CFCM

CENTRE FOR FINANCE AND CREDIT MARKETS

Working Paper 13/04

Macroprudential and Monetary Policies: Implications for Financial Stability and Welfare

Margarita Rubio and José A Carrasco-Gallego

Produced By:

Centre for Finance and Credit Markets
School of Economics
Sir Clive Granger Building
University of Nottingham
University Park
Nottingham
NG7 2RD

Tel: +44(0) 115 951 5619
Fax: +44(0) 115 951 4159
enquiries@cfcm.org.uk

Macroprudential and Monetary Policies: Implications for Financial Stability and Welfare

Margarita Rubio*
University of Nottingham

José A. Carrasco-Gallego†
University of Nottingham and U. Rey Juan Carlos

August 2013

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 on the loan-to-value ratio (LTV), which responds to output and house price deviations, interacts with a traditional Taylor rule for monetary policy. From a positive perspective, introducing a macroprudential tool mitigates the effects of booms in the economy by restricting credit. However, monetary and macroprudential policies may enter in conflict when shocks come from the supply-side of the economy. From a normative point of view, results show that the introduction of this macroprudential measure is welfare improving. Then, we calculate the combination of policy parameters that maximizes welfare and find that the optimal LTV rule should respond relatively more aggressively to house prices than to output deviations. Finally, we study the efficiency of the policy mix. We propose a tool that includes not only the variability of output and inflation but also the variability of borrowing, to capture the effects of policies on financial stability: a three-dimensional policy frontier (3DPF). We find that both policies acting together unambiguously improves the stability of the system.

Keywords: Macroprudential, monetary policy, welfare, financial stability, three-dimensional policy frontier, loan-to-value, Taylor curve

JEL Classification: E32, E44, E58

*University of Nottingham, Sir Clive Granger Building, University Park, Nottingham, NG7 2RD, UK. E-mail: margarita.rubio@nottingham.ac.uk.

†Universidad Rey Juan Carlos, Madrid, Spain. E-mail: jose.carrasco@urjc.es. We would like to thank the discussants and participants of the IREBS Conference 2012, Dynare Conference, ReCapNet Conference, CEUS Workshop 2013, and the IFABS Conference 2013, as well as the seminar participants at the Bank of England, the Central Bank of Luxembourg, and the University of Nottingham. Special thanks to Matteo Iacoviello, John Duca, and Carlos Thomas.

"*Highly leveraged or financially fragile households and businesses are less able to withstand adverse changes in income or wealth, including those brought about by deteriorating conditions in financial and credit markets*". Chairman Ben S. Bernanke at the 49th Annual Conference on Bank Structure and Competition sponsored by the Federal Reserve Bank of Chicago, Chicago, Illinois, May 10, 2013

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, driving 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 would be 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, sectoral capital requirements or dynamic provisions).

In this paper we evaluate the implications of macroprudential policies for business cycles, financial stability, and welfare. 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 by 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 a loan-to-value. The macroprudential tool we propose is a rule that automatically increases loan-to-values when there is a boom, therefore limiting the expansion of credit. The monetary policy literature has extensively shown that simple rules result in a good performance; therefore it seems sensible to apply this kind 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 questions.

Our paper is related to the strand of research that, following Iacoviello (2005), introduces a rule on the LTV interacting with monetary policy. For instance, Borio and Shim (2007) emphasizes the complementary role of macroprudential policy to the monetary policy and its supportive role as a built-in stabilizer. As well, N'Diaye (2009) shows that monetary policy can be supported by countercyclical prudential regulation. Angelini, Neri and Panetta (2012) shows interactions between LTV and capital requirements ratios and monetary policies; they find that the macroprudential policies are most helpful to counter financial shocks that lead the credit and asset price booms. In a similar way, Kannan, Rabanal and Scott (2012) 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 the importance of identifying the source of the shock of the housing or price boom when assessing policy optimality.

From a positive perspective, we simulate impulse responses for both supply and demand-side shocks. We find that when the LTV rule operates in the economy, booms are moderated because a tighter limit on credit is set. Interestingly, we observe that the macroprudential policy could enter in conflict with monetary policy. When output and inflation vary in the same direction (demand shocks), there is no conflict between monetary and macroprudential policies because both react expanding or contracting credit, depending on the case. However, if output and inflation change in opposite directions (supply shocks), there is a conflict between both policies. The reason is that monetary policy reacts to inflation whilst the LTV rule evolves depending on output and house prices.

Then, we perform a normative analysis. We obtain that, unambiguously, when monetary policy and a rule for the LTV ratio interact, the introduction of this macroprudential measure is welfare enhancing. We also compute the optimal policy mix, that is, we find the combination of parameters for both rules that maximizes welfare. We find that the LTV rule should respond relatively more aggressively to house prices than to output.

Finally, we construct policy frontiers (Taylor curves) to evaluate both policies. Interestingly, we find that the traditional policy frontier which shows the inflation and output variability trade-off indicates that monetary and macroprudential policies acting together deliver a less efficient scenario than monetary policy acting alone. However, the traditional analysis does not take into account financial stability. As a measure of financial stability we propose the variability of borrowing. We show that if we substitute the output variability by the borrowing variability in the Taylor curve results are reversed, that is, the economy is more stable with macroprudential policies. In order to solve the ambiguity of those results, we propose a three-dimensional policy frontier (3DPF) as a new tool to evaluate the stability of the economy. This 3DPF includes the variability of output, the variability of inflation and the variability of borrowing. With this tool, results indicate that the macroprudential policy unambiguously helps to achieve a more stable financial situation.

The rest of the paper continues as follows: Section 2 describes the model. Section 3 presents results from simulations. Section 4 presents the welfare analysis and the optimal parameter combination of the different policies. Section 5 studies the financial stability. Section 6 concludes.

2 Model Setup

The economy features patient and impatient households, a final goods firm, and a central bank which conducts monetary policy. Households work and consume both consumption goods and housing. Patient and impatient households are savers and borrowers, respectively. Borrowers are credit constrained and need collateral to obtain loans. The representative firm converts household labor into the final good. The central bank follows a Taylor rule for the setting of interest rates. The macroprudential authority sets the LTV following a Taylor-type rule.

2.1 Savers

Savers maximize their utility function by choosing consumption, housing and labor hours:

$$\max_{C_{s,t},H_{s,t},N_{s,t}} E_0 \sum_{t=0}^{\infty} \beta_s^t \left[\log C_{s,t} + j_t \log H_{s,t} - \frac{(N_{s,t})^{\eta}}{\eta} \right],$$

where $\beta_s \in (0,1)$ is the patient discount factor, E_0 is the expectation operator and $C_{s,t}$, $H_{s,t}$ and $N_{s,t}$ represent consumption at time t, the housing stock and working hours, respectively. $1/(\eta - 1)$ is the labor supply elasticity, $\eta > 0$. j_t represents the weight of housing in the utility function. We assume that $\log(j_t) = \log(j) + u_{Jt}$, where u_{Jt} follows an autoregressive process. A shock to j_t represents a shock to the marginal utility of housing. These shocks directly affect housing demand and therefore can be interpreted as a proxy for exogenous disturbances to house prices.

