DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICIES

ECONOMIC AND MONETARY AFFAIRS

Systemic Risk and the ESRB

NOTE

Abstract

Financial crises are often characterised by a few financial institutions failing, followed by a cascade of collapses. Economists are not good at predicting which shocks will trigger an initial collapse. Thus, an early warning system might be better focused on measuring systemic risk, or the vulnerability of the financial system to the initial collapse. I suggest what data might be used and the difficulties associated with identifying systemic risk. I discuss why the ESRB is not adequate for the challenge.

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EXECUTIVE SUMMARY

- Systemic risk is not yet well understood. A typical definition is that it is the risk that one or a few financial institutions might fail, at least partially because of some institution-specific factors. Then, because of the size of the failed firms or interlinkages between these firms and other financial institutions, additional financial firms collapse, endangering the entire financial system

- It is difficult to explain where financial crises occur; it may be impossible to predict when they will occur.

- Measuring the vulnerability of the financial system to shocks is an alternative to attempting to forecast financial crises.

- There are many difficulties with using systemic risk measures as early warnings crises: collecting the appropriate data would be costly and require changes in the rules; the data cannot be analysed mechanistically; only the symptoms of problems are seen in the data; international coordination in collecting data is important; propagation mechanisms in crises are not well understood.

- The structure of the ESRB is risible: it is way too big and not diversified enough.

1. INTRODUCTION

1.1. The role and structure of the ESRB

With the European Systemic Risk Board (ESRB) ready for action in 2010, ECB Executive Board Member Lorenzo Bini Smaghi described its goals and institutional setup in a speech at a CEPR/ESI conference in Vienna in September. The ESRB is to be responsible for macro-prudential oversight of the financial system within the European Union. It is intended to avert or lessen systemic risks within the EU financial system by issuing risk warnings and recommendations for the containment of risks. The Board is to be made up of the 27 EU national central bank governors, the ECB President and Vice-President, a Commission member and the three chairs of the new European Supervisory Authorities. In addition, a representative from the national supervisory authority of each EU country and the President of the Economic and Financial Committee may attend meetings of the ESRB, but may not vote.

1.2. The definition of systemic risk

There is no single definition of systemic risk, probably because the concept is not yet well understood by the economics profession or by policy makers. Systemic risk was defined by the G10 in 2001 as "… the risk that an event will trigger a loss of economic value or confidence in, and attendant increases in uncertainty about, a substantial portion of the financial system that is serious enough to quite probably have adverse effects on the real economy." More specifically, systemic risk appears to be viewed as the risk that one or a few financial institutions might fail, at least partially because of some institution-specific factors. Then, because of the size of the failed entities or interlinkages between these entities and other financial institutions, additional financial firms would begin collapsing until entire markets or even the whole financial system is endangered. Because the financial system is an important component of the real economy's infrastructure, the collapse of just one or only a few financial firms could then ultimately lead to a damaging, or even a catastrophic, blow to the real economy.

2. AN EARLY WARNING SYSTEM FOR FINANCIAL CRISES

2.1. Predicting where and when crises will occur

Until recently, attempts at predicting economic crises have relied on aggregate data. Unfortunately, economists have been and are likely to remain unsuccessful at using such data to predict the timing, or even the incidence, of financial crises. A recent paper by Rose and Spiegel (2009) illustrates some of the difficulties.

An econometric early warning system needs to predict both when and where financial crises will occur. Rose and Spiegel (2009) note that the economics profession has had some limited success in predicting how crises that have already occurred affect particular firms, banks and countries, but that it has had less success in predicting when crises occur. Thus, as a first step in asking whether it is possible to construct a statistical early warning system that could have predicted both when and where the current crisis has hit, they ask whether it is possible to do something much easier: to construct a model of the incidence of the current crisis across countries. The authors use real GDP growth, various financial indicators, such as stock market growth and exchange rate appreciation, and country ratings from the *Institutional Investor* – all for 2008 or early 2009 – to measure the extent of the crisis in each of 107 countries. They then use data from 2006 or before to measure country size, country income, measures of financial policies and the condition of the financial sector, asset price appreciation, international imbalances, macroeconomic policies, the state of economic institutions and geography in an attempt to predict the pattern of the

crisis across countries. Their results are disappointing: only a few variables have even weak predictive power. Countries with relatively large increases in stock market prices relative to GDP, relatively sizable current account deficits relative to GDP or relatively few reserves relative to short-term debt were more apt to have crises than other countries. Other variables had little or no effect. A relatively large increase in real estate prices, for example, had an effect that was not statistically different from zero.

