Defining Systemic Risk

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Introduction

Before getting into the issues of organization of systemic risk regulation, legislators and regulators need to agree on the nature of the problem. This note provides some background. It is divided into four parts:

- The first part gives two alternative definitions.
- The second part discusses three types of systemic risk – bank runs, financial market collapses and infrastructure collapses. In reality, many crises, including the current one, are a mixture of these types.
- The third part discusses the notion of systemically significant institutions – a critical concept in the Administration's strategy for managing future systemic stability.
- The last part discusses models – consistent frameworks for thinking about systems – and how they are evolving. Without such frameworks, any strategy for managing systemic risk is in danger of being incomplete and incoherent.

1. Definitions

The essence of a systemic risk is a risk that something bad happens in the financial system that is a good deal bigger and worse than the failure of any single institution.

An example of the most common type of definition is from the G-10 Report on Financial Sector Consolidation (2001):

> A systemic risk is a risk that an event will trigger a loss of confidence in a substantial portion of the financial system that is serious enough to have adverse consequences for the real economy

The current financial crisis is systemic according to this definition. Many major financial institutions and markets collapsed and the financial crisis precipitated a large drop in US and worldwide GNP. The

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Russian and Asian crises of the 1990s were systemic in the parts of the world they affected. The LTCM crisis might have become systemic but for the actions taken to contain it, although there is a wide range of opinion on this point.

A definition from the sciences and non-financial sectors – such as epidemiology, evolutionary biology and telecoms -- where systemic stability is studied is:

> A systemic risk is the risk of a phase transition from one equilibrium to another, much less optimal equilibrium, characterized by multiple self-reinforcing feedback mechanisms making it difficult to reverse

Maturity transformation and leverage, combined with the fact that financial systems are built on confidence contribute to their instability and make them prone to such transitions. Financial networks, like telecoms networks, occasionally break down. Markets, like liquids, do indeed freeze from time to time – as in the case of the commercial paper market in September 2008. The current crisis is systemic according to this definition too.

What characterizes systemic events? Contagion, hoarding and flight are almost always present when complex systems with many independent actors fail. Individuals behave rationally to save themselves but, in doing so, worsen the overall situation. A loss of confidence, the withdrawal of investments from some class of assets, conserving liquidity, withdrawal from short-term lending all characterized this crisis at different times.

2. Examples

a. A Bank Run

A bank run is a paradigm case of financial instability. Confidence erodes for whatever reason and bank depositors demand repayment at par. Banks are forced to liquidate inherently illiquid investments at distressed values. Contagion spreads to institutions perceived to be exposed to the same "toxic" asset classes or to other banks in danger of failing.

Widespread and pervasive bank runs were largely forestalled in the present crisis via guarantees of official support. Nevertheless, Northern Rock and problems at the two large Icelandic banks indicate the phenomenon is hardly a dead letter.

The collapses of short term financing for Bear Stearns in March 2008 and Lehman Brothers six months later were very like bank runs. Without deposit insurance or access to the Fed's discount window, their

short term creditors did not perceive any benefits from government protection. When concerns about solvency led these creditors to withdraw their funding from the repo market, it was akin to depositors withdrawing their deposits. (And in fact hedge fund deposit balances that had been a source of liquidity for both firms did prove to be highly mobile.)

De facto runs on Morgan Stanley and Goldman Sachs immediately after Lehman and AIG collapsed in September 2008 presumably contributed to their decisions to seek bank holding company status. That gave them the Fed discount window access they needed to re-assure their counterparts. The complexity of their exposures to other institutions (who themselves were exposed to a wide range of other financial institutions) had made it very hard for their creditors to make an independent judgment of their financial strength.

The peak of the crisis in October 2008 was marked by a loss in confidence in the wholesale banking system, money market mutual funds and the commercial paper market. All three cases were tantamount to traditional banking runs translated into a new setting and all three were forestalled only by massive official capital and liquidity injections in the US, UK and other industrial countries.

b. A Financial Market Collapse

Another sort of systemic event is a financial market collapse. A speculative bubble in some asset class – in this crisis it was real estate -- runs out of steam and is followed by a bust. If the declines are deep and widespread enough, they spur concern about additional losses, increasing uncertainty and risk aversion. As firms sell assets to cover margins and reduce exposures, other asset classes can lose value too, providing mutually reinforcing feedback and making the collapse general.

Familiar contributory factors in the financial market collapse in this crisis were:

- excessive leverage – in particular the re-securitizations of RMBS into CDOs; and
- risk management and measurement failures – which facilitated and exacerbated the leverage problem.

