF FINANCE**

BY PERRY MEHRLING

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The financial world has changed immensely in the past 30 years. Through the use of derivatives (assets whose value is determined by another, risky asset) and elaborate hedging schemes, firms can now buy and sell risk, protecting themselves from virtually any unwanted eventuality. This innovation has been made possible by the contributions of a select group of financial economists and the growing numbers of mathematically trained analysts known on Wall Street as “quants.” Finance theorists build models for pricing securities, and quants figure out practical ways to implement these models and to profit from them.

For all the technical sophistication of modern financial markets, it may seem at times that our understanding of the inner workings of these markets has not greatly improved. For instance, the sharp drop in equity prices of many high-tech stocks in 2000 wiped out billions of dollars in assets, demonstrating that financial markets can still be subject to high levels of volatility. How much, then, should we trust financial models, and how much do they really tell us about the world?

These and other questions are addressed in Perry Mehrling’s excellent new biography of Fischer Black, one of the great innovators of modern finance theory as well as one of its earliest practitioners. In covering this unusual and brilliant man’s life, Mehrling, an economist at Barnard College, also provides an engaging history of the development of quantitative finance and a solid introduction to some of its central concepts.

An Eccentric Vision

Described by a colleague as “the only real genius ... in finance,” mathematician-turned finance professor Fischer Black embraced the inherent difficulties of finance en route to uncovering some of its deepest principles. Among academics, Black stands out both for the depth and originality of his research and for his significant contributions in the private sector as one of the first and most celebrated quants. He was also something of an

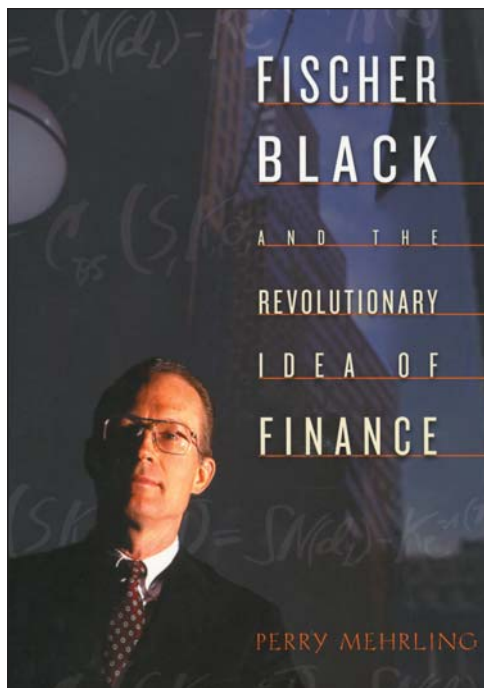
eccentric; for instance, he was well-known for his massive note-taking system which comprised many thousands of single note cards in individually labeled envelopes and for his great love of video games.

His ideas about finance were no less unusual; he spurned large areas of modern economics and finance, preferring instead to focus on a few simplified, intuitive models and practical ways to make financial markets operate more smoothly. With an academic background in physics, logic, and artificial intelligence, Fischer Black began his career skeptical of abstract formulations in finance and the power of economists to influence a highly uncertain world. Black extended this line of thinking into many subfields of economics, positing unorthodox and highly controversial theories about monetary policy and the cause of business cycles.

Fischer Black is described by Perry Mehrling as the “CAPM man,” and in a way this moniker is the key to understanding much of his idiosyncratic approach to finance. CAPM, which stands for “Capital Asset Pricing Model,” mathematically describes a rational way to price risk in an idealized economy. Developed independently by several economists in the mid-1960s, CAPM gives a simple formula for the excess return or “risk premium” for holding a risky stock compared with the return to holding the market index, and uses this relationship to price all securities in the market. Though CAPM makes several empirically false predictions, such as that all investors will hold only the same combinations of stocks and trade very little, it does provide

a rigorous framework with which to analyze questions of risk and reward. We might not live in a CAPM world, but Black thought that through financial innovation we could someday, and that this was a worthy goal.

From his early days as a consultant when he urged his clients to adopt financial instruments which have now become standard (index funds, hedged options positions, etc.) to his last days as a partner at Goldman Sachs where he could see many of his innovations in practice, Black always remained focused on the idea that risk is simply the price of reward, and that the better we understand this relationship, the better off we will be. He even applied CAPM to his personal life; he took academic risks constantly since these promised



great rewards with little downside while at the same time eating ascetic, unadorned meals to mitigate a family history of health problems. Ultimately, these efforts were for naught as throat cancer claimed Black's life prematurely in 1995 at the age of 57.

