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Scientists and bankers — a new model army

Bankers must now surrender more information on their activities. Scientists should use it to build better system-wide financial models, says **John Liechty**.

The financial system is in a credit-confidence trap. Like a badly balanced ship trying not to capsize during a storm, banks and financiers are unwilling to make loans or accept collateral in exchange for securing debts — they fear being overwhelmed by the next wave of crisis. Even though the first sovereign default, in Greece, has passed, there is no obvious port in this storm.

How did the system get so far out of balance? And how can scientists — accustomed to modelling complex events to explain and make predictions — help to create a financial system that is more self-stabilizing? Existing financial models failed to predict the crisis of 2008 and the follow-on crisis of 2011–12. They missed the huge system-wide risks that developed as banks promoted an undisciplined supply of mortgages and created an increasingly complex web of relationships through legal contracts that transferred risk throughout the financial markets.

Financial bonds based on these mortgages (and other assets) were seen as risk-free and cheap, and banks used them as both capital and collateral. But when house prices plummeted, the bonds were useless for securing even short-term loans for the banks, which suddenly faced cash shortages. The banks held assets that were potentially worthless, and they were all interconnected. If one firm went down, everyone else was vulnerable.

Market forces function only if all risks are fairly priced. The system-wide risks that these bonds held were not taken into account, so the bonds were sold too cheaply. A clear scientific goal, therefore, is to build better system-wide models of the global financial system. Both the industry and regulators could use such models to judge financial risk and make decisions.

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True, scientists are not blameless with regard to the recent collapse. They helped to create the models that the banks routinely used to measure risk. But those models lacked crucial data — on common holdings and trading behaviours, for instance, and on the interconnections between firms and the capacity of markets to execute trades.

For commercial reasons, banks have historically been reluctant to share this kind of information, but that is changing. Legislation in the United States now allows regulators to collect such data from banks, pension funds, insurance companies and other big players in the financial markets. Regulators in Europe are following suit, and hopefully Asia will as well. As a result, we will soon be able to model and identify potential system-wide risks.

To get an idea of the challenge of modelling system-wide financial risk, consider an indoor shopping mall that charges people to enter and exit. To model the movement of shoppers, we could build a purely statistical model of the door traffic, and in most situations this would be sufficient. However, in extreme situations, such as a fire, the system would change dramatically. Shoppers would rush for the nearest exits and ticket-takers would get overwhelmed and close their doors. Then shoppers would rush to the next set of doors. In such cases, a statistical model would get it horribly wrong.

Equilibrium or structural models of the same system would track and predict the motives — and, therefore, the movement — of each individual. In normal times, these models are too complex and hard to calibrate — imagine trying to quantify all of the reasons that people go shopping. But in times of distress, as the shoppers' motives and behaviour converge (*get out!*), the model output improves.

To fully understand and predict the dynamics of a market in crisis, we have to understand the capacity of the market-makers (the ticket-takers at the door of the shopping mall) and the demand for assets when prices lurch significantly away from present levels (the number of shoppers trying to get out versus the number trying to get in). The new data will allow models to do this for the first time.

Clearly, regulators have a responsibility to build such models and to use them to monitor for potential crisis. To do this, they will need to leverage expertise among scientists by supporting and encouraging research in universities and labs, and by hosting the more applied work to maintain confidentiality. Bankers should join this effort too, if only to avoid forcing regulators to use crude tools to set prices on these risks — through capital ratios or transaction taxes, for example.

Bankers should work in parallel and form an industry group that collects system-wide data from its members, organizes resources for scientists to develop the necessary models, and creates a secure and confidential infrastructure for members to determine the price of system-wide risks. The industry already has a group that does something similar — the international Operational Riskdata eXchange Association, which shares operational-loss data among member firms.

Everyone would benefit if bankers were to engage with scientists to build the infrastructure needed to price system-wide risk. Banks could get feedback about common holdings and trading strategies, which would allow them to adjust their behaviour and avoid following the herd. Regulators would have extra market information to help them to determine when to act to ensure stability. And the rest of us could have increased confidence in the financial system. ■

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