

Designing effective macroprudential policy

Evidence from agent-based models

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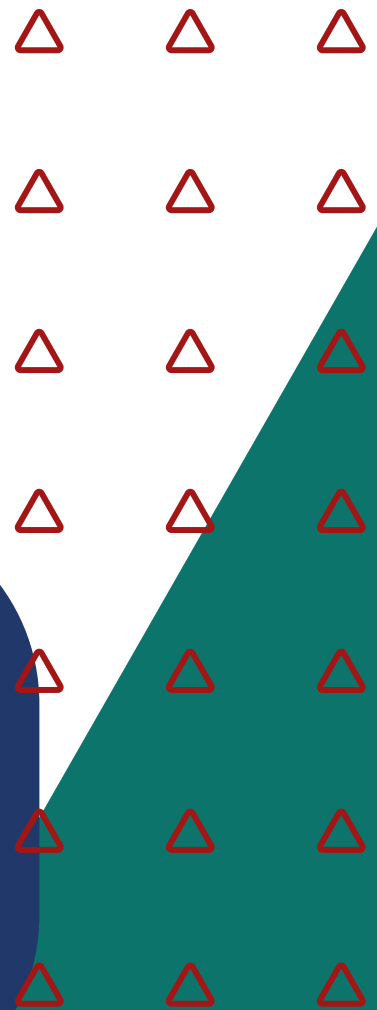
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As economies confront mounting challenges from the climate crisis, credit cycles and rising household debt, policymakers must craft effective regulations to safeguard financial stability. Our research – using innovative agent-based models, which simulate the interactions of individuals to understand how economic systems behave – shows that combining borrower protections with bank capital requirements, not only strengthens financial stability, but actually helps economies grow.

**Computational and Quantitative Methods (CQM)
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Effective policies relating to the whole financial system, not just individual institutions or sectors, are essential for ensuring financial stability and preventing crises. The effectiveness of these macroprudential policies depends on how they are designed and used together. In this briefing, we share new research insights that help address the limited understanding of how different macroprudential policies work together and their impact on financial stability, credit and the economy.

Research overview

Our research uses findings from advanced computer simulations developed with researchers in the central banks of England and Spain. These models simulate the behaviour and interactions of diverse economic actors, such as households, firms and banks, to explore complex system dynamics – providing a space to test how combinations of macroprudential policies can enhance financial stability.

Our **agent-based models (ABMs)** are calibrated and validated using UK data (Wealth and Assets Survey, Financial Conduct Authority, Office for National Statistics and the Bank of England), and uniquely capture housing-credit feedback loops and effects across different households.

Key recommendations for central banks, financial regulators and economic policymakers

1

Use policy tools in combination:

Design policies that combine borrower- and lender-based regulatory instruments together for greater effectiveness

2

Incorporate flexibility:

Embed flexibility into prudential tools such as capital and liquidity requirements to avoid amplifying downturns and to counter the effects of an economic cycle

3

Assess how policies affect different groups:

Assess who benefits or is limited by macroprudential policies, such as forcing banks to hold more capital, to avoid unintended inequalities

4

Coordinate macroprudential and monetary policy:

Align macroprudential and monetary policy objectives and timing to maximise their impact on stability and growth, and avoid sending conflicting signals

5

Adopt ABMs for testing policy:

ABMs replicate the complex dynamics of an economy in a virtual laboratory. Use them to simulate real-world dynamics to inform better policy



ABMs are highly flexible in both scenario exploration and model adaption. First, their ability to simulate countless what-if scenarios allows researchers to explore a wide range of potential outcomes under different assumptions. Second, it is relatively easy to modify to new information or structural shifts in the economy.”

– Arzu Uluc, Economist, Bank of England

Following the economic crash of 2008, governments and central banks have focused on developing macroeconomic policies designed to prevent a similar crisis. However, understanding how macroprudential policies work together and their potential impacts is challenging for policymakers.



ABMs offer valuable guidance

Appropriately designed ABMs can help policymakers, providing a data-driven laboratory for realistic policy analysis. By modelling individual agents and their interactions within complex systems, **ABMs can help policymakers to identify imbalances and design appropriate policies** through:

- Realistic scenario testing
- Evaluating policy coordination and optimisation
- Financial risk assessment

ABMs can be used to model economic risks from climate transition policies, such as risks that once-valuable assets become worthless or from unintended consequences of green credit policies.



Our analysis in the UK

We used a bespoke ABM to study the impact of macroeconomic policies on the UK housing market, credit markets and the wider economy. Our analysis uses detailed data on UK household mortgages and spending, and replicates policies implemented by the Bank of England after 2014, enabling us to test realistic combinations of policies.

Key findings



Policy combinations outperform single tools: Combining borrower-based regulations (e.g. loan-to-income, loan-to-value caps) with lender-based regulations (e.g. counter-cyclical capital buffers, liquidity coverage ratios) can significantly reduce risks in the financial system.



Macroprudential tools can have uneven impacts: Policies affect households and sectors differently, leading to unintended inequalities. For instance, our research showed tightening loan-to-income caps may disproportionately limit first-time buyers, while benefitting landlords who rely on capital financing.



Policy coordination boosts impact: The impact of macroprudential policies is increased when they are coordinated with monetary policies, such as interest rates, improving financial stability and economic outcomes.



Timing and design are critical: Financial tools designed to promote stability, such as liquidity ratios for banks, can increase financial instability unless they are designed with counter-cyclical features.

Contrary to concerns that tighter regulations hurt the economy, our research suggests combinations of macroeconomic policy may boost GDP and employment by shifting resources from housing to more productive sectors. **View the [infographic](#) illustrating the design of our agent-based model.**



ABMs can help policymakers to identify imbalances in the system and design appropriate policies to address these. This matters because economies are facing heightened risks – from climate shocks to geopolitical tensions and debt overhangs – while traditional macroeconomic tools are proving insufficient. Strengthening macroprudential policy design is essential to prevent the next crisis and ensure an inclusive, sustainable recovery.”

– Dr Lilit Popoyan

Underpinning research

- Bardoscia, M., Carro, A., Hinterschweiger, M., Napoletano, M., Popoyan, L., Roventini, A., & Uluc, A. (2025). The impact of prudential regulation on the UK housing market and economy: Insights from an agent-based model. *Journal of Economic Behavior & Organization*, 229, 106839.
- Popoyan, L., Napoletano, M., & Roventini, A. (2017). Taming macroeconomic instability: Monetary and macro-prudential policy interactions in an agent-based model. *Journal of Economic Behavior & Organization*, 134, 117-140.
- Popoyan, L., Napoletano, M., & Roventini, A. (2020). Winter is possibly not coming: Mitigating financial instability in an agent-based model with interbank market. *Journal of Economic Dynamics and Control*, 117, 103937.



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Lilit Popoyan's research focuses on policy-relevant quantitative analysis at the intersection of macroeconomic policy, financial regulation, financial stability, sustainable finance and climate change, production networks and macroeconomic dynamics. Lilit has a PhD in Economics from the Sant'Anna School of Advanced Studies in Pisa, Italy. Before joining QMUL, she was an Assistant Professor in Economic Policy at the University of Naples Parthenope. She is an Associate Editor of the *Journal of Economic Interaction and Coordination* and leads the ABM and Networks research stream in the Computational and Quantitative Methods (CQM) research cluster at QMUL.

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