Protection against Uncertainty

Working as a business consultant in the late 1960s, Black mastered CAPM and began thinking of ways to apply it to financial and economic questions. Starting from a CAPM-like equilibrium, he and finance professor Myron Scholes of the Massachusetts Institute of Technology were able to make their most celebrated discovery, the Black-Scholes Options Pricing formula which gave a rational method for valuing derivative securities.

Two years after Black's death, Scholes and Robert Merton were awarded the Nobel Prize for this contribution to mathematical finance. Black-Scholes set off a wave of research and model building that allowed firms to control their risk much more precisely than before. So successful was his formula that Black was given academic appointments at the University of Chicago and then MIT. Black's meteoric rise in economics is particularly remarkable since his doctorate was in applied mathematics; Black had never taken an economics or finance course in his life, yet in a few years working on weekends and evenings he was able to move to the forefront of his field.

Throughout his working career, Black was able to construct powerful, intuitive models, many of which, like Black-Scholes, have stood the test of time. One reason for this strength lay in Black's deep respect for the uncertainty involved in life; like CAPM, his models describe only a moment in time and are not dependent on historical trends in data which may change without notice. Black scorned econometrics and other forms of economic modeling for introducing spurious precision where none lay. He, perhaps alone among economists, was not surprised when the stock market plummeted unexpectedly in October of 1987; he thought that congestion on the trading floor and a change in sentiment were enough to account for the fall. If we think that the world is volatile and unpredictable, then we should not be surprised when dramatic and unexpected things happen. Rather, we should seek to protect ourselves adequately against such shocks.

Interestingly, when offered the chance to join Long-Term Capital Management (LTCM) in 1994, a firm whose principals included Scholes and Merton, Black declined. Though his former colleagues believed they could profitably exploit some simple arbitrage opportunities at virtually no risk, Black believed quite the opposite — that they were "loading up on risk." The firm did very well for a period,

with its assets growing from \$1 billion to \$7.5 billion in just three years, but in 1998 LTCM faced collapse. Black believed that LTCM's strategy was based on a dangerous assumption: that markets are inefficient in a way that can be exploited for systematic profit. Such opportunities may arise for limited periods of time, Black acknowledged. But over the long haul markets are efficient, and any strategy based on a contrary assumption is likely to fail, sometimes spectacularly.

Black and Macroeconomics

Black took his peculiar, CAPM-derived ideas beyond Wall Street. He was interested in macroeconomic questions, and it was his inability to get his papers on monetary theory and business cycles published that prompted him to leave the academy for Goldman Sachs. For instance, while at Chicago, he debated Milton Friedman about the power of the Federal Reserve. Black argued that it could not affect the money supply unless people let it, since otherwise one would have to assume untaken profit opportunities before the Fed acts. Essentially, Black assumed equilibrium before a Fed action, and asked what incentives would prompt financial

institutions to alter their behavior after a Fed policy change. Friedman responded by saying that Black's position was "utterly fallacious." Despite hours of debates in monetary theory seminars, Friedman was unable to convince Black that he was wrong. While Black remained unpersuaded, his theory remains a distinctly minority view among monetary economists.

At MIT, Black clashed with Robert Solow and other neo-Keynesians by arguing that business cycles arise naturally when production cycles are mismatched with consumer tastes. In his view not much could be done by the government to smooth out these cycles, whereas Keynesianism recommended active government intervention to stabilize macroeconomic fluctuations. Though well thought-out, Black's ideas were so radical that he had a difficult time even engaging his colleagues in debate.

Unlike other economists, Black did not care if his models were easily testable because he thought the purpose of economics was to provide insight, not testable predictions. He liked to approach each new problem with a fresh eye — his friends and collaborators often commented that it was difficult to tell where Black would stand on a given topic based on his other stances. The only constant that he permitted himself was a belief in equilibrium as the appropriate lens with which to view a highly unpredictable future. His approach to macroeconomics was thus ultimately rooted in his understanding of risk and uncertainty — that is, in CAPM, the revolutionary idea of finance. Mehrling's book provides an excellent discussion of that idea and the unique man behind it. **RF**

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