

## On Systemic Risk

Jeffrey M. Lacker<sup>1</sup>  
Federal Reserve Bank of Richmond

Comments presented at the Second Joint Central Bank Research Conference on Risk  
Measurement and Systemic Risk  
at the Bank of Japan, Tokyo, November 16-17, 1998.

Systemic risk, the title of our conference, is a phrase on every central banker's lips these days. This is a subject that many economists have struggled with, so the Bank of Japan is to be commended for organizing hold a conference devoted to recent work on this timely subject.

In thinking about systemic risk, I find it helpful to go back to basic scientific principles. In economics, as in any empirical science, the advancement of knowledge essentially falls in one of two categories. At times, some noteworthy phenomenon is observed empirically, and we seek plausible models which display the same phenomenon. If our catalogue of models does not contain one that displays the observed phenomenon, then we try to construct models that do. On the other hand, sometimes we find that a particular model in our catalogue displays an unusual or remarkable phenomenon. In this case, we go looking for empirical evidence of that the phenomenon actually occurs in real life.

Systemic risk, according to the first paper in this session [De Bandt and Hartmann (1998)], falls in neither category. The authors report that we do not have any serious models that can be said to display systemic risk, as they define it. Thus systemic risk is not a theoretical phenomenon in search of empirical confirmation. Furthermore, we do not have any convincing empirical evidence of phenomenon that can be readily identified as systemic risk, and that cannot be explained adequately by existing models in our catalogue. Thus, systemic risk does not appear to be an empirical phenomenon in search of a theoretical explanation either. About the only evidence we have for systemic risk is that many central bank officials speak of it when discussing their lender of last resort function or the risk containment measures they impose on private settlement arrangements.

---

<sup>1</sup> Correspondence: Federal Reserve Bank of Richmond, P.O. Box 27622, Richmond, Virginia, 23261, USA. The author's views do not necessarily represent those of the Federal Reserve Bank of Richmond or the Federal Reserve System.

What is meant by the term systemic risk? The papers presented here are fairly clear. Systemic risk refers to “contagion effects” that embody “negative externalities.” Financial distress at one institution has “external effects,” causing further financial distress or even failure at other institutions. The central idea is that multiple failures are causally linked, and that the linkages reflect externalities of some sort. This is, I believe, a popular definition.

I will argue here that there is good reason to believe that we will never have any very convincing models of systemic risk, at least according to the popular definition. I will also argue that there is good reason to believe that it will be quite difficult to find empirical evidence of systemic risk, according to the popular definition. Finally, I will propose an alternative approach to systemic risk, one that does not rely on notions of “externalities” in financial arrangements.

Why am I skeptical about the prospects of constructing convincing models of systemic risk? Systemic risk is supposed to be an externality, and yet it is supposed to be transmitted via financial market transactions: for example, runs by depositors, interdependencies that arise in settlement arrangements, or exposure to volatile asset prices. But all of these linkages represent voluntary transactions, and we do not usually think of voluntary transactions as giving rise to externalities. An externality, according to the standard definition in economics, represents an involuntary exposure of one agent to the effects of an action by another agent. The classic example is the effect of a steel mill’s pollution on the laundry in your backyard.

When you place a deposit in a bank, for example, you implicitly accept the possibility of some bad things happening. If something bad does happen – for example, the bank fails and you lose money – it can hardly be called an externality in the standard sense. This is true no matter why the bank failed. Similarly, participants in multilateral settlement arrangements implicitly accept a number of possible outcomes. Some of them may involve losses, since credit exposures may be incurred in the course of clearing and settling. These are hardly external effects in the standard sense, no matter what their cause. Similarly, holders of actively traded securities have implicitly accepted a financial arrangement which could in certain circumstances result in large reductions in their wealth when prices fall. But this is hardly an external effect in the standard sense. In fact it seems quite difficult to imagine a financial transaction that could give rise to phenomena that meet the standard definition of externality.

The distinction between external effects and unpleasant contingencies is important because of the policy implications. Externalities, defined the standard way, carry with them the presumption that government intervention of some sort is warranted, perhaps in the form of Pigovian taxes, perhaps in the form of quantitative restrictions. In the absence of externalities, there is no presumption that government intervention is necessary.

Many of the models that are said to capture systemic risk essentially assume some sort of externality. I think it is fair to say that they represent reduced forms of some sort or another, not unlike putting money in the utility function in an otherwise nonmonetary general equilibrium model. As with money-in-the-utility-function, there are well-known problems with reduced forms. First, and foremost, they take institutional arrangements as given. For some purposes this poses no fundamental difficulty. After all, it seems worthwhile to understand the implications of various hypothetical institutional arrangements, apart from understanding how those arrangements arise.

