

# The History of Financial Risk Management: A (Mostly) Personal View

From the early 1970s to the present day, financial risk management has grown by leaps and bounds. Aaron Brown, a long time risk management professional, had a front-row view of much of this evolution. Recalling both his own experiences and those of his colleagues, Brown outlines and analyzes the seminal events that transformed the industry over the past 40 years – including the birth of financial risk, the impact of Black Monday, the rise of quants on Wall Street and the development of Value-at-Risk and economic capital models.

**R**isk management is older than written history. Consideration of risks is inherent in any useful activity — building a shelter, planting a crop, anything. This trial and error wisdom is specific to the activity, but generalized risk management concepts such as diversification and hedging are not novel ideas; in fact, mentions of such concepts can be found in ancient writings. The origins of specialized risk industries – such as insurance, lending and gambling — are also lost in the preliterate past.

The mathematical advances of the 18th century supported theoretical progress in risk management in the 19th. Actuarial science blossomed, as did civil engineering risk management. Together they provided comprehensive tools for managing physical risk. Assets were engineered to the appropriate safety standard, and insurance could be purchased for the major residual risks.

Financial risk lagged behind; it did not come into its own until the late 20th century. For a variety of reasons, financial risk was a harder problem to manage than physical risk. Trading markets, which provide financial insurance today, did develop rapidly – but were initially used only for rudimentary risk management.

Financial risk was also strongly politicized, and, perhaps more significantly, all important business transactions until 1971 were based indirectly on gold (or sometimes silver). This eliminated the type of day-to-day interest rate and foreign exchange risk we have today and instead enabled periodic panics in which short-term interest rates went to astronomical levels and currencies changed value sharply. Of course, this created a whole set of problems – because panics are hard to model.

## The 1970s

The inability to manage financial risk meant short panics could depress real activity for years. It also had an impor-

tant effect on the type of people attracted to finance. Financial sales – including both securities sales and investment banking – was glamorous and highly paid; but you didn't need to know any finance to do either one. The remaining financial jobs required meticulousness, honesty, specific knowledge and a shrewd sense of people – but little mathematics (duration and standard deviation were the cutting-edge concepts) or financial theory (practitioners were almost unanimously contemptuous of the academic work that is now garnering Nobel prizes). Ambitious people who were good at math found other fields more rewarding.

In 1971, world currencies dropped any connection to gold, resulting in tremendous volatility in interest rates and



foreign exchange. Supply-side forces sent commodities prices steadily upward and stock prices steadily downward (the Dow Jones Industrial Average first broke 1,000 points in 1966, then dropped and did not go over 1,000 to stay until 1983 – by which time inflation had made the 1,000 worth only 325). The banking system's long time strategy of borrowing short and lending long backfired as short-term rates soared. "Stagflation," high unemployment and high inflation seemed to be a permanent condition.

Fortunately, from the mid-1950s to the mid-1970s, a new science of quantitative finance – Modern Portfolio Theory – had been developed. PhDs trained in quantitative finance methods began arriving on Wall Street in the late 1970s and had extraordinary impact.

These quants divided into two groups. Some of us went to mortgages (the core of mortgages is statistical) and later branched out to all areas of fixed income – including leveraged buyouts, mergers and restructurings. Other quants went into derivatives, where stochastic partial differential equations are the basic tool and risk-neutral distributions are far more important than the actual ones studied in statistics. This mindset went on to dominate equities and commodities.

### Black Monday and the Rise of VaR

On October 19, 1987, the stock market fell 23% in one day. This ushered in a three-year period of financial disaster and scandal (see box, right).

In the late 1980s, the first generation of Wall Street quants was also feeling competition. People with mathematical training from other fields began showing up in large numbers, and new MBAs were now trained in the basics of quantitative finance. New computer tools meant a good trader with a little math could beat a good quant with mediocre trading skills, even for the most exotic products. We were still employable at good salaries; but many of us found ourselves being eased out of management, away from front offices, to become specialists in models, data and code.

As I write this, with the perspective of time and maturity, this seems natural. Many quants, probably the wiser ones, accepted the transition. Some reinvented themselves for the new Wall Street and went on to successful management or front-office careers. Others settled down to less stressful and still well-paid work in research or the middle office. Still others left to find other vocations where mathematics could cause revolution.

But from what I saw, the majority reacted differently. Wall Street was not recruiting mathematicians when the first generation of quants entered graduate school. So we had to be natural contrarians. We went to work at a time when the vast majority of practitioners thought our work

was nonsense. But while we expected to eventually prove them wrong, we were astonished by the ease and speed with which we triumphed (in the late 70s and early 80s).

Unfortunately, as frequently happens to people in their 20s who have had good fortune, our astonishment turned to arrogance. It seemed to us as if practitioners had screwed things up in the 1970s, and we had fixed them. Now they were pushing us out and screwing things up again. What gave them this power? What did they have that we didn't? Capital, of course. What was our comparative advantage? Brains. What did we need? A philosopher's stone to turn brains into capital. We wanted to start hedge funds with the small amounts of real capital we could raise and lever them up to compete with the largest institutions. We wanted to dominate trading in a market, without requiring high limits. We wanted to underwrite innovative businesses, without having to contribute any cash.

