Challenges and Cautions in Analyzing Systemic Risk

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Outline

- Terms and premises. The overall challenge.
- Role of early warning indicators
- Stress tests, as a tool for analysing systemic risk
- Some institutional matters. The role of central banks. Communication of risk assessments
- Conclusions

Preliminary: Terms, Premises. Challenge

- Systemic Risk: risk of a serious disruption (= crisis) to the financial services on which the real economy depends. Assessment requires knowing (all possible) shocks and the financial system's resilience to (all such) shocks.
  - Distinguish: *measuring* risk to system from a particular shock scenario (conditional analysis) vs. *assessing* the overall vulnerability of the system (to all possible shocks)

- Acknowledge limits to our knowledge. Financial systems are complex, adaptive. Past experience may not guide enough.

- Challenge: gain knowledge of systemic risk that has high value for policymaking – and ideally maps into macroprudential and other policy tools (Demekas, 2015)

Financial system as a fragile complex adaptive system

- Highly complex, always changing. No model can fully capture.
- Crises (naturally, inevitably?) occur from time to time in complex systems
- Predicting the timing of a crisis is inherently difficult (impossible?)
- May be little relationship between the size, or even nature, of a triggering event and the magnitude of a subsequent crisis
- Some financial indicators may appear "strongest" when the financial system is at its most vulnerable point
- So, *what role for early warning indicators*?

Challenges to warning of crises: are we too rational to repeat mistakes?

- *If* individuals and societies learn perfectly from past mistakes, then new crises must be surprises, accidents, or shocks! We could not forecast crises using historical data.

- Warning indicators built using observed (reduced-form) relationship between indicator variables and the occurrence of crises may not be very useful (Lucas Critique). If indicators were perfect, crises wouldn't happen?

- Such a judgment is too strong, too harsh. Individuals and societies are perhaps not fully rational and do not recognize making the "same" mistakes

The Anna Karenina Principle (Tolstoy)

- "All happy families resemble one another, but each unhappy family is unhappy in its own way"
- Crises are like unhappy families
- Every crisis is perhaps unique in its causes, triggers and unique in its (observable) pre-crisis symptoms
- Can we exhaust all potential causes of crises and build models that are capable of warning of all crises?

Performance of early warning indicators

- Predicting crises is easier in hindsight. Difficult in real time.
  - Early warning indicators are much better at explaining what happened in the past (giving a "late" warning) than at predicting what will happen.
- Signals can be found, but they come with lots of noise.
- Results vary. Difficult to judge which indicators, model give the best signal (e.g., results differ by sample period)
- But this doesn't mean that we learn nothing from EWIs

Source: Box 6 "Predicting Crises" in *Monetary Policy and Financial Stability* (IMF, 2015)

How should early warning indicators be used, interpreted?

- Not to predict crises. Type I and Type II errors will be too common. Claiming much predictive power may lead to losing credibility.
- Use indicators to detect vulnerabilities that may lead to a "repeat" of crises similar to those of the past
- Use to help judge position in the financial cycle, as large movements in certain indicators may tell us when crisis probability is *changing* (rising). For high frequency monitoring of *changes* in risk
- To allow authorities to take policy actions to prevent, or to reduce severity of, crises with characteristics similar to those seen in the past
- But not to be used to give a false sense of security against future and unknown crises

Challenge: How can we be more forward-looking?

- To set up mechanisms and institutional frameworks to force key players to think through what could go badly wrong
- More attention and resources should be devoted to thinking the unthinkables, and to know the unknowns
- We need wisdom from the past, but also need imagination for the future
- Look for clues by "following the money"
  - Risks tend to accumulate in activities/entities where risk appetite rises and money/investment is pouring in
- Using stress tests, with imagination

Role of stress tests as tool for analysing (quantifying?) systemic risk

- Translate "crisis narratives" into quantitative shocks and macroeconomic scenarios

- Support assessment of systemic risk under particular, *conditional* macroeconomic scenarios:

  - Quantification of *systemic risk amplifiers*: i.e., potential (conditional) losses that an entity could suffer (in addition to losses incurred by its own risks) due to contagion suffered from other entities/markets in a period of high volatility in financial markets.
  - Understanding of contagion channels across entities/sectors; and how these might change under specific scenarios.