Subject to the budget constraint:

$$C_{s,t} + b_t + q_t \left(H_{s,t} - H_{s,t-1}\right) = \frac{R_{t-1} b_{t-1}}{\pi_t} + w_{s,t} N_{s,t} + F_t, \tag{1}$$

where b_t denotes bank deposits, R_t is the gross return from deposits, q_t is the price of housing in units of consumption, and $w_{s,t}$ is the real wage rate. F_t are lump-sum profits received from the firms. The first order conditions for this optimization problem are as follows:

$$\frac{1}{C_{s,t}} = \beta_s E_t \left(\frac{R_t}{\pi_{t+1} C_{s,t+1}} \right), \tag{2}$$

$$w_t^s = \left(N_{s,t}\right)^{\eta-1} C_{s,t}, \tag{3}$$

$$\frac{j_t}{H_{s,t}} = \frac{1}{C_{s,t}} q_t - \beta_s E_t \frac{1}{C_{s,t+1}} q_{t+1}. \tag{4}$$

Equation (2) is the Euler equation, the intertemporal condition for consumption. Equation (4) represents the intertemporal condition for housing, in which, at the margin, benefits for consuming housing equate costs in terms of consumption. Equation (3) is the labor-supply condition.

2.2 Borrowers

Borrowers solve:

$$\max_{C_{b,t}, H_{b,t}, N_{b,t}} E_0 \sum_{t=0}^{\infty} \beta_b^t \left[\log C_{b,t} + j_t \log H_{b,t} - \frac{\left(N_{b,t}\right)^{\eta}}{\eta} \right],$$

where $\beta_b \in (0,1)$ is impatient discount factor, subject to the budget constraint and the collateral constraint:

$$C_{b,t} + \frac{R_{t-1} b_{t-1}}{\pi_t} + q_t \left(H_{b,t} - H_{b,t-1}\right) = b_t + W_{b,t} N_{b,t}, \tag{5}$$

$$E_t \frac{R_t}{\pi_{t+1}} b_t = k_t E_t q_{t+1} H_{b,t}, \tag{6}$$

where b_t denotes bank loans and R_t is the gross interest rate. k_t can be interpreted as a loan-to-value ratio. The borrowing constraint limits borrowing to the present discounted value of their housing holdings. The first order conditions are as follows:

$$\frac{1}{C_{b,t}} = \beta_b E_t \left(\frac{R_t}{\pi_{t+1} C_{b,t+1}} \right) + \lambda_t R_t, \tag{7}$$

$$w_{b,t} = (N_{b,t})^{\eta-1} C_{b,t}, \tag{8}$$

$$\frac{j_t}{H_{b,t}} = \frac{1}{C_{b,t}} q_t - \beta_b E_t \left(\frac{1}{C_{b,t+1}} q_{t+1} \right) - \lambda_t k_t E_t \left(q_{t+1} \pi_{t+1} \right). \tag{9}$$

where λ_t denotes the multiplier on the borrowing constraint.[1] These first order conditions can be interpreted analogously to the ones of savers.

2.3 Firms

2.3.1 Final Goods Producers

There is a continuum of identical final goods producers that operate under perfect competition and flexible prices. They aggregate intermediate goods according to the production function

$$Y_t = \left[\int_0^1 Y_t(z)^{\frac{\varepsilon-1}{\varepsilon}} dz \right]^{\frac{\varepsilon}{\varepsilon-1}}, \tag{10}$$

where $\varepsilon > 1$ is the elasticity of substitution between intermediate goods. The final good firm chooses $Y_t(z)$ to minimize its costs, resulting in demand of intermediate good z:

$$Y_t(z) = \left(\frac{P_t(z)}{P_t} \right)^{-\varepsilon} Y_t. \tag{11}$$

The price index is then given by:

$$P_t = \left[\int_0^1 P_t(z)^{1-\varepsilon} dz \right]^{\frac{1}{\varepsilon-1}}. \tag{12}$$

2.3.2 Intermediate Goods Producers

The intermediate goods market is monopolistically competitive. Following Iacoviello (2005), intermediate goods are produced according to the production function:

[1] Through simple algebra it can be shown that the Lagrange multiplier is positive in the steady state and thus the collateral constraint holds with equality.

$$Y_t(z) = A_t N_{s,t}(z)^{\alpha} N_{b,t}(z)^{(1-\alpha)}, \tag{13}$$

where $\alpha \in [0,1]$ measures the relative size of each group in terms of labor.[2] This Cobb-Douglas production function implies that labor efforts of constrained and unconstrained consumers are not perfect substitutes. This specification is analytically tractable and allows for closed form solutions for the steady state of the model. This assumption can be economically justified by the fact that savers are the managers of the firms and their wage is higher than the one of the borrowers.[3]

A_t represents technology and it follows the following autoregressive process:

$$\log(A_t) = \rho_A \log(A_{t-1}) + u_{At}, \tag{14}$$

where ρ_A is the autoregressive coefficient and u_{At} is a normally distributed shock to technology. We normalize the steady-state value of technology to 1.

Labor demand is determined by:

$$w_{s,t} = \frac{1}{X_t} \alpha \frac{Y_t}{N_{s,t}}, \tag{15}$$

$$w_{b,t} = \frac{1}{X_t}(1-\alpha)\frac{Y_t}{N_{b,t}}, \tag{16}$$

where X_t is the markup, or the inverse of marginal cost.[4]

The price-setting problem for the intermediate good producers is a standard Calvo-Yun setting. An intermediate good producer sells its good at price $P_t(z)$, and $1-\theta, \in [0,1]$, is the probability of being able to change the sale price in every period. The optimal reset price $P_t^*(z)$ solves:

$$\sum_{k=0}^{\infty} (\theta\beta)^k E_t \left\{ \Lambda_{t,k} \left[\frac{P_t^*(z)}{P_{t+k}} - \frac{\varepsilon/(\varepsilon-1)}{X_{t+k}} \right] Y_{t+k}^*(z) \right\} = 0, \tag{17}$$

where $\varepsilon/(\varepsilon-1)$ is the steady-state markup.

The aggregate price level is then given by:

[2] Notice that the absolute size of each group is one.

[3] It could also be interpreted as the savers being older than the borrowers, therefore more experienced.

[4] Symmetry across firms allows us to write the demands without the index z.

$$P_t = \left[\theta P_{t-1}^{1-\varepsilon} + (1-\theta)\left(P_t^*\right)^{1-\varepsilon}\right]^{1/(1-\varepsilon)}. \tag{18}$$

Using (17) and (18), and log-linearizing, we can obtain a standard forward-looking New Keynesian Phillips curve $\widehat{\pi}_t = \beta E_t \widehat{\pi}_{t+1} - \psi \widehat{x}_t + u_{\pi t}$, that relates inflation positively to future inflation and negatively to the markup ($\psi \equiv (1-\theta)(1-\beta\theta)/\theta$). $u_{\pi t}$ is a normally distributed cost-push shock.[5]

2.4 Monetary Policy

We consider a Taylor rule which responds to inflation:[6]

$$R_t = (R_{t-1})^{\rho}\left((\pi_t)^{\left(1+\phi_\pi^R\right)} R\right)^{1-\rho} \varepsilon_{Rt}, \tag{19}$$

where $0 \leq \rho \leq 1$ is the parameter associated with interest-rate inertia, $\phi_\pi^R \geq 0$ measures the response of interest rates to current inflation, and ε_{Rt} is a white noise shock with zero mean and variance σ_ε^2.