The study of systemic risk, however, is fundamentally motivated by questions having to do with central bank policy, particularly lender of last resort activities and central bank settlement arrangements. Central bank policy in these areas helps establish the “rules of the game” for market participants. As with monetary policy, market participants can be expected to adapt to changes in the rules of the game. This is particularly relevant to payment systems, since private settlement arrangements clearly represent endogenous institutions. Reduced form assumptions about externalities essentially extrapolate from behavior under the past policy regime. Thus, with reduced forms it is difficult to evaluate new institutional arrangements, such as the proposed new foreign exchange clearing arrangement, or TARGET, the euro funds transfer system, or even a change as simple as paying interest on reserves. For the same reason, models that start by assuming some sort of contractual incompleteness can only take us so far, since settlement arrangements generally involve choices regarding the allocation of risk.

A coherent account of systemic risk would require an explicit model; a model where you can do welfare economics in the standard way. Moreover, we would need models in which people can create institutions like clearinghouses (or banks, for that matter) if it would be useful to them. We need models in which you can understand exactly what multilateral arrangements agents are capable of agreeing to. Generally, this means describing a physical environment so clearly that you could imagine living in it (although you may not like it very much). You should be able to answer questions like: Are agents spatially separated? With whom can they communicate? What information do they have? Can they precommit? Can they share risks? Admittedly, this is a difficult task, but we now have some examples of how to proceed. Scott Freeman (1996a; 1996b) has described a set of models like this in which specific interbank clearing occurs. [See also Edward J. Green (1997).] In addition, the paper by Hiroshi Fujiki, Edward J. Green and Akira Yamazaki (1998) at this conference is in fact specified at this more fundamental level. Models such as these provide good examples of how to proceed. But until we have more such models, any assertions about externalities and systemic risk will always be suspect.

There are alternatives to this program, but they are not terribly attractive, I would argue. One alternative is to appeal to irrationality on the part of financial market participants. The BIS takes this approach in some of its documents, for example, as does the staff of the Board of Governors at times. According to this approach, participants in multilateral settlement arrangements do not always realize that a counterparty could fail due to the failure of another counterparty. The problem with this approach is that it is

conflicts with the fundamental philosophy underlying the vast corpus of financial market supervision and regulation; namely, that with adequate disclosure, market participants are generally capable of making risk exposure decisions for themselves. It strains credibility to assert that the participants in elaborate multilateral settlement arrangements, like CHIPS, for example, represent an isolated pocket of irrational or suboptimal investors that need to be protected against their own reckless lack of foresight.

Despite what I have said about the desirability of complete, well-articulated models, I should note that there will always be a place for the sort of partial-equilibrium analyses of payments arrangements that sometimes appear in the literature. I have in mind exercises like the calculations published in the mid-1980s of the quantitative implications of unwinding a CHIPS settlement, or the similar calculations recently published for an Italian settlement system. The third paper in this session, by Yukinobu Kitamura and Shuji Kobayakawa (1998), is another example along those lines. They examine the quantitative implications of particular closure rules in a multilateral settlement arrangement. As long as we are clear about what these exercises set out to do and about what is taken as given, and the authors of this paper are quite clear, then they add to our knowledge of the numerical mechanics of payment arrangements. As I mentioned earlier, this is valuable because it is informative about the implications of hypothetical institutional arrangements.

Why am I skeptical about the prospects of finding convincing empirical evidence of systemic risk? The type of evidence that economists look for consists of correlations between runs or failures at different banks, or between asset price declines in various markets. The second paper in this session, by Dirk Schoenmaker (1998), is a good example of a bank failure study along these lines. The idea is to find evidence consistent with the notion that one bank's failure can cause other banks to fail that otherwise might not have failed. The paper appears to succeed in this objective – bank failures appear to be serially correlated in the late 19<sup>th</sup> and early 20<sup>th</sup> century in the U.S.

But the natural question to ask is: what is the null hypothesis? It is easy to imagine models without any sort of externalities in which bank failures are correlated. For example, the failure of loan customers could be correlated across banks, due to correlated real shocks, or banks could be exposed to each other directly through interbank lending markets. Moreover, bank runs might rationally be correlated in a world in which depositors are imperfectly informed about banks' conditions.