Cautions re: uses and interpretations of stress tests for systemic risk

- Not for (unconditional) forecasting; not for unconditionally quantifying overall risk of crisis
- Can give *conditional* forecasts that may provide insight useful for management of a future crisis
- Give valuable insight into the fault lines along which crises may deepen, crisis dynamics
- Caution: do not take too much comfort from the "implausibility" of the negative shocks considered in a stress test

Technical Challenges for Stress Tests as Guide to Systemic Risk

- Great progress in recent years. Many shortcomings are being addressed. Expanding to general equilibrium, allowing responses and feedbacks; incorporating liquidity as well as capital/solvency; expanding to non-banks; incorporating the international context.
- Challenges in incorporating contagion effects (indirect as well as direct), non-linear responses, dynamics that change in periods of stress. Incorporating "non-rational" behavior?
- Adding up individual bank results? Aggregation problem. Need knowledge of the "dependence structure" between individual balance sheets – this dependence tends to rise in periods of stress.
- Recognized challenges. New efforts continue

Institutional matters matter… thoughts on the roles of central banks

Comparative advantages of central banks

- CB analytical work already involves, for the purpose of monetary policy setting, analyzing and forming a view of the states of the economy and of the financial cycle.
  - CB work already requires focus on interactions between monetary and macro-prudential policies

- CB staff often trained in the analysis of systems (general equilibrium analysis, feedback loops, simultaneity), dynamic, forward-looking analysis

- Technical modelling capacity may be very advanced
- Joining the dots of individual risk assessments:
  - Quantification of amplification magnitude of systemic risk
  - Understanding the channels of contagion and how these might change due to structural changes in markets or due to shocks

Comparative advantages of central banks

- If CA is more independent, may be more able to resist possible pressures to understate risks; e.g., may be able to be bold and imaginative in scenario analysis
- CB's legal power to impose relevant data requirements which may support their analysis
- Market intelligence. CB already involved in markets, as participant
- Does the CB have more information and/or analytical power, to allow it to see risks that markets do not perceive, that others may underestimate?

The role of financial stability policy committees

- To brainstorm and sketch out adverse narratives
- To translate such narratives into macroeconomic scenarios
- To rank such scenarios in terms of plausibility, likelihood and severity of impact
- To communicate risks to financial stability based on scenario planning, their ranking, and impact. (Perhaps to induce corrective behaviour by market participants?)
- To implement policy mix to reduce risks of crisis (to reduce their probability and/or their severity)

Issues in communicating financial stability outlook and risks

- Advantages of communication: public understanding of need for risk assessment; accountability for quality of analysis; counter the messages of private agents who understate risks and lobby against mitigating policies; creating a constituency for financial stability, helping to avoid a "bias toward inaction" on risks
- But concerns: public may have unrealistic expectations for minimizing Type I and Type II errors; possibility of triggering excessive market reaction at a time of high stress or risk aversion; confidentiality
- Points to consider in communication policy:
  - Ensure that credible backstops are in place, and are well known
  - Avoid overselling analysis.

Concluding

- Complexity of financial systems and uniqueness of crises will keep it very difficult to build robust models that would allow us to accurately gauge overall vulnerability of financial system
- Early warning exercises and stress tests are part of the toolkit for stability analysis, and each type has strengths and weaknesses
- Recognizing imperfections of analysis, pursue multiple analyses. Challenge: communication of multiple results, messages.
- Central banks are uniquely positioned to think forward, to practice the art of scenario planning, and to quantify the impact of different scenarios
- Identifying systemic risk requires experience, judgment and imagination, as well as strong quantitative and modelling skills
- Continuing hard work – and continuing humility – are important

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Thank you