2.5 A Macroprudential Rule for the LTV

In standard models, the LTV ratio is a fixed parameter which is not affected by economic conditions. However, we can think of regulations of LTV ratios as a way to moderate credit booms. When the LTV ratio is high, the collateral constraint is less tight. And, since the constraint is binding, borrowers will borrow as much as they are allowed to. Lowering the LTV tightens the constraint and therefore restricts the loans that borrowers can obtain. Recent research on macroprudential policies has proposed Taylor-type rules for the LTV ratio so that it reacts inversely to variables such that the growth rates of GDP, credits, the credit-to-GDP ratio or house prices. These rules can be a simple illustration of how a macroprudential policy could work in practice. Here, we assume that there exists a macroprudential Taylor-type rule for the LTV ratio, so that it responds to output and house prices:

$$k_t = k_{SS}\left(\frac{Y_t}{Y}\right)^{-\phi_y^k}\left(\frac{q_t}{q}\right)^{-\phi_q^k}, \tag{20}$$

[5] Variables with a hat denote percent deviations from the steady state.

[6] This is a realistic policy benchmark for most of the industrialized countries. Note that this rule is consistent with central banks like the ECB whose primary objective is price stability. Furthermore, we have performed robustness analysis checks and we have found that the specification of the Taylor rule does not affect the optimal parameters in the macroprudential rule.

where k_{SS} is a steady state value for the loan-to-value ratio, and $\phi^k_y \geq 0$, $\phi^k_q \geq 0$ measure the response of the loan-to-to value to output and house price deviation from their steady states, respectively. This kind of rule would deliver a lower LTV ratio in booms, when output and house prices are high, therefore restricting the credit in the economy and avoiding a credit boom derived from good economic conditions.[7]

2.6 Equilibrium

The market clearing conditions are as follows:

$$Y_t = C_{s,t} + C_{b,t}. \tag{21}$$

The total supply of housing is fixed and it is normalized to unity:

$$H_{s,t} + H_{b,t} = 1. \tag{22}$$

3 Simulation

3.1 Parameter Values

The discount factor for savers, β_s, is set to 0.99 so that the annual interest rate is 4% in steady state. The discount factor for the borrowers is set to 0.98.[8] The steady-state weight of housing in the utility function, j, is set to 0.1 in order for the ratio of housing wealth to GDP to be approximately 1.40 in the steady state, consistent with the US data. We set $\eta = 2$, implying a value of the labor supply elasticity of 1.[9] For the parameters controlling leverage, we set k_{SS} to 0.90, in line with the US data.[10] The labor income share for savers is set to 0.64, following the estimate in Iacoviello (2005). For the Taylor rule, we consider $\phi^R_\pi = 0.5$, as in the original paper by Taylor. For ρ we use 0.8, which also reflects a realistic degree of interest-rate smoothing.[11]

For the impulse responses, four types of shocks are considered: two demand-side shocks, a monetary policy and a housing demand shock; and two supply-side shocks, a technology and a cost-push shock.

[7] Funke and Paetz (2012) consider a non-linear version of this macroprudential rule for the LTV.

[8] Lawrance (1991) estimated discount factors for poor consumers at between 0.95 and 0.98 at quarterly frequency. We take the most conservative value.

[9] Microeconomic estimates usually suggest values in the range of 0 and 0.5 (for males). Domeij and Flodén (2006) show that in the presence of borrowing constraints this estimates could have a downward bias of 50%.

[10] See Iacoviello (2011).

[11] As in McCallum (2001).

The housing demand shock can be interpreted as a house price shock, since it is directly transmitted to house prices. We assume that technology, A_t, follows an autoregressive process with 0.9 persistence and a normally distributed shock. We also assume that the weight of housing on the utility function is equal to its value in the steady state plus a shock which follows an autoregressive process with 0.95 persistence.[12] For the reactions parameters in the LTV rule, we tentatively use 0.05 for illustration purposes. However, in section 4, we perform an optimal policy analysis and find the values of policy parameters that maximize welfare. Table 1 presents a summary of the parameter values used:

Parameter Values		
β_s	.99	Discount Factor for Savers
β_b	.98	Discount Factor for Borrowers
j	.1	Weight of Housing in Utility Function
η	2	Parameter associated with labor elasticity
k	.9	Loan-to-value ratio
α	.64	Labor share for Savers
X	1.2	Steady-state markup
θ	.75	Probability of not changing prices
ρ_A	.9	Technology persistence
ρ_j	.95	Housing demand shock persistence
ρ	.8	Interest-Rate-Smoothing Parameter in Taylor Rule
ϕ_π^R	.5	Inflation parameter in Taylor Rule
ϕ_y^k	.05	Output parameter in LTV Rule
ϕ_q^k	.05	House price parameter in LTV Rule

Table 1: Parameter values. Baseline model

3.2 Impulse Responses

In order to understand the dynamics of the model and how the LTV rule interacts with monetary policy, in this section, we simulate the impulse responses of the baseline model (both with and without macroprudential policies). We consider demand shocks (asset price shock and monetary policy shock), and supply shocks (technology shock and cost-push shock). This analysis shows that when output

[12] The persistence of the shocks is consistent with the estimates in Iacoviello and Neri (2010).

and inflation vary in the same direction (demand shocks), there is no conflict between monetary and macroprudential policies because both are going to react expanding or contracting credit, depending on the case. However, if output and inflation change in opposite directions (supply shocks), there is a conflict between the policies. The reason is that the Taylor rule reacts to goods prices whilst the LTV rule evolves depending on output and house prices.

3.2.1 Demand shocks

Here, we consider two types of shocks that come from the demand side and generate a boom in the economy; namely an asset price shock and an expansionary monetary policy shock. For both demand-side shocks, we see that the boom is mitigated when the macroprudential rule is in place. We also see that monetary and macroprudential policy actions reinforce each other because both of them aim at cutting credit in the economy with different instruments. Therefore, there is no conflict between both policy instruments when the shocks come from the demand side.

Asset price shock In figure 1, we see the effects of a 25 percent asset price shock. We first analyse the case when there is no macroprudential rule in place, the solid lines. In this situation, the increase in the asset price, the house price in our model, directly affects the collateral constraint and borrowers are able to borrow more out of their housing collateral, which is worth more now. The wealth effect permits them consume both more houses and consumption goods. The increase in house prices is, therefore, transmitted to the real economy and output increases. The raise in output generates inflation and the Taylor rule responds with a higher interest rate. This higher interest rate reduces the price of the asset, the house.

