Is risk constant?

David Rowe explores Gerald Wilde's idea that risk homeostasis is relevant to risk management

To a dedicated risk manager, the question "Is risk constant?" sounds like rank heresy. How can risk be constant when so many people are working so hard to keep it under control? Nevertheless, there is a school of thought whose members argue that the answer is yes in a broad range of situations. This startling idea, known as risk homeostasis, was first proposed seriously by Gerald Wilde in 1982 ("The theory of risk homeostasis: implications for safety and health", *Risk Analysis*, 2, 209-225). Ironically, this was concurrent with the early development of financial derivatives as a risk management tool.

Feedback systems

Wilde's hypothesis relates to broad social systems. It is a theory about people's attitudes to risk and their reactions to externally imposed structural changes in risk conditions. Homeostasis is a widely observed phenomenon in nature. It is the result of feedback mechanisms that maintain conditions within a narrow range of some "normal" circumstance.

A familiar example is how a thermostat regulates the temperature in our homes. When the temperature falls sufficiently far below the desired setting, the thermostat engages the furnace, heating the space. Eventually, the temperature rises sufficiently above the desired setting and the furnace is shut down until the temperature falls again to the critical level. A similar mechanism controls our internal body temperature, our blood volume and the level of other critical substances.

The phenomenon is also observed in populations of organisms. Sometimes the feedback mechanism is harsh, as when dwindling vegetation reduces the number of foraging animals through starvation.

In other cases, especially among human populations, the mechanism may be more benign. An example is the tendency for birth rates to fall as income rises and infant mortality declines. The diminishing role of children as the sole source of their parents' old age security combines with an increased likelihood that any given child will survive into adulthood. Add to this the increased cost of educating a child to succeed in a complex society, and the economically rational response is smaller families.

Given the prevalence of homeostasis in nature, it should not be surprising that some have sought to find evidence of it in the area of society's behaviour towards risk.

Early claims of risk homeostasis relate to studies of the effect of introducing anti-lock brakes on a widespread basis. This important innovation prevents wheels from locking completely, assuring that directional control is maintained no matter how hard the brake peddle is depressed in a panic situation. It was widely expected to have a statistically measurable impact in reducing accidents and associated damage and injuries. In fact, no such effect could be detected in various research studies. Indeed, the incidence of brake-related accidents remained remarkably constant before and after the introduction of anti-lock technology, hence "risk homeostasis".

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Further research studies have pointed to a pattern of vehicle operators driving faster and braking harder when equipped with anti-lock brakes than was true without them. In effect, the risk reduction from superior equipment was "consumed" by more aggressive driving habits. While at first this may seem to be a puzzling result, the behaviour involved is not really that strange.

As economist David Hemenway has pointed out, on reflection it is not surprising that "soldiers walk more gingerly when crossing mine fields than when crossing wheat fields" and "circus performers take fewer risks when practising without nets".

Implications

For financial risk management, I do not find the strong form of the risk homeostasis hypothesis compelling. But I do believe that important lessons should be drawn from this discussion.

First, changing the objective risk structure of a system will change the behaviour of the participants. An example I have cited before is raising the measured counterparty exposure of derivatives transactions to reduce the total credit risk of such activity. It is a fallacy to believe that the same amount of measured exposure will be approved regardless of how conservative the assessment method may be. All my experience supports the idea that a behavioural feedback loop will thwart the desired effect.

Credit officers begin to approve larger limits under a more conservative measurement regime. Whether this behavioural reaction fully offsets the greater conservatism of the measurements is open to question, but I suspect the orders of magnitude are the same.

Second, even a risk homeostasis advocate such as Wilde argues there is a way to reduce an organisation's aggregate risk. To accomplish this, he argues, requires reducing the target risk levels of the organisation's members (see *Target Risk* by George Wilde, 1996). This, in turn, requires a direct change in the incentive structure: increasing the cost or reducing the benefits of risky behaviour while increasing the benefits or reducing the cost of cautious behaviour.

Needless to say, this basic insight is at the heart of the widespread acceptance of risk-adjusted return as a best-practice performance metric. The essential trick, however, is to drive this type of measure all the way down to individual decision-makers. While this has been accomplished in most trading organisations with regard to market risk, the record is much spottier with regard to trading-related credit risk.

The difficulty relates to the complex nature of trading related exposure, especially its dependency on how the valuation of an incremental deal interacts with pre-existing deals with the same counterparty. The goal should be to provide traders with incremental credit charges (for expected default and allocated capital) on a pre-dealing basis. This allows them to price deals with full knowledge of the impact on their risk-adjusted profitability measure.

Adherence to fixed credit exposure limits is certain to play a continuing role in this area. Nevertheless, augmenting this with visible charges for the cost of credit, especially if these are available on a pre-dealing basis, is a far more effective approach to managing trading credit risk.

The final lesson is that corporate culture matters. If risk management is treated as a narrow function performed by a small group of specialists, its impact will be limited. One reason is that the rest of the organisation is often induced to behave in a riskier fashion by the perception that "someone else has the risk under control".

Senior executives must be visibly committed to making risk management a core competency of the organisation. Also, effective contributions to risk management must be part of the periodic performance evaluation criteria for all employees. Only then will the incentives be in place to reduce target risk at the individual level and to reduce total risk at the organisational level. ■