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A theoretical foundation for prudential authorities' decision-making

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In the aftermath of the Global Financial Crisis, financial regulation uses micro and macroprudential rules based on fixed capital requirements ratios, most of the time motivated by empirical studies. This research, based on Badarau and Roussel (2022), provides a theoretical explanation for time-varying countercyclical capital requirements that incorporates micro- and macro-prudential stabilization objectives. We suggest that the Capital Adequacy Ratio (CAR) imposed to individual banks by a Prudential Authority (PA) should be an optimal regulation that avoids individual and systemic risk accumulation by imposing minimal constraints to financial institutions. We find an optimal time-varying prudential rule, with non-linear structure, that allows PAs to take progressive countercyclical actions in order to ensure financial stability. We also test the mechanism in a DSGE model and show that it would be more suitable for the financial and real stability compared to the existing fixed prudential ratios.

The Global Financial Crisis of 2008 shed light on important issues from the financial regulation perspective. Microprudential policies have not been sufficient to manage financial risk. The risk-taking behavior of banks can generate systemic risk accumulation and the occurrence of financial crisis. To deal with these aspects, Basel committee has decided to implement specific macroprudential tools in Basel III agreements. We note here the additional capital buffers, as the capital conservation buffer and, even more relevant, the countercyclical capital buffer. As defined by the European System of Financial Supervision, the capital conservation buffer represents additional 2.5% capital requirements whose objective is to conserve banks' capital and thus limit financial instability. The countercyclical capital buffer is an additional flexible buffer that depends on the financial cycle, designed to counter pro-cyclicality in

the financial institutions' activity. Capital is supposed to accumulate when systemic risk increases and creates buffers to increase the resilience of the banking sector during periods when losses materialize. This could help to maintain the credit supply in periods of stress and dampen excessive credit growth during financial booms.
The implementation of these two additional buffers adjusts the original microprudential capital requirements or capital ratio (CAR) by taking into account macroeconomic issues and the financial cycle. Cosimano and Hakura (2011), Lim et al.(2011), Kashyap et al. (2011), Agenor and Da Silva (2017) or Hassine and Rebei (2019) empirically analyze the benefits of such macroprudential tools for the financial stability and find that their efficiency differ across countries and across financial boom or bust periods.

However, to the best of our knowledge, there is no theoretical justification in the literature for the capital requirements ratios chosen by regulators. To explain them, prudential regulators try to take up the challenge with empirical exercises such as stress tests for macroprudential requirements (Acharya et al., 2014) or statistical assumptions for microprudential requirements (Risk Weighted Asset follows a Gaussian law). But what are the theoretical intuitions behind Basel prudential ratios? Are prudential regulators right to discretionary apply positive capital buffers over the existing fixed prudential ratios instead of defining time-varying capital requirements? What are the criteria to be used for optimizing the prudential regulation? In our research, we address such questions, in an original way, by using a DSGE (Dynamic Stochastic General Equilibrium) framework. The seminar work that uses the DSGE framework to analyze the impact of macroprudential policies on the real and financial variables is Gerali et al. (2010). They consider monopolistic competition among financial intermediaries and use a prudential regulation based on fixed capital ratios (including the conservation capital buffer). The prudential constraint simply introduces a quadratic cost in the banks' profit function, which depends on the spread between the current Capital Adequacy Ratio (CAR) of the bank and the expected 10.5% level defined by Basel III. Each deviation of banks' capital from the fixed CAR imposed by the regulator is costly and these costs constrain banks to follow the regulation. Their model is estimated on European data and show how a prudential regulation based on fixed capital buffer would have contributed to regulate the financial system during the 2007–2009 financial crisis. Poutineau and Vermandel (2017) introduce time-varying capital requirements that depend on the dynamics of the credit/GDP ratio in the economy and converges to a constant 10% level in the long-term. But nor Gerali et al. (2010) neither Poutineau and Vermandel (2017) provide theoretical foundations for the suitable 10.5% or 10% long term level.