Secondly, we study the case when the macroprudential policy is active together with the monetary policy, the dashed lines. Since the beginning of the shock, the LTV decreases, and borrowers can not borrow as much as without this policy in place. Then, borrowers' consumption does not increase as much, the wealth effect is not so strong, output does not increase as much, and inflation is lower. With a more reduced inflation, when the Taylor rule starts to work, the interest rate does not need to be increased so much because of the previous use of the macroprudential policy. As the interest rate does not increase so much, house prices do not decrease as much. Therefore, the macroprudential and the monetary policy are complementing each other in this case because a reduction of the LTV and an increase in the interest rate work in the same direction: reduce the borrowing. Furthermore, the macroprudential policy reacts

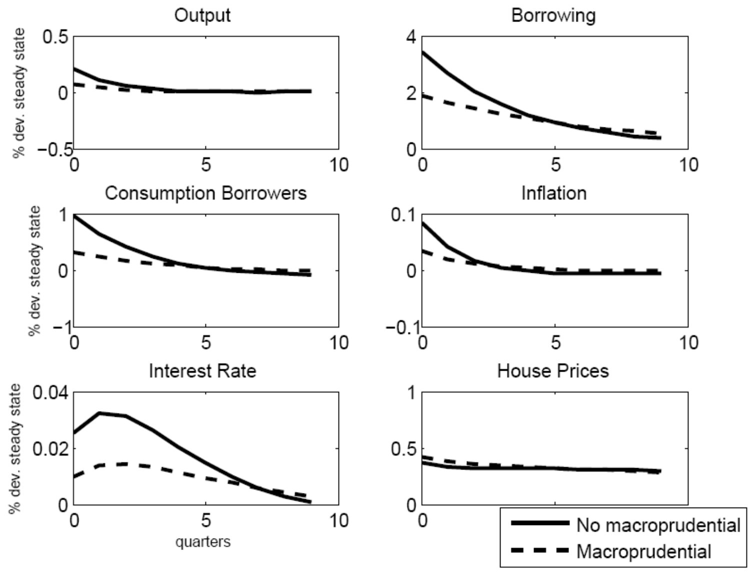

Figure 1: Impulse Responses to a housing demand shock. Macroprudential versus no macroprudential

before the Taylor rule, and it would be not necessary to increase the interest rate so much.

Monetary policy Figure 2 shows the impulse respones to a one standard deviation expansionary monetary policy shock. The solid lines, with no macroprudential policy, show that this expansionary policy causes an increase in output, in inflation, and in the asset price. Borrowers can, with a higher value of the collateral, borrow more and consume more. The Taylor rule reacts to inflation increasing the interest rate.

If there exists also the macroprudential policy, the dashed lines, when the expansionary shock appears the LTV decreases because of the increase in output and house prices. Borrowers can not borrow and consume as much as previously. Output and inflation are lower and the Taylor rule does not need to be as aggressive as in the case with no macroprudential policy. The house price does not decrease as much because the interest rate does not increase so aggressively. Again, the monetary and the macroprudential policies are reinforcing each other: both work in the same direction, reducing credit.

3.2.2 Supply shocks

We will show that in the case of supply-side shocks, there is a conflict between both policies, since output and inflation go in different directions. On the one side, the macroprudential regulator aims at increasing LTVs to cut credit while the central bank, since inflation is going down, will decrease interest rates, thus boosting credit.

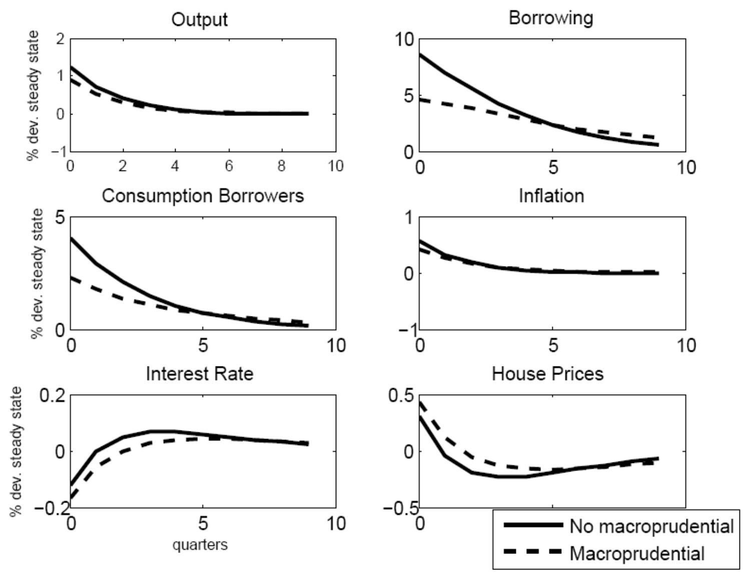

Figure 2: Impulse Responses to a monetary policy shock. Macroprudential versus no macroprudential

Technology shock Figure 3 presents impulse responses to a 1 percent shock to technology. Without the macroprudential rule, given the technology shock, output increases and inflation decreases. With lower prices, the Taylor rule reacts with lower interest rates. A reduced interest rate causes an increase in the housing price. With higher housing prices, borrowing rises and also borrowers' consumption does.

On the other hand, with the macroprudential policy, the rise in output activates the LTV rule and the collateral constraint becomes tighter. The effects on borrowing of the shock are not as strong. Since borrowers cannot borrow as much as they would do with a higher LTV, consumption does not increase as much. This leads to a weaker response of output when the macroprudential rule is active. Thus, inflation is decreasing by even more. The Taylor rule reacts decreasing the interest rate more than in the previous case. House prices, since they are an asset price, move inversely with interest rates. This is why, in the macroprudential scenario, house prices are slightly above.

In this latter case, there is a conflict between both policies. Monetary policy reacts to lower inflation reducing the interest rate. This produces higher output and prices. However, the macroprudential rule reacts to a higher output and house prices reducing the LTV which leads to a lower output and lower prices.

Cost-push shock Figure 3 shows the impulse responses to a cost-push shock. We take into account a cost-push shock that reduces the cost in order for the effects to be comparable to the rest of the shocks that expand the economy. When there is not a macroprudential rule, output increases and inflation

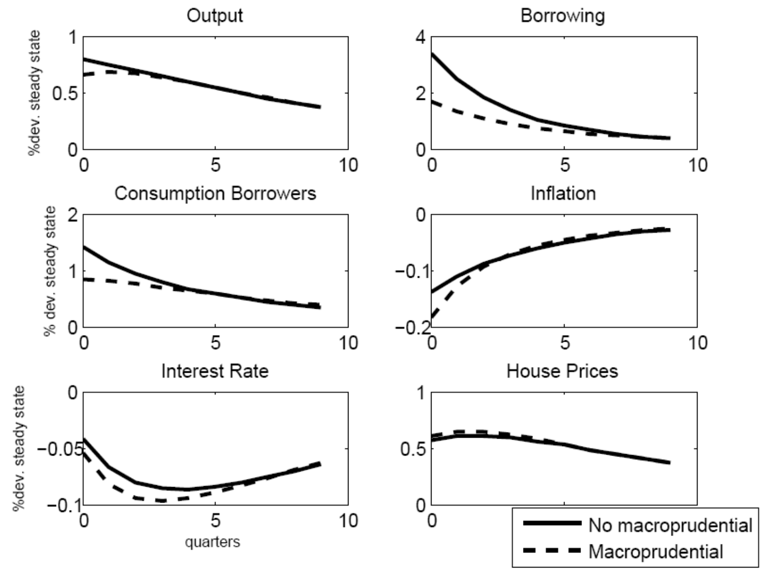

Figure 3: Impulse Responses to a technology shock. Macroprudential versus no macroprudential

decreases. Lower prices cause a reaction of the Taylor rule, reducing interest rate. A lower interest rate produces a rise in the housing price. Higher house prices let borrowers borrow more and, then, consume more.

If the macroprudential policy is acting, the increase in output reduces the LTV. Borrowers do not borrow and consume as much as without the macroprudential policy, and output raises less. Inflation is reduced to a larger extent and thus the interest rate decreases by more. Then, house prices increase slightly more.

