Comment

Have we gone too VAR? The forsaken side of risk management

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Abstract Financial institutions are reeling with unprecedented losses, much of which can be traced to the adoption of risk models and management techniques that failed the test of time. This paper comments on how bright portfolio managers got into this global calamity, what was overlooked, and steps the profession can take to foster improved decision making. According to Randall Payant, the time is now for risk professionals to reexamine the foundation of their beliefs about risk taking. Doing so should allow for a better understanding of how to improve the management process that can help avoid future economic disasters.

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> 'It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness. In short ... some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.'

Charles Dickens was not writing about contemporary risk management, but he could have been. For all those affected by this evolving discipline, Dickens' words could aptly be describing the current state of financial risk management.

Financial risk is nothing new, despite it now being headline news in the popular press. Risk and its consequences have been around since the dawn of banking. Value-at-risk (or VAR) is not a particularly innovative concept, despite rhetoric to the contrary. While popularised by RiskMetrics and others in the mid-1990s, their research staff did not discover risk measurement. Even the

Professional Risk Managers' International Association (PRMIA) has at times promoted the view that the industry is at the dawn of an era — the quantitatively-managed risk era. However, numerous financial disasters have recently revealed something has gone terribly wrong within the profession, and it is time to rethink approaches to measuring and quantifying financial risk.

For those old enough to have grappled with managing credit and investment portfolios prior to the advent of PCs, one cannot help but notice that the often-neglected improbabilistic risk side of the risk–return relationship is now receiving long overdue attention. In what now seems like prehistoric times, portfolio managers combined cautious instinct with limited data and crude analytics to set their investment strategies. Experience reigned. Quantifying and managing risk is not a new profession; however, it is certainly a craft undergoing long overdue introspection.

The rapid changes in risk measurement and management affect financial institutions, industrial organisations, investors, shareholders, regulators, governments and their minions, virtually all economies, societies and communities. Advances in data gathering, computer technology, applied mathematics and statistics have all contributed to the creation of increasingly complex financial structures and their inherent risks.

Financial innovation has created a continuous spectrum of investment contracts that, until the recent credit crunch, made distinctions between risk-free debt and risk-capital (equity) largely irrelevant. Investment bankers have and will continue to underwrite and distribute new classes of financial instruments, decomposed and reformulated from the same old financial raw material.

Newfangled equity-class issues track segments of business, attempting to uncover value not found in the host corporation's stock market capitalisation figure. Mortgage loans are stripped to their bare essentials and sold off in tranches at premium prices. Default assumptions are based on myopic beliefs that even if the borrower cannot pay the loan, the collateral's rising value, often real estate, will avert loss. Ambiguous cash flows in proprietary written financial contracts are divided and subdivided among various investors. The contracts' anticipated but indeterminable gains are capitalised on the belief that their future earnings potential has a deterministically quantifiable value today. There are now increased numbers of ways to assume excessive risk, rather than to manage it.

Coupling these trends to decompose and reformulate cash flows are words like securitisation, risk-controlled arbitrage, delta-neutral structured portfolios, portfolio insurance and long-term hedges; terms that attempt to take the sting out of the idea of potential financial loss. Collateralised debt obligations, collateralised loan obligations, and credit derivatives ... well need one say more?

Sophisticated, multifaceted trading strategies are developed and tested with the aid of computer models that attempt to quantify return and risk exposures. The global financial web continuously shifts, with lightning speed, the fuels of regional economic engines — capital, currencies, debt and commodities. The

speed of global communications and the free flow of capital have led to the growth of loosely regulated financial casinos, where market players can place customised bets on perceived financial market anomalies.

While the global village has clearly benefited from these advances in financial risk management, for many players, the bets have turned sour, creating billions of losses. These losses have trickled down from investors to the general public, humbling scores of economies and causing great social tragedy.

Numerous governments and international financing agencies have had to bail out financial risk management gone wrong. Adding insult to injury, in many cases the market players' ultimate losses have not been commensurate with the amount of risk assumed. Some who have bet big and lost have been bailed out, and are allowed to play the game again. Some who had nothing at risk have experienced loss. In the attempt to divide and conquer risk, one has to wonder whether more has inadvertently been created.

So, how have we arrived where we are today in risk management? The author believes there are three factors that have shaped the good, the bad and the ugly in contemporary risk management.

First, there has been a paradigm shift in risk management from too little data to too much data. The availability of too much data has led to increasingly finer divisions of risk and reward.

