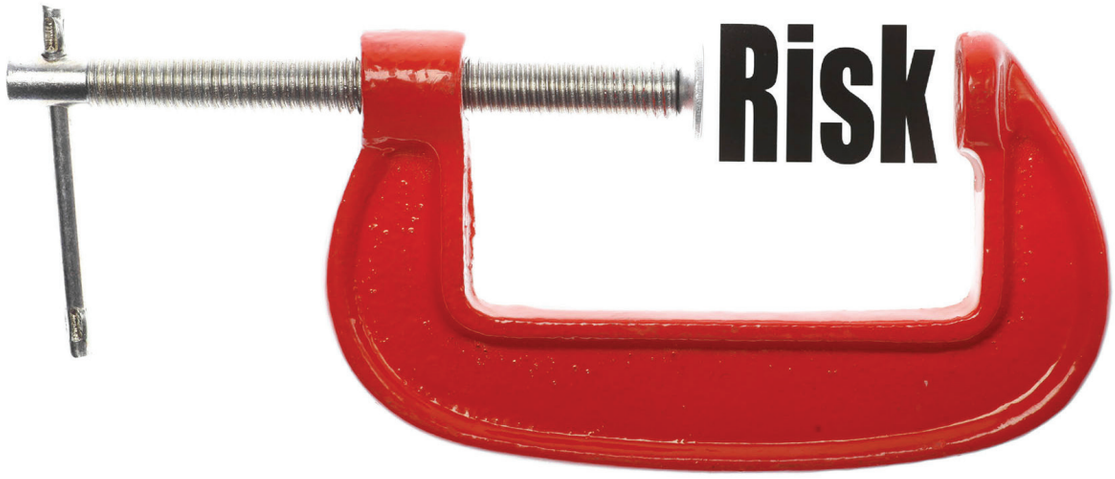
CORPORATE RISK MANAGEMENT

Changing times require new tools for risk management



The rise of globalisation, interconnectivity and economic development has created new complexities in risks, but also enhanced how we are able to learn and derive insights from these risks. **Dr Michel Dacorogna** of **SCOR** and **Professor Marie Kratz** and **Dr. Patrick Lecomte** of **ESSEC Business School** examine the changing approaches to risk management.

We are, today, living in an ever more connected and faster world, which contributes to making risks more complex and difficult to handle.

With globalisation and the widespread use of internet communication, economic development has become more global, leading to multiple networks. These networks are working at a faster pace than ever before, relying on multi-layered links. The relevant time scale is therefore much quicker.

Strong dependence between risks

Due to the degree of complexity embedded into this new time scale, human beings have difficulties to perceive, let alone distinguish, the most relevant information among the avalanches of news they are subjected to.

The world has become deeply interconnected, which creates strong dependence between risks. Although some of the interactions underpinning those dependences most probably existed in the past, it was difficult to see or live through their consequences. People were less aware of them because it took longer to observe them, customarily beyond human time scale (or the life span of one generation). Only historians and scientists could study them based on historical data.

For instance, it was virtually impossible to analyse demographic trends such as ageing, birth rates, immigration as they take years to develop and exercise defining influences on societies. Understanding and planning for the impact of these trends on health care or retirement systems have become essential to the workings of developed economies.

Today's acceleration in time scale is accompanied by a newly found ability to study and to learn from many actual cases of risk occurrences, thus allowing us to gain a wealth of experience in little time.

Transition phase

The last century will most probably be considered as a transition phase, when mankind made fantastic jumps forward, but was also often overwhelmed by its own new technological advances and fast tools.

On one hand, as we are not able to keep up with these tools' neck-breaking pace, we might find ourselves more as serving them rather than being helped by them. On the other hand, being able to turn technological breakthroughs into a helpful toolkit in order to expand our reach seems a worthy challenge. Two points might emerge from this situation.

New and complex interactions

First, we live many outcomes of risks during our lifetime. This might give us the opportunity to study them better, since we can often see their immediate consequences and observe in *vivo* their interactions.

Second, the discovery of new interactions could help us change our views on phenomena, thereby enabling us to better master their consequences.

The conservative approach which aims to read or fit phenomena within a given theoretical frame or a given economic theory, will have to be replaced by a more scientific, and pragmatic, approach, ie learning from observations that are becoming increasingly available, instead of selecting them a priori

to fit within a theoretical framework.