Here, a conflict between macroprudential and monetary policies appears. The Taylor rule reduces the interest rate to respond to a lower inflation, causing higher output and prices. However, the macroprudential rule reduces the LTV because output and house prices are higher. This, in turn, reduces output and prices.

4 Welfare

4.1 Welfare Measure

To assess the normative implications of the macroprudential and monetary policies, we numerically evaluate the welfare derived in each case. As discussed in Benigno and Woodford (2008), the two approaches that have recently been used for welfare analysis in DSGE models include either characterizing the optimal Ramsey policy, or solving the model using a second-order approximation to the structural

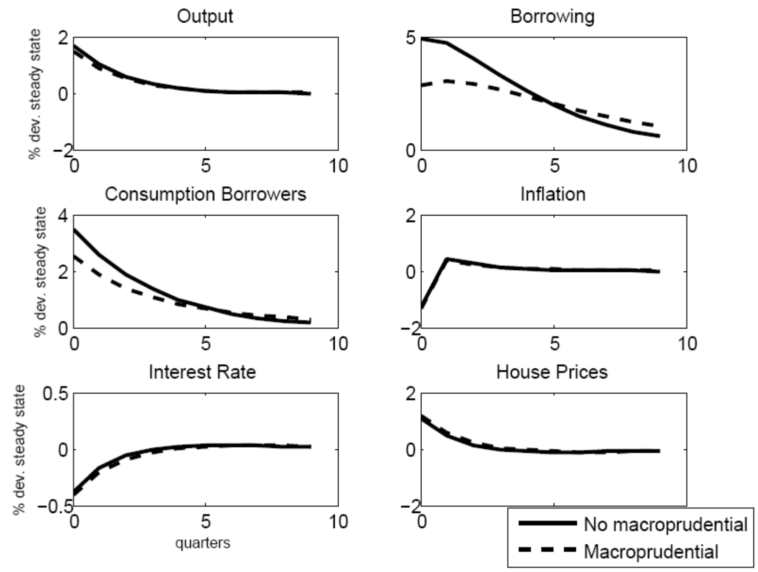

Figure 4: Impulse Responses to a cost-push shock. Macroprudential versus no macroprudential

equations for given policy and then evaluating welfare using this solution. As in Mendicino and Pescatori (2007), we take this latter approach to be able to evaluate the welfare of the two types of agents separately.[13] The individual welfare for savers and borrowers, respectively, as follows:

$$W_{s,t} \equiv E_t \sum_{m=0}^{\infty} \beta_s^m \left[\log C_{s,t+m} + j \log H_{s,t+m} - \frac{(N_{s,t+m})^{\eta}}{\eta} \right], \tag{23}$$

$$W_{b,t} \equiv E_t \sum_{m=0}^{\infty} \beta_b^m \left[\log C_{b,t+m} + j \log H_{b,t+m} - \frac{(N_{b,t+m})^{\eta}}{\eta} \right], \tag{24}$$

Following Mendicino and Pescatori (2007), we define social welfare as a weighted sum of the individual welfare for the different types of households:

$$W_t = (1 - \beta_s)\, W_{s,t} + (1 - \beta_b)\, W_{b,t}. \tag{25}$$

Each agent´s welfare is weighted by her discount factor, respectively, so that the all the groups receive the same level of utility from a constant consumption stream.

However, in order to make the results more intuitive, we present welfare changes in terms of con-

[13] We used the software Dynare to obtain a solution for the equilibrium implied by a given policy by solving a second-order approximation to the constraints, then evaluating welfare under the policy using this approximate solution, as in Schmitt-Grohe and Uribe (2004). See Monacelli (2006) for an example of the Ramsey approach in a model with heterogeneous consumers.

sumption equivalents. The consumption equivalent measure defines the constant fraction of consumption that households should give away in order to obtain the benefits of the macroprudential policy. We will multiply results by -1, so that a positive value means a welfare gain, that is, how much the consumer would be willing to pay to obtain the welfare improvement. Then, when there is a welfare gain, households would be willing to pay in consumption units for the measure to be implemented because it is welfare improving. We use as a benchmark the welfare evaluated when the macroprudential policy is not active and compare it with the welfare obtained when such policy is implemented. We evaluate welfare at the steady state when the macroprudential policy is not active and at the steady state when it is, the derivation of the welfare benefits in terms of consumption equivalent units is as follows:

$$CE_s = 1 - \exp\left[(1-\beta_s)\left(W_s^{MP} - W_s^{*}\right)\right], \tag{26}$$

$$CE_b = 1 - \exp\left[(1-\beta_b)\left(W_b^{MP} - W_b^{*}\right)\right], \tag{27}$$

$$CE = 1 - \exp\left(W^{MP} - W^{*}\right), \tag{28}$$

where the superscripts in the welfare values denote the benchmark case when macroprudential policies are not introduced and the case in which they are, respectively.[14]

4.2 Welfare Analysis

In this section, we numerically evaluate welfare gains when we introduce a macroprudential rule, given the Taylor rule. For the macroprudential rule, in order to simplify things and gain some insight, we restrict the analysis to the case in which both reaction parameters are equal, so that we can show results graphically. In the next section, we relax this restriction in order to find the optimal values of these parameters.

Figure 5 shows the welfare gains of introducing a macroprudential tool in the economy, given the Taylor rule. Leaving fixed monetary policy, we present welfare for a continuum of values of the reaction parameters in the LTV rule, from a less to a more aggressive rule. The figure is very informative because it shows welfare gains for each agent in the economy and for the aggregate. The conclusions we can

[14] We follow Ascari and Ropele (2009).

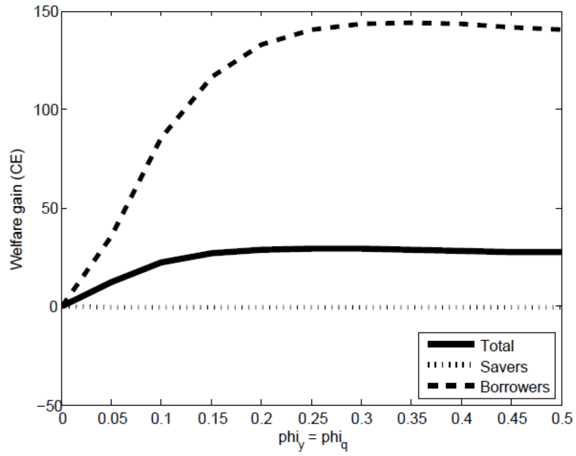

Figure 5: Welfare gains from introducing macroprudential policy, given Taylor rule. Borrowers, savers, and total.

obtain from the figure is the following. Using both policy measures at the same time is unambiguously welfare enhancing, as we can observe from the solid line. We can see that welfare increases by more, the larger the response of the LTV to house prices and output is, but up to a point in which welfare stops increasing. The figure also shows the trade-off between borrowers and savers welfare, illustrated by the twe dashed lines. Welfare of borrowers increases with the introduction of the macroprudential rule because tightening the collateral constraint avoids situations of overindebtness in which debt repayments are a burden for them. Furthermore, borrowers can benefit from more financial stability in the economy, as we will show later on. Notice that borrowers have a collateral constraint which is always binding and this does not allow them make consumption smoothing. A more stable financial system smoothes their consumption path thus mitigating the negative effects of the collateral constraint. This welfare gain is at the expense of savers, who lose from having this measure in the economy, given that they are not financially constrained. However, the borrower´s welfare gain compensates the loss of the savers and globally, the measure is welfare increasing.

