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News release

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Tails of the unexpected – paper by Andrew Haldane

In a paper given at "The Credit Crisis Five Years On: Unpacking the Crisis" conference held at the University of Edinburgh Business School, Andrew Haldane – Executive Director for Financial Stability and member of the Financial Policy Committee – argues that economic and financial systems are prone to tail events, as demonstrated during the financial crisis, that are not captured by traditional macro-economic and risk-pricing models. In doing so, he draws a number of important lessons for economic and financial policymakers. The paper is co-written with a Bank colleague, Benjamin Nelson.

Andrew Haldane explains that, for almost a century, the world of economics and finance has been dominated by a particular way of describing the distribution of possible real world outcomes, known as the normal distribution. But more recently there has been mounting evidence of non-normality. Drawing parallels with evidence from natural and social systems, Andrew Haldane explains that measures such as GDP and equity prices exhibit "fat-tailed" distributions. Catastrophe risk is often much greater than the normal distribution would imply. That can result in considerable under-pricing of catastrophe risk.

Andrew Haldane says that interaction is the key factor explaining these extreme outcomes: "Systems are systems precisely because they are interdependent. In a nutshell, that is why so few systems behave normally in the statistical sense". He discusses four important features of economic and financial systems that arise from interaction: non-linear and chaotic dynamics; the tendency for systems to automatically organise themselves into fragile, knife-edge, states; inefficiencies in co-ordination, which can result in multiple or sub-optimal equilibria; and the generation of critical states through human intervention.

As Andrew Haldane says: "It is not difficult to imagine the economic and financial system exhibiting some, perhaps all, of these features – non-linearity, criticality, contagion. This is particularly so during crises. Where interactions are present, non-normalities are never far behind. Indeed, to the extent that financial and economic integration is strengthening these bonds, we might anticipate systems becoming more chaotic, more non-linear and fatter-tailed in the period ahead." He argues that fat tails contain important lessons for economics and finance.

First, he notes that, in response to the crisis, there has been a groundswell of recent interest in modelling economic and financial systems as complex, adaptive networks. Should they enter the mainstream economics profession, those models would provide a realistic prospect of generating the sorts of discontinuities in real and financial variables that have been evident over recent years. But, he notes: "Doing so will require a fairly fundamental re-think of the foundations of modern-day economics, finance and econometrics."

Second, he argues that risk management tools used by financial institutions, ranging from market risk models such as Value-at-Risk and option pricing models to credit risk models, can lead to material mis-pricing of risk. Recent losses at JPMorgan are evidence of that. This points to the need for a rethink of core risk management tools including, importantly, models used to set regulatory capital requirements. "That was a key fault-line during the crisis and, as recent experience attests, remains a key fault-line today."

Third, he believes there is a need for a systemic oversight agency, able to monitor and potentially model actions and interactions among the moving pieces of the financial system. Andrew Haldane notes that systemic risk agencies have been created since the crisis in the UK, US and Europe. He argues that the systemic risk regulator can provide individual firms with a systemic risk map and give early risk warnings to enable defensive actions to be taken.

He says that international regulators must also re-calibrate regulatory rules with an eye to systemic risk. "In a complex, uncertain environment, the only fail-safe way of protecting against systemic collapse is to act on the structure of the overall system, rather than the behaviour of each individual within it." He adds that: "Regulatory rules of the past sought to reflect risk. Regulatory rules of the future will need to seek to reflect uncertainty." One implication of this is that fine-tuned policy responses can come at a potentially considerable cost, because complex intervention rules may simply add to uncertainties in the system. Regulation has, he notes, learned some of these lessons with the adoption of simple rules such as the leverage ratio and structural, fail-safe, policies such as the Volcker rule in the US and the Vickers proposals in the UK. But he says that there is further to go.

Key Resources

Tails of the unexpected (201KB)

http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech582.pdf

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