Transactions on Banking, Finance, and Leadership Informatics
"Volume 1, Issue 1, Year 2024"
website: https://www.c5k.com

Research Article

Systemic Risk and Financial Stability: Measurement and Policy Implications

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ARTICLE INFO

Article history:
02 Jul 2024 (Received)
08 Aug 2024 (Accepted)
15 Aug 2024 (Published Online)

Keywords:
European Systemic Risk Board, macroprudential policy, Procyclicality, financial stability, contagion mechanism.

ABSTRACT

The Basel Committee on Banking Supervision has initiated discussions on incorporating macroprudential policy into the financial stability toolkit. This has led to the creation of the European Systemic Risk Board (ESRB) and numerous initiatives to produce macroprudential regulations. The Czech Republic's financial stability concept, which has been applied since 2004, is a starting point for developing macroprudential policy. The macroprudential policy aims to prevent systemic risk from forming and spreading in the financial system, reducing the probability of financial crises with large real output losses for the entire economy. The Czech Republic is advised to prefer a relatively narrow macroprudential policy concept focused primarily on risks associated with the financial cycle and the cross-sectional dimension. A sophisticated operational framework linking individual dimensions and development phases of systemic risk with relevant indicators and instruments is essential for efficient and effective implementation of macroprudential policy.

DOI: https://doi.org/10.63471/tbfli24002

1. Introduction

The global financial crisis has prompted discussions on incorporating macroprudential policy into the international, European, and national financial stability toolkit. The European Systemic Risk Board (ESRB) has been established as the European authority for macroprudential oversight. Numerous initiatives have been established to produce macroprudential regulations, some already incorporated into Basel III proposals. The article aims to open a debate on the development of macroprudential policy in the Czech Republic, considering its financial market structure, existing monetary policy regime, and history of regulating and supervising financial institutions. The original macroprudential policy framework advocated by economists from the Bank for International Settlements (BIS) will be incorporated into this starting concept, supplemented by information from assessments of the causes of the latest global financial crisis (Frait & Komárková, 2010).

The article is structured into sections examining the objective of financial stability, defining macro-prudential policy and systemic risk, focusing on the time dimension of systemic risk, cross-sectional dimension, methods for identifying and assessing systemic risk, operational frameworks for macro-prudential and monetary policy, and individual macroprudential policy tools.

2. Literature review

A systematic study in Thailand shows that the systemic risk in the Thai banking sector is a significant concern, with individual banks imposing additional risk on the overall system. The concept of conditional value-at-risk (CoVaR) was used to quantify this risk, revealing that larger banks contribute more to systemic risk. However, size is not a dominant factor. The study also identifies balance-sheet factors determining financial linkage between banks, providing valuable insights for regulators and highlighting the need for further regulation in the Thai banking sector (Roengpitya & Rungcharoenkitkul, 2011). Another study suggests that Climate change may threaten financial stability, but its causes and consequences remain underexplored. Stress testing has emerged as a regulatory tool to address climate-related systemic financial risk. This article analyzes stress testing's role in mitigating climate change's effects on financial stability. It synthesizes multidisciplinary literature on climate-related financial

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Cite: Md Saddam Hosain, Md Abdullah Al Mahmud, Dr. Joseph P. Siegmund (2024). Systemic Risk and Financial Stability: Measurement and Policy Implications. *Transactions on Banking, Finance, and Leadership Informatics,* 1(1), pp. 8-11.

risk, financial stability, and stress testing, and applies it to comparative case studies of the Bank of England and US Federal Reserve. The study concludes that stress testing can support the measurement and management of both macroprudential and macroprudential climate-related financial risks, but its benefits are largely unrealized (DeMenno, 2023).

Again, the euro area banking sector has been exposed to systemic risk-taking due to both conventional and unconventional monetary policies. This has increased vulnerability through contagion and interconnectedness. Banks' balance sheets do not fully account for the transmission of risk-taking from micro to systemic. A persistently accommodative monetary policy may lead a monetary authority to consider a trade-off with financial stability. The coordination between monetary and macro-prudential policies is crucial for maintaining financial stability. The evidence on micro risk-taking is insufficient to indicate a threat to financial stability (Kabundi & De Simone, 2020).

3. Financial stability and macroprudential policy

The central bank community has a consensus that the financial stability objective is to achieve stability in the provision of financial services over the entire business cycle, supporting the economy in attaining maximum sustainable economic growth. The Central Bank of the Czech Republic (CNB) adopted a definition consistent with this current thinking in 2004. Financial stability is defined as a situation where the financial system operates with no serious failures or undesirable impacts on the present and future development of the economy as a whole, while showing a high degree of resilience to shocks. Fig. 1 shows tability states of the financial system.