There are several possible reasons that exercises such as this one may fail. First, it is possible that crises are caused by a shock that arises in one, or a small number of countries, and that then spread to the other countries through contagion. Second, it is possible that the crisis was caused by different factors in different countries. Third, crises might be caused by factors that are difficult to measure. For example, a decline in business ethics might have been a contributing cause, but how can this be quantified? Rose and Spiegel had to use what was available to measure the condition of financial policies and the state of the financial system, but the data appears inadequate.

Even if economists were able to predict the incidence of crises, forecasting their timing is a far more daunting task. Future economic outcomes are functions of future fundamental random variables. Thus, even if economists could perfectly model the world and even if they knew all of the potential fundamental random variables and their distributions, they still could not predict the future. At most they could describe the statistical distribution of future economic outcomes.

2.2.   Measuring the vulnerability of the financial system

Given the difficulties in predicting where and when a crisis will occur, measuring systemic risk is another, and perhaps easier, way of providing an early warning system. Instead of asking how likely it is that events will trigger the collapse of one or more institutions, the goal is to ask how vulnerable is the EU financial system as a whole should one or more important institutions fail.

Economists have been criticised for failing to spot the risks in the financial system prior to the current crisis. Many economists had voiced concerns about the rise in house prices but few economists knew that financial firms had become so leveraged or understood the nature of the real-estate backed assets that they held. To make an assessment of systemic risk and to have an effective early warning system, one must have the right data.

While economists, the ECB and the ESRB have yet to develop good models of systemic risk, it seems clear that the ESRB needs to have a better picture of the balance sheet of the euro area as a whole. In the current crisis, small changes in financial asset prices had devastating consequences for highly leveraged institutions. The ESRB should be able to assess how leveraged the euro-area financial system is. If a financial institution is in difficulty, it may have to sell its illiquid assets at fire sale prices; hence, the ESRB should also be able to tell how liquid the assets of the financial system are. In addition, it would be desirable if the ESRB could assess how correlated the prices of euro-area assets are and how sensitive euro-area portfolios are to changes in economic conditions. This means that the ESRB would want to collect data on the market prices of the on- and off-balance sheet assets and liabilities of all euro-area financial firms, including those in the shadow banking sector.[1]

In addition to calculating an overall balance sheet, it is also desirable to measure how relationships between financial institutions contribute to risk. That is, we need measures of how financial institutions are connected. A simple question is whether some financial institutions – such as AIG – are too interconnected to fail without damaging the financial system. Recently, net work theory has considered this question in a more sophisticated manner. Some findings, for example, are that increased connectivity may ensure more risk

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[1] For a detailed description of data that might be collected see Lo (2009).

sharing, but may also amplify shocks. If a larger than expected number of institutions are more connected than average, then the system may be more robust to random shocks but more vulnerable to shocks to hubs.[2] Data on connectivity may be collected in a variety of ways: as an example, Soramäki et al (2007) used a network map of the US Fedwire interbank payment system to look at connectedness in the US financial system.

2.3. Problems with measuring systemic risk

It is important to stress the difficulties in collecting and limitations in using a systemic risk data set. First, acquiring it would require a change in the rules: many financial entities are not required to report their balance sheet positions. The ECB and the euro area should also anticipate that the expense of collecting the appropriate raw data and turning it into something usable would be considerable.

Second, Bini Smaghi appears to advocate a somewhat mechanistic approach. "Early warning indicators" and "early warning signal models", he said, should play an important role in the ESRB's work. However, this dataset should not be used mechanistically. It is possible, for example, that particular indicators of risk may be insignificant on their own, but can be important in the right combination with other indicators. An example from macroeconomic data suggested by Lo (2009) illustrates this point. Real estate prices, interest rates and the efficiency and availability of refinancing opportunities for homeowners may not lead to crises on their own, but rising house prices, falling interest rates and an increased availability of financing – when combined – can lead to householders synchronising equity withdrawals via refinancing. Homeowners become increasing leveraged with no way of reducing their leverage when house prices start to drop. The result is a wave of defaults and foreclosures across the economy. It is unlikely that this combination of events and their possible consequence would have been spotted by some mechanistic process.

Third, a systemic risk data set will, at most, allow policy makers to observe the symptoms of financial vulnerability, not the root causes. Using a systemic risk data set as an early warning system does not replace a good regulatory system.

Fourth, many financial firms are multinational enterprises. Thus, data collected solely by the ESRB is necessarily going to be incomplete. This suggests that international coordination, says through the BIS or IMF, is desirable. But, this may be politically difficult.

Fifth, systemic risk is not yet well understood and this creates obvious difficulties in its measurement. A key feature of a crisis caused by systemic risk factors is the domino-like collapse of a chain of financial institutions after the demise of a just one or a few. Currently, policymakers' efforts to measure the risk of this happening appear to focus on network theory and connectedness. But, we do not yet completely understand the mechanisms which cause a financial crisis to propagate and connectedness may not be the main factor.

