

Simply an unintended consequence of innovation

In searching for the cause of the global meltdown, there is no smoking gun, writes **Peter Cebon**.

We're told that the root cause of the current financial crisis is a few regional financiers selling dodgy mortgages to poor people. How can that be? The sub-prime mortgage market is a small portion of the United States mortgage market, which is a small portion of the US credit market, which is a small portion of the global credit market.

How can defaults in a sub-sub-sub-market destroy banks in two continents and send countries bankrupt?

In his landmark analysis of the Three Mile Island nuclear accident, sociologist Charles Perrow argued that that meltdown was not caused by any particular component or operator failure. Rather, it was caused by a number of small component failures that interacted in unpredictable ways to escalate to a catastrophe.

Those failures included a valve that didn't reseal properly, a meter which gave deceptive information, another meter that didn't work properly, and some perceptual operator errors.

If a system has high interactive

complexity, it is hard to predict the effect of a particular action on the other elements in the system. If a system is tightly coupled, it means an action at one point propagates rapidly throughout. Perrow argued that systems with high interactive complexity and tight coupling are more prone to systems accidents.

The financial sector meltdown is also a systems accident, but in this case, no failures are interacting. With the possible exception of a US Securities and Exchange Commission decision in 2004 to eliminate the capital reserve requirements of investment banks, it is hard to say that anyone erred, anywhere up the food chain from the mortgagees to the banks. Rather, people just innovated so they could do their job better, and those innovations interacted.

One group innovated by creating the sub-prime mortgage category; another by finding a way to lend people deposits on their homes; a third by working out how to slice and dice the mortgages and combine them with bonds to turn them into securities; a fourth by working out how to price those securities using mathematical formulae. The list goes on.

Innovators deploy resources in novel ways to produce desired results. Innovations come in two varieties:

radical and regular. Radical innovations bring new resources to bear on an old problem. For instance, LEDs produce light using fundamentally different technologies and materials than tungsten filaments. Similarly, repackaging mortgages and bonds into tradeable securities was a radical change from banks holding individual mortgages on customers' properties.

In addition to fundamentally transforming a core technical process, radical innovations change

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the way the artefact interacts with the rest of the system. Just as LEDs produce much less heat than tungsten bulbs, but require a much more stable voltage, securitised debt instruments created fundamentally different relationships between the mortgage and the rest of the financial system.

One change was that the mortgage issuer had much less interest in the debt they had bought, because they were rid of it as soon as they sold it to the investment bank that repackaged

it. Another is that the instruments are so complicated that it is no longer possible to trace where the risk associated with a particular mortgage is located, which means the securities cannot be turned back into mortgages. A third is that instead of being held locally, the mortgage is now smeared across the globe.

It is highly unlikely that the mathematicians who invented these instruments, or the regulators who regulate them, even considered these impacts, let alone thought about their implications. That is, a secondary consequence of radical innovations is that they change the linkages in the larger system and make it harder to understand and analyse. They increase interactive complexity and increase the possibility of mismatches between reality and what regulators assume they are regulating.

Regular innovations generally involve using the same resources more efficiently. Thus they tighten coupling. Every generation of computer chip is basically the same as the one before, but the chips are faster because the engineers find ways of making the lines in the silicon thinner, and packing the transistors more tightly.

Similarly, a sub-prime mortgage is basically a regular mortgage, pitched at a different market segment, as is a

loan provided so people don't need to actually have the deposit.

By deploying resources more efficiently, innovators remove slack from the total system. That is, each regular innovation makes the system more likely to propagate, rather than absorb, things that go wrong.

Consequently, no smoking gun explains the meltdown. Everyone, with the possible exception of the regulators, just did their job. The meltdown occurred because of the way the mismatches between the innovations and the regulatory environment interacted. The result is almost incomprehensible, given the root sources — a collapse in the market for interbank lending.

These days, everyone seems to think innovation is a great thing. While it can be incredibly valuable, all innovations, whether in genetically modified organisms or financial instruments, can have unpredictable and dire consequences. Consequently, an innovation economy needs a strong and intelligent regulatory regime that manages the systemic risks to ensure that the system as a whole has adequate buffers and safeguards.

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