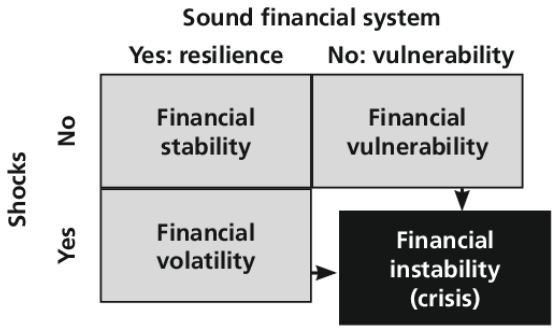

Fig. 1. Stability states of the financial system (Frait & Komárková, 2010).

The CNB's financial stability analyses are focused on determining whether weak spots are forming in the financial system that might reduce its resilience to shocks and whether conditions are being created in which the interaction of macroeconomic factors and policies, excessive household, corporate, government or financial institution debt, and financial market volatility could cause a financial crisis.

Macroprudential policy is the main element of financial stability policy, focusing on the stability of the system as a whole. It primarily monitors endogenous processes in which financial institutions can get into a situation of systemic instability through common behavior and mutual interaction. The object of macroprudential policy is systemic risk, which has two main dimensions: time dimension, which refers to the build-up of systemic risk over time, and cross-sectional dimension, which refers to the existence and distribution of systemic risk at any given moment in time Macroprudential policy can be defined as the application of a set of instruments that have the potential to reduce vulnerability and increase the resilience of the system by creating capital and liquidity buffers, limiting procyclicality in the behavior of the financial system, or by containing risks that individual financial institutions may create for the system as a whole.

4. Procyclicality, the financial cycle and systemic risk

The liberalization of financial markets since the 1990s has made economies susceptible to endogenous boom and bust cycles. In good times, financial institutions and clients can underestimate the risks associated with their economic decisions, or be exposed to strong incentives to take on bigger risks. A major incentive for such behavior is easier access to external financing, which is strongly dependent on current risk perceptions reflecting the currently high economic activity. If economic agents start to misconstrue temporary cyclical improvements in the economy as a long-term increase in productivity, virtuous cycles can develop, supported by increased willingness of households, firms, and government to accept a higher level of debt and use it to buy risky assets. Such cycles are common in converging economies, where it can be particularly difficult to distinguish between long-term productivity gains and cyclical improvements.

In the background of this cycle, financial imbalances grow and systemic risk builds up unobserved. This often shows up openly later on when economic weakening as a result of a negative stimulus. Recession subsequently sets in and the spiral turns around, with economic agents realizing their income has been rising at an unsustainably high rate, burdened with too much debt, and their asset holdings have fallen in value. This suggests that the main source of the time element of systemic risk is the financial cycle, and macroprudential policy must create incentives for financial institutions to behave less procyclically. Fig. 2 shows he financial cycle and the evolution of systemic risk .

5. The Financial Network and Risk Of Contagion

The financial crisis has highlighted the importance of tracking and assessing the links between financial institutions to ensure financial stability. The links

between individual financial institutions can act as channels through which shocks or contagion can propagate, making contagion at the center of systemic risk. Financial institutions are not usually capable of judging the effect their behavior will have on other institutions in the system and cannot defend themselves against the negative impacts of others' behavior. This means that if a financial institution is part of the financial network, it bears network risk, which it cannot effectively defend itself against or hedge against. Fig. 3 shows diagram of systemic risk contagion mechanism in financial credit .

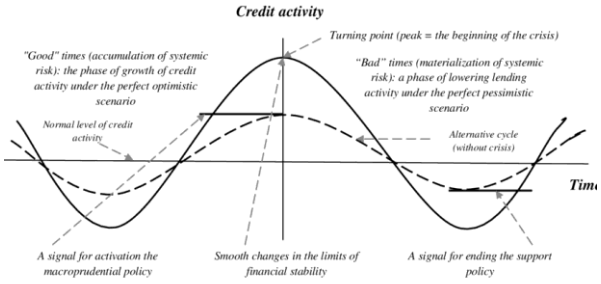

Fig. 2. The financial cycle and the evolution of systemic risk (Song et al., 2022).

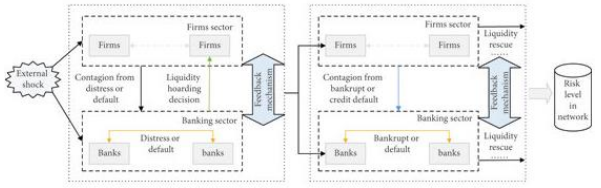

Fig. 3. Diagram of systemic risk contagion mechanism in financial credit (Karcheva et al., 2020).