Instead of making capital requirements depend on an external financial stability indicator such as Credits to GDP ratio after a financial shock, we suggest an endogenous countercyclical prudential regulation given by a progressive, non-linear and convergent process for capital requirements towards a 10.5% long-run optimal level (steady-state level). For us, this theoretical long-run optimal level would correspond to the minimal constraints imposed on the activity of financial institutions, in the absence of any tension on the financial market. We implement this prudential mechanism in the Gerali et al. (2010) benchmark model and compare the stabilization performances of our endogenous time-varying countercyclical prudential rule to the original fixed-capital regulation.

Figure 1 hereafter resumes the main results of the analysis conducted in the context of the 2007-2009 financial crisis.

We calibrate the model by following the median values of the estimation provided by Gerali et al. (2010) for the euro area and we simulate an exogenous and unexpected 5% destruction of bank capital as a starting point for a financial crisis. In a first scenario, the PA fixes a CAR of 10.5%, while, in the second scenario, it chooses to follow the policy rule proposed in our paper with time-varying capital requirements. We do not propose a quantitative experiment, but only focus on the qualitative results of the experiment in order to understand how the transmission of the shock depends on prudential policy. In Figure 1, the impulse response functions are represented in red dotted line for the baseline fixed prudential regulation scenario and in black continuous line when our particular countercyclical prudential rule is implemented.

The baseline scenario is very useful to understand how a financial shock (a negative bank capital shock) can affect the real economy. The transmission channel in our analysis is the same as in Gerali et al. (2010). After the shock, the assets-to-capital ratio of banks goes up. Their capital-to-assets ratio decreases. This implies a deviation from the 10.5% level of PA requirements, which is costly for banks. In order to rebalance their assets and liabilities, banks increase lending rates, but this reduces the demand for credit and therefore investment. The demand for capital weakens and the use of capital increases. The price of capital falls and it becomes less useful as collateral. Financial conditions are becoming even more restrictive for firms, with negative impact on investment and output. The financial shock finally affects the aggregate supply. To produce, firms increase labor demand, wages increase also and allow for higher consumption that limit the output fall. Given the wages dynamics and the higher financing costs, inflation increases. The central bank slightly increases the policy rate to stabilize inflation. Comparatively to this baseline situation (fixed prudential regulation), we can easily observe that the negative impact of the shock on the real economy is much more limited when the prudential regulation follows our countercyclical prudential rule. This is so because the PA reacts to the shock by temporarily reducing capital requirements.

The countercyclical nature of the theoretical rule that we propose is more than evident if we look to the dynamics of the Credit-to-GDP. Following a shock that negatively affect the Credit-to-GDP ratio, the temporary release of the CAR in the theoretical rule allows for a better stabilization of the financial cycle. This will also conduct to a better stabilization of the real business cycle. Indeed, the deviation of the banks' capital ratio from the new lower capital requirements is less important than in the baseline scenario and the costs imposed by this deviation for banks is lower. The rebalancing of their assets and liabilities implies lower increase of loan rates for all economic agents (households and entrepreneurs). The financial market provides more loans to the real economy compared to the baseline scenario. Firms' investment decreases less, as well as the housing investment of households. Housing and capital prices also decrease less, they keep more value and are relatively more useful as collateral. Stimulated by the higher demand, labor demand is even higher, wages increase more and the dynamics of consumption limit even more the output loss. The central bank interest rate increases more to stabilize inflation, but the cost of credits in the economy is lower thanks to the prudential regulation.

