

Complexity kills

[Jon Danielsson](#) 29 September 2008

Complex financial models and intricate assets structures meant extraordinary profits before the crisis. Markets for structured products became overly inflated as even the banks did not have a clear view of the state of their investments. Given complexity's role in today's mess, future regulation should focus on variables that are easy to measure and hard to manipulate (e.g. leverage ratios).

Uncertainty about asset values is a key factor in the wave of financial institutions failures we have been experiencing. It used to be that banks became insolvent because their loans went sour. Now it is the complexity of assets that lets them down. It may well be that the Lehmans of this world would have been able to cover their liabilities in the long run, but their downfall was triggered by a lack of liquidity because they were unable to demonstrate to the market that their assets were sound.

At first, complexity was a virtue

Before the crisis, sophisticated financial models and intricate assets structures enabled many banks to reap extraordinary profits, by enabling them to identify profit opportunities and risks in enormous detail. Complexity became a virtue. However, this complexity often meant that banks did not have a clear view of the state of their investments. Indeed, the greatest profit opportunities often lie at the edge of chaos. Unfortunately, at that point it takes little to send you over the edge.

In such complex financial models, mathematics often assumes far greater importance than the accurate depiction of reality. The models generally ignored liquidity as well as the fact that in a downturn assets that were previously well diversified move together, sharply increasing their correlation. The subprime industry only started after the previous recession, and the models therefore did not consider the possibility of economic downturns.

Consequently, valuations and risk assessments of structured products became increasingly out of sync with economic fundamentals and the underlying assets. Unfortunately, few mechanisms existed for identifying the looming problems. If the models indicate everything is fine, backed up by mark to market accounting practices, it is not surprising that the markets for structured products became overly inflated.

A sense of invulnerability: Mark to market, model or magic

A sense of invulnerability, or hubris developed within the financial

system. It is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing one dollar in any of those transactions" [said](#) Joseph J. Cassano, the former AIG executive, who was in charge of the AIG CDS operation that ultimately led to its failure in August 2007. See [Lo \(2007\)](#) and [Danielsson \(2008\)](#) for more on these issues.

Eventually, in August 2007 the bubble burst. At the beginning of the crisis banks comforted themselves with the belief that that the crisis in the credit markets was a temporary phenomenon. After all, from a mark-to-market point of view the assets retained their values. What they did not realise was that it was the models themselves were wrong. Mark to market in the absence of a liquid market implies mark to model, or simply mark to magic.

Without liquidity, complexity became a vice

When credit markets collapsed and liquidity disappeared, complexity became a vice. In a crisis, banks gain access to liquidity by being able to demonstrate that they are solvent. If assets are so complicated that nobody, not the regulators, not the clients and not even the banks are unable to get any realistic assessment of valuations and risk, of course investors will refuse to supply liquidity. Banks simply became too sophisticated for their own good.

Given the role model complexity played in fuelling the crisis, the reaction of banking regulators has been on occasion incomprehensible. The regulators have allowed and on occasion encouraged the use of sophisticated models by banks, and they have gauged the health of the financial system with the output of these models. This approach is an important component of both the Basel 2 Accord for banks and Solvency 2 for insurance companies.

Before the current crisis there was some logic to this process. But given the role of model-driven complexity in the crisis, regulators should now be focusing on alternatives. An implementation of the leverage ratio as a means to determine minimum capital would be a good step forward. Unfortunately, while the leverage ratio is in use in the US and being advocated by Switzerland, the rest of the world's regulators have so far rejected it.

It is the nature of financial regulations that they tend to be reactions to previous crisis episodes and slow to adapt to the dynamic nature of the financial system. Existing regulations and the Basel 2 Accord address the problems of the financial system circa 1995. Hopefully, this crisis will lead to both banks and regulators to develop a healthy scepticism for the complex models that helped to get us into this crisis. Regulations should focus on variables that are easy to measure and hard to manipulate, such as the leverage ratio, and encourage transparency and simplicity in a bank's operations.