Mankind has continuously faced the financial repercussions of an uncertain future. To help understand the probable outcomes of the future, man began observing and tracking past patterns of behaviour. By tracking the past, man was able to instinctively gain intuition about probable future financial outcomes.

Slowly, man began converting his instinctive understanding of past behaviour to a more rational view of the probable consequences of the future. In order to place a value on yet unknown outcomes, the probability of achieving any single outcome had to be quantified. Much of this rationalisation rested on advances in the mathematical sciences.

One of the first recorded applications of mathematics to model uncertainty was in 1654 when Blaise Pascal and Pierre de Fermat arrived at a probability-based solution to a simple game of chance.[1] Their collaboration rested on understanding all possible outcomes of a game, and then determining the probability of any one outcome occurring. They mathematically quantified uncertainty, and thus laid the seeds for modern risk-quantifying techniques. Their work was based on organising and interpreting data derived from patterns of behaviour. Many others improved on this early work, pushing the mathematics of probability-based solutions to quantify and value risk even further.

Harry Markowitz built on these mathematical approaches with his 1950s work on risk and reward relationships, providing concepts of diversification, correlation of outcomes, and modern portfolio management theory.[2] Others have contributed by refining mathematically-based approaches to value uncertainty — the science of quantifying risk. In 1973, Fischer Black and Myron Scholes provided the framework for option pricing models, a real test of measuring the value of uncertainty.[3]

Mathematical deterministic techniques to quantify risk have been available for years, but what was often lacking was the behavioural data necessary to determine probabilities of outcomes across numerous financial dimensions and markets simultaneously. This is where recent technology and communications advances have changed the paradigm.

With the abundance of increasingly granular data and its transformation into information, updated continuously, risk managers are able to disaggregate financial transactions to their simplest elements and track the elements' individual market volatility. The more minutely data are tracked, the more apparent the underlying volatility becomes. Increased volatility means increased risk. Yet we are blinded to the fact that some of the data at the lowest level represent little more than 'noise' — data with a level too fine to be useful or credible.

As disaggregation of behaviour patterns continues to its most minute elements, the benefit of diversification ceases. Risk-reducing benefits on uncorrelated risk elements are lost when tracked individually. The sum of all individual risk elements inherent in highly-complex financial transactions is much greater than the risk in the underlying transactions from which it is created. Thus, the more finely risk is quantified and traded, the greater in aggregate it becomes. Risks have not been adequately priced risks at the finest levels.

The second factor is that many investors rely almost exclusively on a limited number of deterministic risk measures that they do not truly understand.

Quantifying risk using increasingly complex model algorithms has reached a point such that only the model's designers understand its inner workings, and therefore its strengths and weaknesses. Not all risk modellers use the same approaches, nor start with the same sets of data, although they are measuring the same risk. Even worse, rarely do different models provide comparative measurement results. So what *is* the appropriate measure of risk?

In an effort to come up with simple measures of risk, modellers often force reality to fit the model, rather than the other way around. Behaviour patterns are forced to be normally distributed; correlations across behavioural factors are held constant; and the law of large numbers minimises the impact of catastrophic disasters. Many modellers assume arrogance in their analysis, only to sheepishly blame factors outside their model when unanticipated losses occur. The best one can do with modelling is to create resemblances of behaviour, but one cannot determine the reality of behaviour.

Risk measurement is not only highly dependent on the model, but also on the underlying historical data used to create the assumption sets necessary in the measurement process. But such data represent past behaviour, not future behaviour. We are data-rich, but insight-poor.

Left out of deterministic approaches to risk quantifying are the structural shifts of behaviour patterns caused by factors not considered in the model's equations. Advances in technology, communications, delivery channels, regulation, accounting rules and other barrier breakthroughs to commerce dynamically shift behaviour patterns of economies and markets.

Correlation and auto-correlation of short-term observations of static risk elements cannot capture behaviour-changing undercurrents that have not yet surfaced. Looking only at the past blinds one to paradigm shifts in behaviour. Behaviour is not deterministic. Maybe risk managers have relied too heavily on mathematicians and financial engineers, and not enough on sociologists, psychologists and other behavioural scientists.

The growing complexity of risk models has left many ultimate users of the model's results lacking an instinctual understanding of the measurement process and the underlying premises on which it relies. But this has not deterred market players from placing blind faith in the invincibility of these risk-quantifying tools. Mathematical risk quantification has become a pseudo-religion that pacifies the insecurity caused by our lack of clairvoyance. Models have become sacred pagan gods, but God's wrath can change.