Contagion channels can be divided into real and information channels. Real channels refer to the direct knock-on effects from a stressed institution to others through direct links, while information channels involve sudden and sometimes unexpected changes in economic agents' behavior. The current crisis has demonstrated that asymmetric information, leading to adverse selection, contributed significantly to the spread of the crisis.

Network analysis helps illustrate and track the intricate structure of linkages within a modern financial system. The importance of a key financial institution is measured by its interconnectedness with other financial institutions, and the systemic relevance of an institution can increase over time. Negative shocks propagate from the financial system to the real economy, affecting consumption, investment, economic growth, and overall wealth. The objective of macroprudential policy is to adopt measures to reduce the size or interconnectedness of systemically important nodes or make them more resilient to systemic shocks.

5.1. Systemic risk detection and assessment

Systemic risk is a significant issue in the financial system, often arising during a phase of increasing leverage due to easy access to cheap credit and over-optimistic expectations. This risk accumulates during a phase of materialization, where banks revise their view of credit, market, and liquidity risk, increase credit margins, and tighten lending conditions. The success of pursuing financial stability depends on authorities' ability to identify and assess the sources and evolution of systemic risk over the financial cycle. The Czech Republic's small and open economy faces significant risk sources due to its links with the external environment. The Central Bank of the Czech Republic emphasizes vulnerabilities resulting from internal and external macroeconomic imbalances and negative international positions of the financial sector. To assess systemic risk, authorities must reach a consensus on normal or sustainable values of relevant indicators and continuously assess deviations from normal levels.

5.2. Operational macropudential policy

Macroprudential tools play a crucial role in the implementation of macroprudential policy, which requires a sophisticated operational framework similar to that used in flexible inflation targeting. These tools should be accompanied by sophisticated communication and should be used in conjunction with monetary policy to protect against financial imbalances. The main intermediate target of macroprudential policy is to increase the financial system's resilience by creating buffers and reducing the amplitude of the financial cycle. However, their individual effect on the financial cycle is limited. A combination of macroprudential tools and microprudentially applied microprudential instruments can help eliminate manifest excesses over the financial cycle and enhance risk management in individual institutions. Despite the higher degree of uncertainty and lower level of accuracy, macroprudential policy can have a longer and more variable reaction horizon due to the multi-dimensional nature of the financial stability objective and the longer length of the financial cycle. Fig. 4 shows framework for macroprudential analysis .

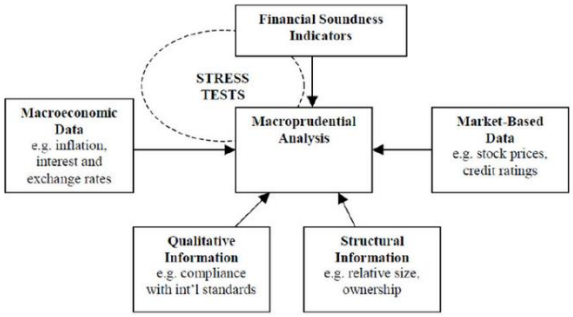

Fig. 4. Framework for Macroprudential Analysis (Siregar et al., 2011).

5.3. Systemic risk prevention and impact mutation

Macroprudential policy is a crucial tool for financial institutions to prevent or mitigate systemic risk. It involves two development phases and two dimensions of systemic risk: systemic risk materialization and accumulation. In the systemic risk materialization phase, macroprudential policy priorities include preventing instability, reducing panic adjustment by financial institutions, and mitigating the negative impacts of significantly worse conditions. In a systemic crisis, monetary policy instruments and regulatory and supervisory measures can become macroprudential in nature, acting via built-in stabilizers or crisis management tools. Active communication with financial markets and the public, including disclosure of stress tests results, is also important. There is not a complete consensus on what tools can be considered macroprudential policy tools, but true macroprudential tools should limit the procyclicality of the financial system or the risky behavior of individual institutions.

6. Conclusion

The macroprudential policy framework aims to prevent systemic risk from forming and spreading in the financial system, reducing the probability of financial crises with large real output losses for the entire economy. The policy should act primarily preventively against signs of financial instability in the future and mitigate their impacts if prevention fails. The two main tasks reflect the evolution of systemic risk: accumulation and mitigation. Using forward-looking indicators, the policy should catch the moment when systemic risk starts to accumulate, identify the point at which the tolerable limit for systemic risk has been exceeded, and activate macroprudential tools. If prevention fails, it will be necessary to declare a financial instability event, assess the potential scale and seriousness of the crisis, and recommend appropriate anti-crisis tools. A trigger mechanism for the use of tools in the risk inception and manifestation phase is crucial for implementing the policy.

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