Next section performs an optimal policy analysis in order to assess which are the combination of values of the reaction parameters which would maximize welfare and make policy recommendations on this issue.

4.3 Optimal Policies

In this section, we find the optimal combination of parameters of the monetary policy and the macroprudential policy that maximizes welfare.[15] Table 2 shows the optimal parameter values and the welfare gains in consumption equivalents, taking as a benchmark the situation without macroprudential policy:

Table 2: Optimal Macroprudential and Monetary Policy mix

ϕ_y^{k*}	0.08
ϕ_q^{k*}	0.43
ϕ_π^{R*}	2.5
Welfare gain (wrt no MP)	40.921

We see that in order to maximize welfare, the LTV rule should respond relatively more aggressively to house prices than to output. In fact, the output response is negligible.[16] Given the collateral constraint, this result is intuitive. Notice that borrowing is directly determined by the financial constraint. Borrowers can borrow as much as the value of their housing lets them. The value of housing is given by house prices so they are directly linked to the amount of borrowing that is available. However, output increases make borrowers wealthier and thus they can demand more housing to use as collateral. Nevertheless, this effect is indirect. Therefore, optimally, the LTV rule should respond more strongly to the variable which directly affects the collateral constraint.

5 Financial Stability

So far, we have seen that macroprudential policies increase welfare for the economy from the borrowers side. We have also found a combination of monetary and macroprudential policies that maximizes welfare. In this section, we disentangle the source of this welfare gain. We break down welfare in two parts; the monetary and the financial side to see how the macroprudential policiy affects each of them. Finally, we aggregate these two sides and see how the whole system is affected.

Standard sticky price models do not have a collateral distortion. The only distortions in these models come from monopolistic competition and from the firm's inability to change prices every period. Then, in order to reduce these negative effects, welfare depends on price stability. There is however a

[15] We make a search over a grid of parameter values of both the macroprudential and the monetary policy rule.

[16] For robustness analysis, we have also experimented with an extended Taylor rule that responds to inflation, output and house prices. The optimal macroprudential rule parameters are unaffected by the Taylor rule specification in place.

trade-off between inflation and output variability, so the goal of the central bank is to keep inflation as stable as possible given this trade-off.[17] Policy analysis, within this framework, is usually done through policy frontiers, also known as Taylor curves or efficiency frontiers.[18] This curve shows, given different paramenters of the Taylor rule, the combination that delivers the lower output and inflation variability. Therefore, a Taylor curve which is closer to the origin would be more efficient. In the next subsection, we present efficiency frontiers for the cases in which there is and there is not a macroprudential policy in place.

5.1 Efficiency Frontier

In figure 6 we represent the inflation and output volatility frontiers (Taylor curves) for the scenarios in which the macroprudential policy is and is not active. Notice that we use the optimized parameters for the macroprudential rule obtained in the previous section.[19] We can clearly observe the trade-off between inflation and output variability. The darker line represents the economy in which the LTV rule is interacting with monetary policy. We see that, under this perspective, the economy seems more stable when there is no macroprudential policy. The darker line lies further away from the origin, meaning that both policies together are not able to stabilize inflation and output as effectively as when monetary policy is acting alone. The intuition is the following: as we saw when we presented the dynamics of the model, there are situations in which the two policies are conflicting with each other, namely when shocks come from the supply side. The existence of these shocks makes the job of the central bank hindered by the presence of the LTV rule. That is, when monetary policy increases interest rates to decrease inflation, the macroprudential rule reacts lowering the LTV and thus increasing output and inflation in turn. It seems that the central bank has difficulties to achieve its goals with this macroprudential rule in place.

However, as we have already seen, in models with collateral constraints, welfare analysis and the design of optimal policies involves a number of issues not considered in standard sticky-price models. In models with constrained individuals, there are two types of distortions; price rigidities and credit frictions. As we have seen, since this may create conflicts between savers and borrowers, we always observe a trade-off in their welfare. Savers may prefer policies that reduce the price stickiness distortion.

[17] This argument is valid when there are cost-push shocks.

[18] See for instance Iacoviello (2005) that evaluates a Taylor rule responding to house prices with a policy frontier.

[19] We compute the Taylor curves as the minimum values of inflation and output variance for a range of reaction parameters of the policy rule. In order to generate the trade-off, we consider cost-push shocks with a 0.02 standard error. Inflation is measured on a quarterly basis.

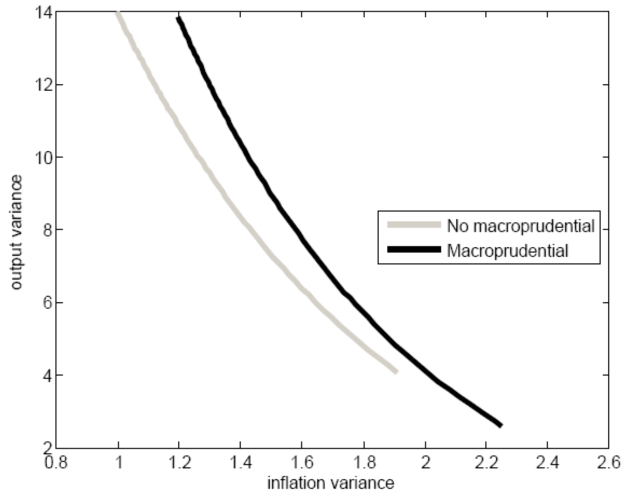

Figure 6: Efficiency frontier. Macroprudential versus no macroprudential.

However, borrowers may prefer a scenario in which the pervasive effect of the collateral constraint is softened. Borrowers operate in a second-best situation. They consume according to the borrowing constraint as opposed to savers that follow an Euler equation for consumption. Borrowers cannot smooth consumption by themselves, but a more stable financial system would provide them a setting in which their consumption pattern is smoother. Therefore, in order to assess the optimality of policies, the usual monetary policy frontier analysis, in which only the variability of output and inflation are taken into account, may not be accurate. Factors that help borrowers smooth their consumption should be included. Andrés et al. (2009) and Rubio (2011) already show that in models with collateral constraints, total welfare may depend on things that are not on the axis of the frontier.[20] An example would be financial stability. The next subsection presents a modified Taylor curve in which we substitute the variability of output by the variability of borrowing, as a measure to capture financial stability.

5.2 Modified Efficiency Frontier with Financial Stability

We are aware that there is not a widely accepted definition of financial stability or systemic risk. Those are difficult concepts to define and to measure. Many definitions include the interactions between the financial and the real sector.[21]

In our model, we characterize the financial sector implicitly: borrowers take credits from savers and

[20] Andrés et al. (2009) find that optimal monetary policy may involve a trade-off between the stabilization of inflation, output gap, consumption gap and the distribution of the collateral asset between constrained and unconstrained consumers. Rubio (2011) makes a policy-frontier analysis for fixed and variable-rate mortgages.

[21] See Galvão and Owyang (2013) for a discussion on the topic.

