Macroprudential and monetary policies: Implications for financial stability and welfare

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ABSTRACT

In this paper, we analyze the implications of macroprudential and monetary policies for business cycles, welfare, and financial stability. We consider a dynamic stochastic general equilibrium (DSGE) model with housing and collateral constraints. A macroprudential rule for the loan-to-value ratio (LTV), which responds to credit growth, interacts with a traditional Taylor rule for monetary policy. We compute the optimal parameters of these rules both when monetary and macroprudential policies act in a coordinated and in a non-coordinated way. We find that both policies acting together unambiguously improves the stability of the system. In both cases, this interaction is welfare improving for the society, especially in the case of the non-coordinated game. There is though a trade-off between borrowers and savers. However, borrowers can compensate the saver's welfare loss *à la* Kaldor–Hicks to achieve a Pareto-superior outcome.

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"Normally, however, the policy rate is not the only available tool, and much better instruments are available for achieving and maintaining financial stability. Monetary policy should be the last line of defence of financial stability, not the first line." Svensson (2012)

1. Introduction

The housing sector is key to understand how the recent financial crisis developed and, therefore, crucial for designing recovery and prevention policies. The financial crisis was born in the housing sector, grew in the financial sector and had its final consequences in the real sector. Financial innovations made the financial system increasingly complex and interconnected, leading to an expansion of systemic risk, especially through the mortgage market. In this context, when house prices collapsed, micro-prudential policies, those dedicated to prevent the risk from each company, had not managed to avoid the contagion to the real sector, and the crisis spread across the financial system to the real economy. Then, a great recession affected the whole economy, causing a high level of unemployment. Thus, from a policy perspective, traditional measures have not seemed to be sufficient to, first, avoid the crisis and, second, have a fast and effective recovery.

As a result, several institutions have implemented macroprudential tools in order to explicitly promote the stability of the financial system in a global sense, not just focusing on individual companies. The goal of this kind of regulation is to avoid the transmission of financial shocks to the broader economy. Some examples of macroprudential tools are asset-side tools (loan-to-value (LTV) and debt-to-income ratio caps), liquidity-based tools (countercyclical liquidity requirements), or capital-based tools (countercyclical capital buffers, sectorial capital requirements or dynamic provisions).

The LTV requirement is a limit on the value of a loan relative to the underlying collateral (e.g. residential property). Several studies have pointed out that higher LTV ratios combined with higher risk mortgages contributed to the mortgage crisis.[1] The LTV is nowa-

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[1] See, for instance, Abraham et al. (2008) and Duca et al. (2011).

days described as one of the main macroprudential instruments to "mitigate and prevent excessive credit growth and leverage" by the European Systemic Risk Board.[2] Within the EU, LTV limits are available in the national prudential framework of 16 Member States.[3]

The aim of this paper is to evaluate the implications of a macroprudential LTV tool for business cycles, financial stability, and welfare, as well as its interaction with monetary policy. In order to do that, we use a dynamic stochastic general equilibrium (DSGE) model which features a housing market.

The modelling framework consists of an economy composed of borrowers and savers. In particular, our model imposes a limit on borrowing, that is, loans need to be collateralized by a proportion of the value of the assets that the borrower owns. This proportion can be interpreted as an LTV. The macroprudential tool we propose is a rule that automatically reduces loan-to-values when there is a credit boom, therefore limiting the expansion of credit. We assume that there exists a macroprudential Taylor-type rule for the LTV ratio, so that it responds to credit growth, in the spirit of the Basel III regulation which aims at avoiding episodes of excessive credit growth. The monetary policy literature has extensively shown that simple rules result in a good performance; therefore, it seems sensible to apply these kinds of rules to macroprudential supervision. This microfounded general equilibrium model allows us to explore all the interrelations that appear between the real economy and the credit market. Furthermore, such a model can deal with welfare-related issues.

In the context of this model, we address several research questions. First, we study the welfare gain for each agent and for the aggregate both for different levels of a static LTV and for different values of the reaction parameters of the macroprudential rule. In this way, we discuss the welfare trade-offs that may appear between borrowers and savers. Second, we analyze the combination of monetary and macroprudential policy parameters that maximize welfare when the macroprudential regulator and the central bank are coordinated and when they are not. Third, we discuss a Pareto-superior outcome to overcome this trade-off by a system of transfers à la Kaldor–Hicks. Then, we study the dynamics of the model under the optimal parameters. Finally, we graphically convey our results to highlight the effects on macroeconomic and financial stability of introducing a new macroprudential policy based on the LTV ratio.