The numbers and techniques only provide a representation of what 'might' happen, not what 'will' happen. As Peter Bernstein stated, 'Numbers are the tools of our discipline, not its soul'. It is a lack of an instinctual understanding of the tools' shortcomings that has left many losers in the risk-taking game wondering what went wrong. Most lament that, 'If I had only known the model's fallacies, I would have reacted differently'.[4] Based on observations collected over time, this conjecture itself is probably false. Greed and blind faith often win out over fear and scepticism in the financial risk-taking business.

The final factor is that, for many investors, short-term valuation and value-at-risk measures have completely replaced the long-term focus on earnings, earnings-at-risk and liquidity.

Risk only relates to something that has value. Value is determined at a point in time. Changes in value occurring over time create earnings opportunities. The mesmerising fixation with value-at-risk concepts has shifted focus away from managing earnings accumulation and liquidity over time.

Value can decline drastically in the short term, especially in illiquid markets, due to temporary abnormalities in market behaviour patterns. Bear Stearns' shareholders and employees learned this lesson the hard way. But the underlying question is who determines value — markets or models?

Liquid markets allow players to enter and exit transactions relatively friction-free, providing diversification of timing. The ability to diversify market timing creates liquidity. Diversification does not insure against loss, only against losing everything immediately. With sufficient liquidity, temporary downturns in value can be weathered, sometimes without negatively affecting earnings. Liquidity is found only in markets, not in models.

Models do not calculate market value; rather they attempt to explain value, based on observations of price behaviours of market-traded instruments. Models calculate model value, and too often models assume a static continuation of liquidity in their calculations. It is rare to find a value-at-risk model that considers the changing breadth and depth of market liquidity as a factor in determining overall risk.

Too often financial bets are placed on monetary values that are determined only with valuation models, not from prices directly observed in liquid markets. For a growing number of the

structured transactions, a party to one side of the transaction controls the model and the market, and is therefore the sole determinant of value. These transactions have no observable market price and no liquidity. Casino owners, who control the game and its payoff odds, rarely allow their players to leave without suffering losses. If market participants have sufficient external sources of liquidity, they can weather short-term market price turbulence. Those who cannot, go broke.

None of this speaks well of the profession. With too much data, a limited understanding of the limitations of the data, and a growing focus on the short term only, how can we, as risk managers and modellers, bring true value to our profession?

For answers to this question, it is worth turning to the principles of risk management as outlined by the Basel Committee.[5] Of the 15 principles, those that relate to the risk measurement process are paraphrased below:

- Risk measures must identify and address all major sources of risk.
- Risk measurement processes must be reasonable and transparent, with the underlying assumptions used to quantify risk understood by those relying on the measures.
- The risk measures must consider possible breakdown of key assumptions, particularly the liquidity of markets, on the measured results.

The essences of the principles establish the recommended standards for all risk measures. While these principles should not create dissent from risk modellers, the manner in which they are adhered to has not been established or formalised. This is where PRMIA can improve the stature of the risk profession discipline. PRMIA should adopt a standardised 'risk measurement disclosure statement'. A disclosure statement would provide decision makers with the information necessary to understand the measurement process and the degree of confidence they choose to place in its results.

Without specifying format or content detail, a disclosure statement should include at minimum the following five items:

- definition of the risk(s) being measured and which risks are not being considered in the measurement process — this should include what is being risked, who is financially affected directly by the risk, and the time period for which the risk is assumed to exist;
- description of the risk measurement framework used, including the specific sources of risk considered in the measurement process — known sources of risk not formally addressed in the measurement process should be disclosed;
- description of the behavioural data used in the assumption determination phase of the measurement process, including the length of any look-back period used to derive the measurement assumptions;
- identification of the critical measurement assumptions and the degree of sensitivity each key assumption has on the measured results — the key assumptions' sensitivity should be disclosed without regard to correlation;
- disclosure of the weakest known link in the risk measurement framework.

Whether or not a disclosure statement is ever adopted, everyone assuming financial risk should have a clear

understanding of the underlying premises on which the risk analysis is based. By doing so, risk takers should not be lulled into a false sense of security. Quantifying risk is a necessary part of managing risk, but so is having an instinctual understanding of the dynamics of risk.

There is real danger in relying solely on deterministic approaches to risk measurement. We must take their results, understand them and use them in conjunction with our own experience and intuition. These measurement tools are still needed, however, as they are the only approach to determine, *relatively*, the degree of possible negative consequences of the uncertain future.

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