The essence of the problem is that the information available to financial market participants is not directly observed by the econometrician. Of course, one can attempt to account for rational contagion effects by including control variables. The paper by Schoenmaker does this by including three macroeconomic variables for the contemporaneous month. Any serial correlation in bank failures, above and beyond that explained by these three contemporaneous macro variables, is counted as consistent with an external contagion effect. This is quite right – it is consistent with a contagion effect. But I would argue that it is not very convincing evidence against the null hypothesis that agents had knowledge, above and beyond that captured in the three macro variables, that

was informative about bank solvency. Related, is it plausible that movements in these three variables account for all possible serial correlation in bank asset values? In general, I submit, we will always be able to find empirical evidence “consistent with” external contagion effects, but it will be difficult to find evidence that rules out quite natural alternative explanations that do not rely on externalities.

There is an empirical phenomenon that cries out for explanation, however: the undeniable fact that central bankers frequently claim that systemic risk exists. How should we understand this?

Let me begin by proposing a different definition of systemic risk – one that does not presuppose the existence of externalities in the traditional sense: Systemic risk is the risk that significant financial distress occurs at a significant number of institutions at about the same time. One could call this an agnostic definition, because it is agnostic about whether there is any sort of externality in financial markets or payment arrangements. Jean-Charles Rochet and Jean Tirole adopt a very similar definition [Rochet and Tirole (1996)].

The agnostic definition has very different policy implications than the popular definition. The popular definition presupposes a role for central bank lending to alleviate the effects for which people did not adequately prepare. In contrast, the agnostic definition does not prejudge the usefulness of central bank lending. In fact, it allows one to tell a very different story about central bank policy, and why central bankers talk about systemic risk. My interpretation of central bankers’ use of the term “systemic risk” is based on two elements. The first is that central banks implicitly or explicitly provide backstop lending commitments to certain payment system participants and, more broadly, to certain financial market participants. Investors believe that in certain circumstances the central bank would intervene with direct or indirect lending to prevent the spread of losses. Similarly, payment system participants believe that the central bank would intervene to help participants avoid large (private) costs in the event of an unusual occurrence, such as the failure of a large participant to meet payment commitments.

The second element is that for whatever reason, perhaps political, this implicit line-of-credit service is underpriced in the sense that the cost to those that take advantage of it is less than the true social cost. This could occur because the price that beneficiaries pay for the service is below its true social cost. Or for some reason, again perhaps political, central banks cannot precommit not to lend in circumstances in which it is not socially beneficial to lend. In other words, the implicit lending commitment is overextended.

Together, these two hypotheses imply that a certain degree of moral hazard arises from central bank intervention in situations of financial distress. Financial market participants are not sufficiently mindful of the costs associated with the contingencies that gives rise to central bank intervention. The natural response, given such policies, is to attempt to contain such risks. For example, central banks impose risk controls, like the Lamfalussy Standards, on multilateral payment arrangements. Central bankers are right,

in my view, to attempt to contain the moral hazard caused by underpriced lending commitments. On the other hand, the agnostic definition of systemic risk suggests that efforts to constrain private risk taking ought to be coupled with efforts to roll back central banks' implicit lending commitment. But this is best left for another paper.<sup>2</sup>

## References

De Bandt, Olivier, and Philipp Hartmann. "What Is Systemic Risk Today?" Manuscript. European Central Bank, October, 1998.

Freeman, Scott. "Clearinghouse Banks and Banknote Overissue," *Journal of Monetary Economics*, vol. 38 (1996a), pp. 101-115.

Freeman, Scott. "The Payments System, Liquidity, and Rediscounting," *American Economic Review*, vol. 86 (December 1996b), pp. 1126-1138.

Fujiki, Hiroshi, Edward J. Green, and Akira Yamazaki. "Sharing the Risk of Settlement Failure: Synopsis." Manuscript. Federal Reserve Bank of Minneapolis, October, 1998.

Goodfriend, Marvin, and Jeffrey M. Lacker. "Limited Commitment and Central Bank Lending." Manuscript. Federal Reserve Bank of Richmond, October, 1998.

Green, Edward J. "Money and Debt in the Structure of Payments," *Monetary and Economic Studies, Bank of Japan*, vol. 15 (1997), pp. 62-87.

Kitamura, Yukinobu, and Shuji Kobayakawa. "Risk Accumulation, Contagion and the Rules for Bank Failure." Manuscript. Institute for Monetary and Economic Studies, Bank of Japan, November, 1998.

Rochet, Jean-Charles, and Jean Tirole. "Interbank Lending and Systemic Risk," *Journal of Money, Credit, and Banking*, vol. 28 (November 1996, Part 2), pp. 733-762.

Schoenmaker, Dirk. "Contagion Risk in Banking." Manuscript. Ministry of Finance, The Netherlands, November, 1998.

---

<sup>2</sup> See Goodfriend and Lacker (1998).