However, the existence of complex interactions and phenomena does not imply that the model to handle them should be complex.

Scientific approach

The scientific approach consists in distinguishing the main contributions to a given phenomenon and in modelling these main contributions. Fundamentally, science helps simplify without reducing the problem, putting it on grounds that can be treated and experimentally proven.

Such an approach will be crucial in handling this complex world, with inherent permanent risks and new ones stemming from increased connections. Studying the dependence between risks is essential for understanding their real impacts and consequences. This has always been a topic in probability and statistics when looking at what is called a multivariate framework. Notions like linear correlation or copula, for instance, were introduced to deal with this problem.

The realisation that risks are more dependent in extreme situations led to the development of the notion of systemic risks, ie risks that would affect the entire system, as well as the notion of systematic risks, ie components present in all other risks.

In the next few years, research in statistics and probability will have to make significant progress in this area if our societies want to master risk at the aggregate level. Social demand for protection at a global level goes in that direction.

Quantitative tools' assumptions

During the last financial crisis, we were reminded that quantitative tools must be used with full knowledge of the assumptions embedded in them. These assumptions limit in certain ways the scope and validity of these tools. Thus, utmost care must be exercised in using their results and generalising their usage.

Interestingly, during the Global Financial crisis, a controversy erupted on the use of models for credit risk evaluation, particularly for sub-prime debts. A famous article by Salmon published in Wired magazine in 2009 and entitled: "Recipe for Disaster: The Formula That Killed Wall Street" cast doubts on the ability of quants (the familiar name given in Wall Street to traders who base their valuation on financial mathematics) to correctly estimate risks. The author was pointing to the fact that those models underestimated the tendency of defaults to be correlated in extreme situations.

Gaussian assumptions and EVT models

Clearly, greed coupled with unrealistic expectations led to highly leveraged financial institutions, which left them vulnerable. However, the culprits are not the models per se. Many of the models used by banks at the time relied on Gaussian assumptions that grossly underestimate the probability of extreme events.

However, other models existed, such as those based on Extreme Value Theory (EVT) that would attribute reasonable probabilities to what actually happened. Unfortunately, these models were held in poor esteem by banks' management as their application would have implied higher capital charges and thus less profits for the companies (and less bonuses for their managers).

Prevalent belief in the low probability of failures

In the mid-1990s, luminaries such as Alan Greenspan, then head of the Federal Reserve, supported the idea that from now on, quantitative tools for risk management would prevent speculative bubbles and financial crises from spilling over the economy. The belief that any quantitative models, irrespective of their relevance or inherent flaws, would prevent unrealistic expectations has of course been proven wrong.

Similar statements on the low probability of failures are often made by safety engineers of nuclear power plants with the consequences we witnessed in Fukujima for instance. This attitude was rightfully put into question in the aftermath of the Global Financial Crisis or the 2010 Japanese tsunami. Yet, it would be dangerous to abandon all the progresses we experienced in understanding and managing risks because faulty attitudes led to the second worst financial crisis of the last hundred years, or to accidents of the type of Fukujima.

Both quantitative and qualitative approach needed

Nowadays, given the difficulties of implementing new risk-based solvency requirements, like Basel II or Solvency directives, scepticism towards quantitative approaches has been spreading. Controversy rages between those who defend a quantitative approach and those who advocate a qualitative approach to risk management. The fact is that both approaches need to be used for understanding ever more complex risks and achieve efficient risk management for all.

Highlights

- Globalisation, interconnectivity and time-scale acceleration are accompanied by a newly found ability to study and to learn from risk occurrences.
- More progress needs to be made in the area of systemic risks, if societies want to master risk at the aggregate level.
- The failure of some quantitative models in recent times shows that qualitative approaches must also be used in conjunction with models to understand risks as they grow in complexity.

During the last financial crisis, we were reminded that quantitative tools must be used with the full knowledge of the assumptions embedded in them as these assumptions limit the tools' scope and validity.

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This article is based on a research paper co-authored by Michel Dacorogna and Marie Kratz under the title "Living in a Stochastic World and Managing Complex Risks". The full paper is available at https://goo.gl/9a3Tt7