Propagation of shocks may occur even without interlinkages. One way that this can happen is if a new or old-style bank run or speculative attack in one market makes a similar run or attack a focal outcome in another market. Another way that this is can occur is with adverse selection. Recent research by Princeton professors Stephen Morris and Hyun Song Shin (2009) demonstrates that even a small amount of adverse selection can shut down a market.

A highly stylised example of how this might work is as follows. Consider an over-the-counter market where trade is done bilaterally. Normally, trade is expected to produce a gain for both partners. But, occasionally, one trading partner may know that the trade will yield a large benefit to him and a loss to his counterparty. An example might be the trade

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[2] See Haldane (2009) for an overview.

of an asset-backed security where either the buyer or the seller has substantially better information about the origins of the underlying securities. If the likelihood of meeting up with a better informed trading partner and the cost of trading with such a partner is high, then trade may not take place. However, in normal times the benefits to trade outweigh the cost and trading takes place.

Now suppose that the loss suffered by an uninformed trader when he trades with an informed trader is stochastic. To formalise this, suppose that there are a large number of equally likely possible outcomes. Suppose that one trader, call him the *seller*, can tell when the first outcome has occurred, but cannot tell the difference between the second and third outcomes or between the fourth and fifth outcomes and so on. The other player, call him the buyer, cannot tell the difference between the first and second outcomes or the third and fourth outcomes, and so on. Suppose further that all outcomes have the same moderate loss that would not normally lead to an adverse selection problem except for outcome one.

Suppose that the loss in outcome one is sufficiently large that not only will an uninformed seller not trade if he knows that outcome one has occurred, but an uninformed buyer who knows that either outcome one or outcome two has occurred will not trade either. Now suppose that the seller knows that outcome two or three has occurred. By hypothesis, uninformed buyers will not buy if state 2 has occurred, but can we have an outcome where uninformed sellers trade and uninformed buyers trade if state three has occurred? In this case sellers make the usual gain from facing an average buyer if state three has occurred. But, in state two they make a loss because any buyer who will trade is informed. Thus, the conditions for trade to take place are stronger. Suppose that, as a consequence of this, trade no longer takes place when the seller knows that outcome two or three has occurred. By the same logic, then, no trade will occur if the buyer knows that outcome three or four has occurred and no trade will occur if the seller knows that outcome four or five has occurred and so on. A very small possibility of a big loss, combined with a small amount of uncertainty about the world and a small amount of moral hazard causes the entire market to collapse. While this example is stylised and its robustness is unclear, it indicates that propagation may occur without any particular connectedness conditions being met.

3. THE STRUCTURE OF THE ESRB

One problem that the ESRB will face is glaringly obvious. Given its size and composition, the ESRB is clearly a body that is designed for maximum inefficiency. Consistent with the familiar jokes, it is a stylised fact that the output of committees is not as good as one would expect, given their members. Process losses due to coordination problems, motivational losses and difficulty sharing information are well documented in the social psychology literature: not everyone can speak at once; information is a public good and gathering it requires effort; no one wants to make a fool of themselves in front of their co-members. As the size of a group increases so does the pool of human resources, but motivational losses, coordination problems and the potential for embarrassment become more important. The optimal size for a group that must solve problems or make judgements is an empirical issue, but it may not be much greater than five. The bloated ESRB, with up to 61 people at a meeting, is laughable. Bini Smaghi comments that, "… all parties involved in the preparation of ESRB risk assessments and potential warnings need to do the necessary analysis and research to bring our understanding of systemic risk and macro-prudential regulation to a new level." This is an onerous task and one must wonder how much time a person with many competing demands on his or her time is going to spend on it if they are part of a group of 61.

In addition to being way too big, the committee has little diversity: all of the voting members are central bankers and the others are supervisors: the same people whose responsibility it was to foresee the current crisis. There were many reasons for the current crisis and it would have taken a committee with many different types of expertise to have foreseen it. It would have been far more sensible to include practitioners to provide practical expertise and researchers outside of governments and international organisations. Career concerns may stifle the incentive of a bureaucrat to express some original ideas; academics or other independent researchers are used to being rewarded for them. The independent researchers should have included financial engineers, microeconomists and research accountants as well as macroeconomists. Macroeconomists, for example, saw the potential for risk pooling in securitisation; a microeconomist would have seen the reduced incentive to monitor loans. There appears to be little likelihood of a lumbering army of central bankers and supervisors collectively publishing a report identifying the next crisis based solely on their own deliberation

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