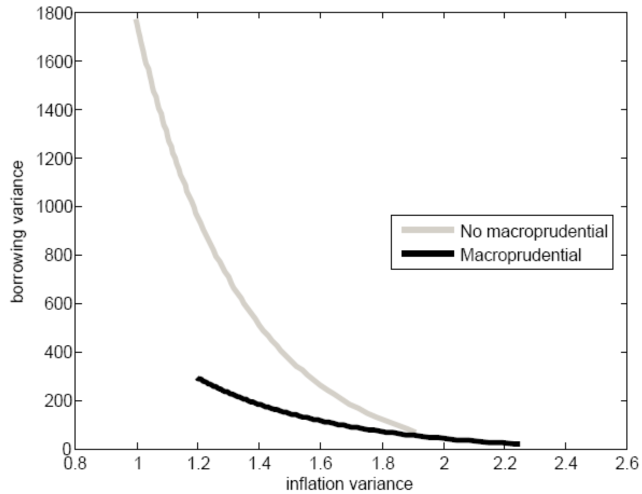

Figure 7: Modified efficiency frontier. Borrowing and inflation variability trade-off. Macroprudential versus no macroprudential.

sign mortgages to buy houses, the asset of our model. Therefore, the financial system can be proxied by the amount of borrowing that takes place. Within this framework, we propose a measure for financial stability: a low variability of borrowing.

In this sense, a lower variance of borrowing would imply a more stable financial system: if the variance of borrowing is lower, credit is smoother. A more stable financial system contributes to a lower systemic risk. Our model fits this idea. Borrowers do not have an Euler equation that allows them to smooth their consumption, as savers do. If the variability of the borrowing is lower then borrowers can sign mortgages in a smoother way and also can achieve a more stable consumption. The financial sector will be more stable and also the real sector. The economy can benefit from a more stable financial system and a lower systemic risk with a higher welfare, as we proved in previous sections. However, if the situation is the opposite and there is a high variability of borrowing, the financial system will be more unstable: with credit being more variable, consumption would also be more variable, the systemic risk will increase and, therefore, welfare will be lower.

In this subsection, we modify the traditional Taylor curve by substituting the variability of output by the variability of borrowing. Since borrowing and output are strongly correlated, we can expect that there still exists a trade-off between inflation and borrowing variability. Figure 7 shows results.

Again, the darker line represents the case in which macroprudential policies are active. The trade-off between the two variabilities is in place, as in the standard case. However, if we compare this graph with the previous one, implications for policy efficiency are reversed. In this case, the macroprudential

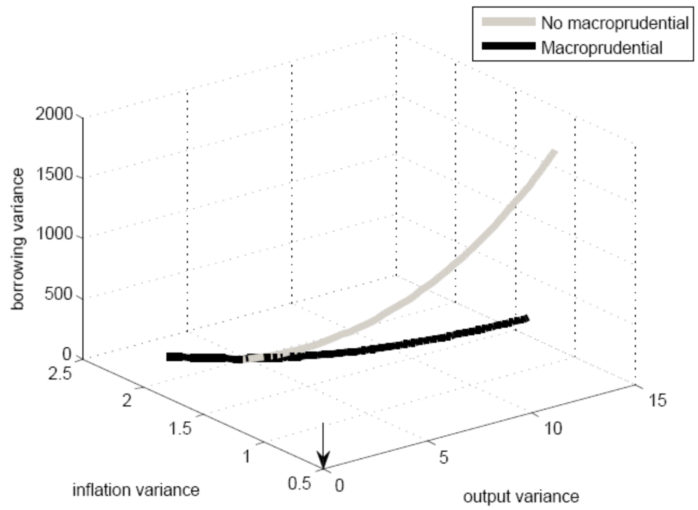

Figure 8: Three-dimensional Policy Frontier. Macroprudential versus no macroprudential.

policy interacting with monetary policy delivers a more stable system, which justifies why, in terms of welfare, the economy is bettter off when these policies act together. Standard analysis are missing an important part of the picture: financial stability.

The standard Taylor curve and the modified one provide us conflicting results that prevent us from obtaining an unambiguous conclusion. In order to obtain a definite answer, we need to develop a measure of global stability, which includes financial stability. That is, we need to build a tool that contains not only monetary and output stability but also financial stability.[22] Therefore, in the next subsection we propose a three-dimensional policy frontier (3DPF) which includes the variability of borrowing in a third axis.

5.3 Three-dimensional Policy Frontier

Figure 8 presents our augmented policy frontier which is three-dimensional, since it takes into account three policy objectives: output, inflation and financial stabilization. The first two correspond to the standard objectives of the central bank, while the third one would be the objective of the macroprudential regulator. As in previous cases, we are comparing the macroprudential (darker line) with the no macroprudential scenario. Here, curves are preferable the lower (less borrowing variance) and closer to

[22] As an example, Foot (2003) claims that the financial system is stable when there is monetary stability, employment levels close to the economy's natural rate, confidence in the operation of the generality of key financial institutions and markets in the economy, and no relative price movements of either real or financial assets within the economy that will undermine monetary stability and employment.

the inflation and output variance origin (less inflation and output variability) are.[23] We see that when we take the three dimensions together, there is no ambiguity anymore. Macroprudential and monetary policies interacting with each other manage to deliver a more stable scenario, which includes not only macroeconomic stability but also financial stability. These results are in line with findings in previous sections, that is, the introduction of the macroprudential policy is welfare enhancing because it is delivering a more stable system.

6 Concluding Remarks

In this paper, we analyze the impact of macroprudential and monetary policies on business cycles, welfare, and financial stability. In particular, we consider a macroprudential rule on the LTV ratio. From a positive perspective, we find that introducing a macroprudential tool mitigates the effects of booms in the economy by restricting credit. We also find that monetary policy and macroprudential policy may enter in conflict when shocks come from the supply-side of the economy. On the other hand, both policies can reinforce each other when shocks arise from the demand-side.

From a normative point of view, we find that, unambiguously, when monetary policy and a rule for the LTV ratio interact, the introduction of this macroprudential measure is welfare improving.

Then, we calculate the combination of parameters of monetary and macroprudential policies that maximizes welfare. We find that the optimal LTV rule should respond relatively more aggressively to house prices than to output deviations.

Finally, we propose a tool to evaluate these policies: a three-dimensional policy frontier (3DPF), which includes the variability of output, inflation and borrowing. The variability of borrowing is considered as a measure of financial stability. The 3DPF shows that the macroprudential and the monetary policies acting together can unambiguously enhance the stability of the economic system.

Appendix

Main Equations

$$\frac{1}{C_{s,t}} = \beta^s E_t \left(\frac{R_t}{\pi_{t+1} C_{s,t+1}} \right), \tag{29}$$

[23] The arrow on the graph signals the point of maximum efficiency.