Mortgage quants tried to create virtual capital with statistics. Their first step was to standardize business ideas into categories and gather data about them. This led to a natural partnership with financial control departments, which had been working on this problem for millennia. This cross-fertilization between detailed quantitative knowledge of all operations of large financial institutions and modern financial theory led to the invention of Value-

### Aftershocks of the 1987 Stock Market Crash:

- \$300 billion of taxpayer money lost in failed Savings & Loans.
- Worldwide collapse in asset prices.
- Bankers Trust's FX option marking and financial reporting scandal.
- A recession that Japan still suffers from.
- Michael Milken's conviction.

at-Risk. Most of this work was done between 1988 and 1992, with widespread acceptance of VaR coming from 1994-98.

Many critics of VaR today don't understand what it was designed to do. We considered lots of measures with better theoretical properties, but VaR won for several reasons. One of the reasons was because 1% 1-day VaR was (and remains) on the edge of statistical reliability. You expect about one break every five months. Given the rate of

change of financial parameters, anything less frequent is impossible to estimate reliably. Measures that go deeper into the tails, like expected shortfall, are too model-dependent for consensus measurement.

The emphasis was never on the VaR number itself; it's not something anyone particularly wants to know. VaR is not a limit, nor a measure of capital requirements. There is no appropriate level of return on VaR. Its value is that businesses have to be under control in order to measure their

---

“All the important theoretical work underlying modern financial risk management was done between the late 1980s and the early 1990s; the job since then has been implementation.”

---

VaR and have to be well-run in order to control their VaR. This was the financial control contribution to the idea.

Just as all managers are expected to be able to measure and control costs for budgeting, and industrial managers are expected to predict delivery times and quantities, financial managers are expected to be able to measure and control VaR. The managers that can't are uncontrollable risks, which a well-run institution will not tolerate. VaR is a cost, and a manager who cannot measure and control costs should be fired. VaR is also a prediction about results, and no business can be run without accurate predictions from managers.

Quants liked VaR because we can measure it with statistical reliability. Financial control liked it because it controls businesses more tightly with less intrusion. Top management liked it because it's understandable and applicable across all businesses. Line managers liked it because it's meaningful at the business level. Nevertheless, it took five years of back and forth negotiations to come up with a VaR number that satisfied everyone.

### The 1990s and the Development of Economic Capital

There are many different kinds of capital, but financial institutions eventually settled on a standard risk level equivalent to a credit rating. Although credit ratings are related to probability of default, they are not probabilities (among other things, they do not go up and down as economic conditions make default more or less likely). They are judgments with precisely measurable market prices. Also, this is not a single number, but a profile over time. This was called “risk-adjusted capital” at the time, but later acquired the name “economic capital.”

Economic capital represents a fundamentally different view of the institution than VaR. VaR is a control tool, something that makes sure everyone in the institution is working together. Economic capital views the institution as a portfolio of businesses. Top management's job is to deliver capital to the profitable businesses, close down the unprofitable and manage the total portfolio – in an effort to minimize the cost of real capital necessary to support the economic capital.

Over the last decade, institutions with public shareholders have drifted toward economic capital, which maximizes shareholder wealth; institutions insulated from the public markets, either through private ownership or regulation, have favored VaR. Regulators whose primary concern is bank safety like VaR; regulators who view dynamic, risk-taking banks as essential to the economy prefer economic capital.

VaR generally makes more sense for market risk, with its rapid position change, while economic capital is more suited for credit risk, with its longer-term structures. Both ideas have contributed to spectacular disasters – spectacular because new ideas cause new kinds of disasters. But both ideas have done quiet good that outweighs the disasters more than a thousand to one.

All the important theoretical work underlying modern financial risk management was done between the late 1980s and the early 1990s; the job since then has been implementation. None of this work was preserved in papers or articles. Communication at the time was done mostly through private dial-up computer bulletin boards. Quants set these up in their homes when they came to Wall Street, primarily to exchange financial data, which in those days had to be typed in by hand. People posted ideas and questions as a byproduct.

Much of the work was done at hedge funds, small consulting firms and other specialized businesses set up by quants. The work at established institutions was often done by consultants or itinerant quants. It's impossible today to determine who thought of what first or even trace the development of ideas.

### The Future

This article will strike some people as a superficial account of some quant friends of mine, rather than a history of risk management. What about non-financial firms? What about non-Wall Street or non-US firms? What about contributions from non-quants?

I believe something special happened at the time and place I have described: risk management became a science. A consistent theory was invented, there was free exchange of ideas and data and vigorous efforts at falsification were made.

This is similar to what happened to medicine in the early

continued on page 39