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Stress-Testing the Planet

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The chances of substantive political progress at the Cancun climate talks this year are slim, but at the more mundane level of trying better to understand the problem there are two interesting climate-related events closer to home. The Science Museum in London is finishing a new gallery called Atmosphere, which aims to explain climate science in a straightforward way to a confused public. It will be well worth a visit if only to see how complex this branch of science really is and to gauge the limits of our knowledge.

Meanwhile, at the Newton Institute in Cambridge, a group of the world's leading climate modellers are trying to push out the limits of knowledge by analyzing and reducing the uncertainties in climate models. The truth is that while we know a lot about the behavior of some of the main components of the climate system and we have a sense of how the whole fits together there is still a lot of scope for surprises—especially when we try to figure out what will actually happen as we stress the climate system with increased greenhouse gases.

Replace climate system by financial system in the last sentence and read mortgage-backed securities for greenhouse gases and you have something that might have been written by a central banker any time up to summer 2007. The results of that particular financial experiment are now in. The one on the climate system is very much running. What might we read across from one to the other?

Firstly, the Citigroup principle—if the music is playing, then carry on dancing—holds good. While there is plenty of money to be made from activities that create greenhouse gases it is hard to see this activity slowing meaningfully any time soon. Secondly, there will probably be a Northern Rock moment—some unmistakable public signal that, while not a disaster in itself, lets us know that trouble is surely on its way. An ice-free summer Arctic Ocean might serve this purpose. While fighting shy of exact predictions, the researchers in the field would not be greatly surprised if this happened in the next decade or so.

Thirdly, a Bear Stearns event will eventually arrive—an upset in a major component of the system that tells us we are definitely in trouble. A plausible candidate could be a food crisis triggered by a repeat of this year's Russian wheat crop failure, but occurring several years running in more than one major crop growing area around the world as warmer conditions more frequently trigger floods and droughts. Alternatively, it could be an inundation of a coastal city made vulnerable by higher intensity storms as the oceans warm, helped on by rising sea levels should Greenland's glaciers accelerate their calving as the Arctic warms up.

When might we see this kind of adverse response to the stress test on the planet? The models are too imprecise to say—possibly when the atmosphere is another 1C or so hotter than today but even trying to work out when this will be means coming to grips with feedback loops in the climate system that are still poorly understood. Current models suggest it might be a decade either side of mid-century.

The analogy can readily be extended. Ever-increasing house prices, with no collateral consequences, had to be assumed to justify large-scale subprime lending. Our current use of the climate system implicitly assumes that ever-increasing greenhouse gas concentrations are equally consequence free. In both cases we can choose to argue that the obvious early warning signs— increasing subprime delinquency on the one hand and increasing extreme weather frequency on the other—are statistical fluctuations rather than evidence of a trend.

It turned out that the financial models for mortgage-backed securities were over-optimistic. This was understandable since they were constructed by bankers in selling mode. It will be no great surprise if climate models suffer from the same defect, this time because of an understandable conservatism in assumptions about the operation of positive feed-back loops where knowledge is not yet firm.

The Bear Stearns bankruptcy proved to be a financial tipping point. Through the operation of myriad inter-relationships feeding back upon one another, credit markets seized up and previously uncorrelated asset classes moved in unanticipated unison as their prices rapidly went south, leaving nowhere to hide. Researchers suspect that there may also be climate tipping points. At one of these points, climate feedbacks would operate together to produce what may be uncontrollable change. We can only guess where the tipping points lie, if they exist at all. But like Bear Stearns, we will surely know once we have passed one.

It took the biggest rescue in the history of capitalism to fix the financial system. The fix triggered a sovereign-debt crisis that still reverberates as we try to work out how the fixers will themselves be fixed. The planet's Bear Stearns event may trigger its own rescue through a combination of humanitarian action and geo-engineering that will presumably make the U.S.'s troubled asset-relief program look like a picnic. What sort of rescue will be needed for the rescuers, and everyone else, from the unintended consequences of engineering the climate can only be guessed at.

The financial crisis was upon us remarkably swiftly. Mortgage-backed securities went from being the mainstay of investment banking profits to being toxic financial waste within half a decade. Momentum for a climate crisis will gather more slowly and it may take another half-century for greenhouse gasses to go the same way. We will be waiting for the results of the stress test on the planet for some time yet. Like the stress tests on the banks, we may not appreciate the answers when we see them.

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