The rest of the paper continues as follows: Section 1.1 reviews the literature. Section 2 describes the model. Section 3 presents the welfare analysis. Section 4 computes the optimal parameter combination of the different policies in a coordinated and in a non-coordinated situation. It also develops a rule to obtain a Pareto-superior outcome, presents results from simulations, and conveys the results graphically to show the effects of the macroprudential policy on financial and macroeconomic stability. Section 5 concludes.

1.1. Related literature

Our paper fits into the literature that introduces a macroprudential rule and studies its effects using a DSGE model. Other examples are, for instance, Antipa et al. (2010), who uses a DSGE model to show that macroprudential policies would have been effective in smoothing the past credit cycle and in reducing the intensity of the recession. Another example is Borio and Shim (2007), which emphasizes the complementary role of macroprudential policy to monetary policy and its supportive function as a built-in stabilizer. As well, N'Diaye (2009) shows that monetary policy can be supported by countercyclical prudential regulation. Angelini et al. (2012) uses a DSGE model with a banking sector and shows interactions between capital requirement ratios as a macroprudential tool and monetary policy; they find that macroprudential policies are most helpful to counter financial shocks that lead the credit and asset price booms. We find in our paper that macroprudential policies moderate credit booms. Furthermore, for housing demand shocks, the combination of the macroprudential and the monetary policies manages to control credit without moderating the real effects of the boom.

Since there is an extensive consensus that the origin of the last crisis is related to real estate booms and busts, we have focused on the effects of a macroprudential tool that has to do with the housing sector. However, while most papers in the field tend to analyze macroprudential policies through the lens of a countercyclical bank leverage rule (e.g. Angelini et al., 2012; Christensen et al, 2011), in our paper, we study how a key element of the real estate sector, namely the LTV, can serve as a macroprudential tool to improve financial stability.[4] With a macroprudential orientation, Kannan et al. (2012) also examines a monetary policy rule that reacts to prices, output and changes in collateral values with a macroprudential instrument based on the LTV; they remark on the importance of identifying the source of the shock of the housing price boom when assessing policy optimality. Funke and Paetz (2012) considerers a non-linear version of a macroprudential rule for the LTV. Following this literature, we propose a macroprudential policy based on a Taylor-type automatic rule.[5] By analogy with monetary policy, rule-based macroprudential tools – for example, automatic stabilizers – appear appealing (Goodhart, 2004).

One question that arises from the topic is what the objective of the macroprudential authority should be. In recent years, research on macroprudential issues has been wide and intense[6] and there is an increasing consensus among academics and policy makers that "the ultimate objective of macroprudential policy is to contribute to the safeguard of the stability of the financial system as a whole" (Recommendation of the European Systemic Risk Board, 2013). In this way, Almeida et al. (2006) has studied the effect on the amplitude of the credit cycle results from the mitigating impact of more stringent LTV ratios on the 'financial accelerator' mechanism. They find that when a positive income shock leads to an increase in housing prices, the increase in borrowing is expected to be lower in countries with lower LTV ratios. Gelain et al. (2013) evaluates different policy actions that might be used to dampen the resulting excess volatility, including a direct response to house-price growth or credit growth in the central bank's interest rate rule, the imposition of a more restrictive loan-to-value ratio, and the use of a modified collateral constraint that takes into account the borrower's wage income. We contribute to this line of research, finding that when we use the macroprudential policy based on the LTV, both the macroeconomy and the financial system become more stable. To illustrate that, we construct policy frontiers (Taylor curves) including not only the traditional objectives of monetary policy but also the objective of the macroprudential regulator: financial stability. As a measure of financial stability we propose the variability of borrowing. This three-dimensional policy frontier shows graphically that the macroprudential policy unambiguously helps to achieve a more stable financial and macroeconomic situation.

A central issue that we cover in our paper is the interaction between monetary and macroprudential policies. There is no consensus on whether both policies should act in a coordinated or in a

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[2] See Recommendation of the European Systemic Risk Board (2013).
[3] More world results are available in Lim et al. (2011).

[4] Borio et al. (2001) also evaluated limits on the LTV.
[5] See Borio and Shim (2007) for a distinction between rules and discretion in calibrating the tools of macroprudential policy.
[6] See Galati and Moessner (2013) for an extensive review.