$$w_t^s = (N_{s,t})^{\eta-1} C_{s,t}, \tag{30}$$

$$\frac{j}{H_{s,t}} = \frac{1}{C_{s,t}} q_t - \beta^s E_t \frac{1}{C_{s,t+1}} q_{t+1}. \tag{31}$$

$$\frac{1}{C_{b,t}} = \beta^b E_t \left(\frac{R_t}{\pi_{t+1} C_{b,t+1}} \right) + \lambda_t R_t, \tag{32}$$

$$w_{b,t} = (N_{b,t})^{\eta-1} C_{b,t}, \tag{33}$$

$$\frac{j}{H_{b,t}} = \frac{1}{C_{b,t}} q_t - \beta^b E_t \left(\frac{1}{C_{b,t+1}} q_{t+1} \right) - \lambda_t^b k_t E_t \left(q_{t+1} \pi_{t+1} \right). \tag{34}$$

$$E_t \frac{R_t}{\pi_{t+1}} b_t = k_t E_t q_{t+1} H_{b,t}, \tag{35}$$

$$C_{b,t} + q_t H_{b,t} + \frac{R_{t-1} b_{t-1}}{\pi_t} = q_t H_{b,t-1} + w_{b,t} L_{b,t} + b_t, \tag{36}$$

$$w_{s,t} = \frac{1}{X_t} \alpha \frac{Y_t}{N_{s,t}}, \tag{37}$$

$$w_{b,t} = \frac{1}{X_t} (1-\alpha) \frac{Y_t}{N_{b,t}}, \tag{38}$$

$$\widehat{\pi}_t = \beta E_t \widehat{\pi}_{t+1} - \psi \widehat{x}_t + u_{\pi t} \tag{39}$$

$$W_{s,t} \equiv \; E_t \sum_{m=0}^{\infty} \beta_s^m \left[\log C_{s,t+m} + j \log H_{s,t+m} - \frac{(N_{s,t+m})^{\eta}}{\eta} \right], \tag{40}$$

$$W_{b,t} \equiv \; E_t \sum_{m=0}^{\infty} \beta_b^m \left[\log C_{b,t+m} + j \log H_{b,t+m} - \frac{(N_{b,t+m})^{\eta}}{\eta} \right], \tag{41}$$

$$W_t = (1-\beta_s) W_{s,t} + (1-\beta_b) W_{b,t}. \tag{42}$$

References

[1] Agénor, P., Pereira da Silva, L., (2011), Macroeconomic Stability, Financial Stability, and Monetary Policy Rules, Ferdi Working Paper, 29

[2] Angelini, P., Neri, S., Panetta, F., (2012), Monetary and macroprudential policies, Working Paper Series 1449, European Central Bank.

[3] Ascari, G., Ropele, T., (2009), Disinflation in a DSGE Perspective: Sacrifice Ratio or Welfare Gain Ratio?, Kiel Institute for the World Economy Working Paper, 1499

[4] Beau, D., Clerc, L., Mojon, B., (2012), Macro-prudential policy and the conduct of monetary policy, mimeo, Bank of France

[5] Benigno, P., Woodford, M., (2008), Linear-Quadratic Approximation of Optimal Policy Problems, mimeo

[6] Borio, C., Shim, I., (2007), What can (macro-) policy do to support monetary policy?, BIS Working Paper, 242

[7] Campbell, J., Hercowitz, Z., (2009), "Welfare Implications of the Transition to High Household Debt", Journal of Monetary Economics, 56 (1), 1-16

[8] Caruana, J., (2010a), Macroprudential policy: what we have learned and where we are going, Keynote speech at the Second Financial Stability Conference of the International Journal of Central Banking, Bank of Spain

[9] Caruana, J., (2010b). The Challenge of Taking Macroprudential Decisions: Who Will Press Which Button(s)?, in Macroprudential Regulatory Policies. The New Road to Financial Stability? Edited by Stijn Claessens, Douglas Evanoff, George Kaufman and Laura Kodres. World Scientific, New Jersey

[10] Committee on the Global Financial System (2010a), The role of margin requirements and haircuts in procyclicality, CGFS Papers, 36

[11] Committee on the Global Financial System (2010b), Macroprudential instruments and frameworks: A stocktaking of issues and experiences, CGFS Papers, 38

[12] Domeij, D., Flodén, M., (2006) "The Labor-Supply Elasticity and Borrowing Constraints: Why Estimates are Biased." Review of Economic Dynamics, 9, 242-262

[13] Financial Stability Board, Bank for International Settlements and International Monetary Fund (2009). Guidance to assess the systemic importance of financial institutions, markets and instruments: initial considerations

[14] Financial Stability Board, Bank for International Settlements and International Monetary Fund (2011). Macroprudential policy tools and frameworks. Update to G20 Finance Ministers and Central Bank Governors

[15] Funke, M., Paetz, M., (2012), A DSGE-Based Assessment of Nonlinear Loan-to-Value Policies: Evidence from Hong Kong, BOFIT Discussion Paper No. 11/2012

[16] Galvão, A.B., Owyang, M. T., (2013), Measuring Macro-Financial Conditions using a Factor-Augmented Smooth-Transition Vector Autoregression, Mimeo

[17] Gruss, B., Sgherri, S., (20090, The Volatility Costs of Procyclical Lending Standards: An Assessment Using a DSGE Model, IMF Working Paper, 09/35.

[18] Iacoviello, M., (2005) "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle." American Economic Review, 95 (3), 739-764

[19] Iacoviello, M., (2011), Financial Business Cycles, Mimeo, Federal Reserve Board

[20] Iacoviello, M. , Neri, S., (2010), "Housing Market Spillovers: Evidence from an Estimated DSGE Model," American Economic Journal: Macroeconomics, 2, 125–164.

[21] IMF, Monetary and Capital Markets Division, (2011), Macroprudential Policy: An Organizing Framework, mimeo, IMF

[22] Jeanne, O., Korinek, A., (2011), Macroprudential Regulation versus mopping after the Crash, mimeo

[23] Kannan, P., Rabanal, P., Scott, A., (2012), "Monetary and Macroprudential Policy Rules in a Model with House Price Booms", The B.E. Journal of Macroeconomics, Contributions, 12 (1)

[24] Lawrance, E., (1991), "Poverty and the Rate of Time Preference: Evidence from Panel Data", The Journal of Political Economy, 99 (1), 54-77

[25] McCallum, B., (2001), "Should Monetary Policy Respond Strongly To Output Gaps?," American Economic Review, 91(2), 258-262

[26] McCauley, R., (2009), Macroprudential policy in emerging markets, Presentation at the Central Bank of Nigeria's 50th Anniversary International Conference on Central banking, financial system stability and growth, 4–9 May.

[27] Mendicino, C., Pescatori, A., (2007), Credit Frictions, Housing Prices and Optimal Monetary Policy Rules, mimeo

[28] Monacelli, T., (2006), "Optimal Monetary Policy with Collateralized Household Debt and Borrowing Constraint," in conference proceedings "Monetary Policy and Asset Prices" edited by J. Campbell.

[29] N'Diaye, P., (2009), Countercyclical macro prudential policies in a supporting role to monetary policy, IMF Working Paper

[30] Saurina, J., (2009a), Dynamic provisioning. The experience of Spain, in Crisis Response. Public Policy for the Private Sector, note 7, World Bank

[31] Saurina, J., (2009b), "Loan loss provisions in Spain. A working macroprudential tool", Revista de Estabilidad Financiera, 17, Bank of Spain, 11–26.

[32] Schmitt-Grohe, S., Uribe, M., (2004), "Solving Dynamic General Equilibrium Models Using a Second-Order Approximation to the Policy Function," Journal of Economic Dynamics and Control, 28, 755-775

[33] Smith A., (2009), Comment on "Welfare Implications of the Transition to High Household Debt" by Campbell J., Hercowitz, Z., Journal of Monetary Economics, 56 (1)

[34] Suh, H., (2011), Simple, Implementable Optimal Macroprudential Policy, Mimeo, Indiana University

[35] Volcker, P., (2010), Protecting the Stability of Global Financial Markets, in Macroprudential Regulatory Policies. The New Road to Financial Stability? Edited by Stijn Claessens, Douglas Evanoff, George Kaufman and Laura Kodres. World Scientific, New Jersey