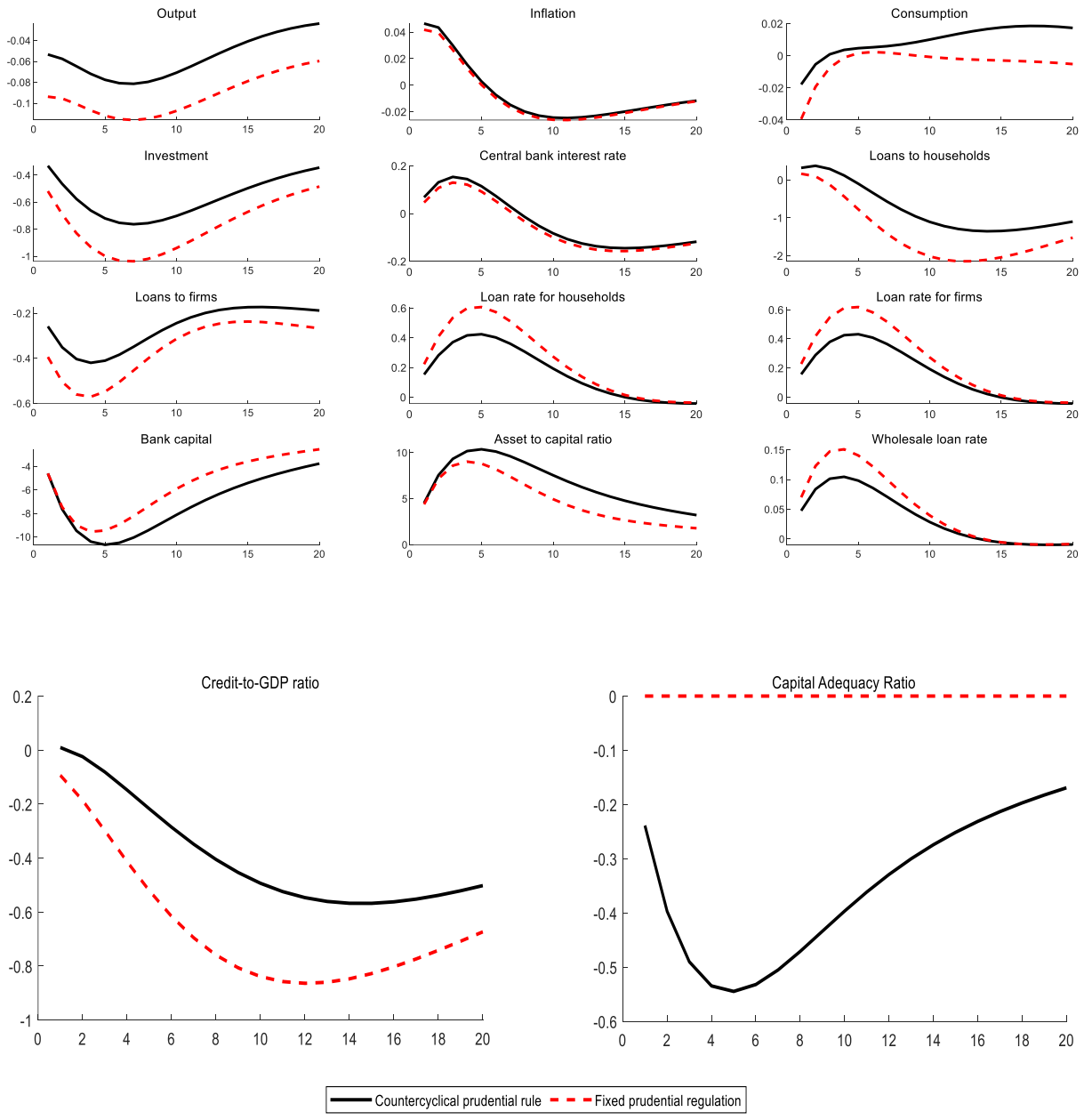

Figure 1. Countercyclical time-varying regulation and economic dynamics after a negative bank capital shock

Implications

We propose a new time-varying non-linear prudential rule that performs better in terms of financial and economic stability than the current fixed-capital rules, being able to simultaneously respond to micro- and macro-prudential stabilization objectives. It presents an implicit counter-cyclical dimension, is based in theoretical foundations and is easy to implement in DSGE models designed for the study of the prudential regulation. This prudential rule respects the main constraints defined by Basel regulation. It supports the stability of the financial system and increases the resilience of credit institutions. Its implementation is not more complicated than for a monetary policy rule and it would be perfectly in line with the definition and the transparency principle for banking regulation and supervision. The implementation of a time-varying non-linear CAR rule such as suggested in this paper may be a solution to simplify the prudential regulation implementation and improve its transparency.

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