New factors behind the crisis were:

- the efficiency of modern technology facilitating rapid product innovation and ramp-up;
- the build-up of undetected huge concentrations of risk hidden in OTC derivative positions, especially CDS,[2] (for which AIG is the poster child); and

[2] Market product definitions like CDS and CDO can be imprecise. From a functional systemic risk perspective, the key product features are (1) tranching of risk, which is characteristic of a CDO, and introduces both nonlinear risk characteristics and implicit leverage, and (2) unfunded transfer of risk, which is characteristic of most CDS (including those with two-way margining since the transfer of risk typically precedes any substantial amounts of collateral flow). The two products can be combined into an unfunded transfer of tranched risk. The most lethal

- the feedback effects of mark-to-market accounting via (a) recognition of losses that would have been ignored in the past and (b) increases in uncertainty about counterparty condition when published accounts reflected internal mark-to-market judgments that were hard for outsiders to understand.

c. An Infrastructure Collapse

Concerns about the integrity of market mechanisms for transacting can lead to a widespread reduction in market activity and liquidity. The 1987 market crash strained clearing and settlement infrastructure. The Herstatt crisis in 1974 was the result of faulty settlement arrangements for foreign exchange transactions that were finally corrected by the creation of the CLS bank in 2002.

In the present crisis, no major payment, clearing or settlement system failed. However, the need for new infrastructure became apparent in two areas: clearing OTC derivatives, and documenting mortgages and mortgage securitization.

3. Defining Systemically Significant Institutions

The Administration proposal places great emphasis on identifying a set of systemically significant institutions (SSIs or Tier I FHCs) for special regulation. The strategy is to focus on large, complex, inter-connected institutions -- particularly those with a heavy dependency on short term funding and a significant maturity mismatch. The idea is that, if disorderly failures of such institutions can be avoided, then the chance of a cascading failure running through the system as a whole is greatly reduced.

If the avoidance of disorderly failure means at the least some degree of protection for other SSIs, then SSIs can trade with each other with less risk than non-SSIs. Moral hazard and competitive advantage result – perhaps to be offset approximately by the strictness of the special regulation regime: restrictions on activity, higher capital requirements, higher standards of risk management and closer scrutiny in general.

Issues include:

- As the system evolves, institutions move up and down the continuum of complexity, interconnectedness and size. Can a bright line be drawn in exactly the right place to identify the institutions requiring special consideration in a future crisis of as yet unknown nature? Is this the best way to internalize the "externalities" associated with the existence of firms whose failure might – due to their size, interconnectedness, or complexity – lead to systemic risk?

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combination was the unfunded transfer of tranched re-securitized risk, which exhibited the full force of multiplicative leverage.

- Can the special regulation regime be tuned finely enough to avoid pressure from institutions either to become systemically significant (because of the associated competitive advantages) or to lose that designation (because of the strictures of the special regulatory regime)?
- Using this SSI designation as a cornerstone of the regulatory regime seems likely to align permanently different regulatory and industry interests (the Fed with SSIs, the FDIC with small banks, and so on) and perpetuate the current structure of the financial system. Is this a good idea?
- Should infrastructure firms such as DTCC be included?
- Is it desirable to identify non-bank SSIs publicly?

A key over-arching question is whether avoiding disorderly failures of SSIs is a sufficient condition for elimination of systemic risk. On the one hand, crises often arise at the edges of the system – Russia's debt crisis in 1998, for example. Moreover, contagion is not always a result of direct credit exposures. Brazil was affected by the Asian debt crisis because industrial country fund managers had to sell Brazilian assets to cover losses in Asia. Hoarding and asset flight can occur amongst large and small institutions alike. Nevertheless, if the failure rate of SSIs could be brought down to zero (without requiring government rescues), it would likely solve a large part of the systemic risk problem, given that they are such an important transmission mechanism for systemic shocks.

4. Models of Systemic Risk

Traditional economic models of financial instability focus on how institutions interact – credit risk contagion for example -- and on portfolio effects -- where a decline in value in an asset class causes a simultaneous sell-off in several institutions, for example. In these models, funding and market liquidity, maturity mismatches and leverage all affect the severity of contagion effects and feedback loops in times of systemic stress.

Business, credit cycle and asset bubble models focus on unsustainable self-reinforcing dynamics during a boom and a subsequent bust. On the upside, these models typically involve widely-held expectations that become progressively unrealistic over time, declines in standards (such as due diligence and underwriting standards) and increases in leverage. When the top of the cycle is reached and the bubble bursts, expectations collapse and businesses and households fail.

New models of systemic risk look at the financial system as networks and populations. Network models explain how complex opaque systems are more vulnerable than simpler more transparent ones; and how highly connected systems increase risk dissipation in normal times but spread contagion faster and farther in abnormal times. Population models look at the financial system as a diverse population of institutions (or products, practices or processes) that evolve over time as conditions change. In these

models stability means having a healthy population where innovation is allowed or even encouraged, old population members disappear and some new members succeed them. Diversity reduces the herd behavior that fuels bubbles. It also increases population resilience and likelihood that some business models succeed following a shock.

Future models will build on all these ways for thinking.