Commentary on Macroprudential Policies

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This commentary serves as a starting point for summarizing the findings of the fast-growing literature on macroprudential policy.

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1. Introduction

This commentary is motivated by the papers "Banks' Equity Capital Frictions, Capital Ratios, and Interest Rates: Evidence from Spanish Banks" by Alfredo Martin-Oliver, Sonia Ruano, and Vicente Salas-Fumás (this issue) and "Capital Flows and Financial Stability: Monetary Policy and Macroprudential Responses" by D. Filiz Unsal (this issue): both papers focus on the implications of macroprudential policy measures. Indeed, recent events in macroeconomics and financial markets have shifted the attention towards the role and the consequences of policies aimed at preventing the occurrence of crisis events. The aforementioned papers are of topical interest and present insightful results from both a theoretical and empirical perspective.

In my commentary I will first summarize the contributions of the two papers and then provide an overview of the fast-growing theoretical literature on macroprudential policy and briefly discuss some issues and future directions.

2. What Do We Mean by Prudential Policies?

As Hanson, Kashyap, and Stein (2011) point out, it is useful to distinguish between micro- and macroprudential policies. Microprudential policies have the scope to "prevent costly failure of individual financial institutions," but recent financial market events have emphasized the need to go beyond a micro approach to financial regulation and focus more on a macro perspective. In the context of a macro perspective, financial regulation aims at preserving the

financial stability as a whole, recognizing in such a way the general equilibrium effects of individual failures. In this sense the scope of macroprudential policy is to limit the risks and costs of systemic crises. In order to rationalize the scope for macroprudential policies, it is important to understand the market failures/frictions at work that would justify a macroprudential approach to financial regulation. Since the focus is on the macro consequences of individual failures, it is critical to identify when individual behavior might differ from the social planner's behavior and to evaluate the social costs of financial regulation. The two papers in this issue contribute to these research questions: the paper by Unsal is an example of a theoretical analysis aimed at rationalizing macroprudential policies from a countrywide perspective, while the paper by Martin-Oliver, Ruano, and Salas-Fumás is an example of empirical analysis aimed at uncovering the social costs of capital requirements.

From a theoretical perspective, in the context of banks, restoring the capital ratio might have negative systemic externalities when the economy is hit by aggregate shocks. In fact, when there is a simultaneous attempt by many banks to restore the capital ratio through shrinking assets, there are social costs that emerge in the form of fire sales (if every bank sells the same type of assets, then their price drops) and credit crunches (if banks restrict the amount of new loans). From a countrywide perspective, a similar mechanism applies: in a context in which private agents face borrowing constraints, individual decisions by households and/or firms might trigger similar asset fire-sale or debt-deflation spirals as in Fisher (1933) that restrict their borrowing ability.

As Hanson, Kashyap, and Stein (2011) note, the foundations of this macroprudential perspective of financial regulations do not rely on the existence of deposit insurance: in fact, the scope of macroprudential policy is to limit the occurrence of the negative systemic effects.

Within this general framework, the paper by Martin-Oliver, Ruano, and Salas-Fumás examines which are the (potential) social costs from higher capital requirements for banks. In fact, the paper deals with the macro implications of financial/banking regulation by assessing the consequences of strengthened regulations on the volume of bank loans and the interest rates on bank loans. This is a relevant issue given the current regulatory pressures coming from Basel III in a crisis context in which equity capital is the

most effective loss-absorption tool. The analysis is mainly empirical and conducted along transitional and steady-state dimensions: the authors assess the social costs in the transition from the current to the new regulatory regime (flow costs) and in the new regime (stock costs).

The theoretical background for the analysis of Martin-Oliver, Ruano, and Salas-Fumás builds on the works by Holmström and Tirole (1997). Higher capital requirements imply social costs when banks choose to achieve the target requirements by reducing the volume of credit rather than getting additional equity from retained earnings; from a steady-state perspective, the new financial structure of banks with higher equity might translate into higher interest rates on loans if the cost of equity is higher than the cost of debt, with possibly lower demand of credit and investment. Martin-Oliver, Ruano, and Salas-Fumás conduct their empirical investigation by examining the behavior of Spanish banks during the period from 1992 to 2007. In their analysis, they distinguish between commercial and savings banks and find that while there are differences between the two groups, their results support the dependence of equity capital on profits and that the social costs in terms of interest rates in the steady state are moderate and lower than the costs during the transition.

On the other hand, the paper by Unsal takes a different perspective: macroprudential measures take the form of a regulatory premium that increases the cost of borrowing, and the analysis is conducted mainly from an applied-theory perspective along the lines of a general equilibrium framework. The paper is motivated by the resumption of capital flows to emerging-market economies that poses two key policy challenges: (i) how to prevent capital flows from exacerbating overheating pressures and inflation, and (ii) how to minimize the risk that easy financing conditions undermine financial stability. The paper is particularly relevant because it is one of the first papers to examine the interaction between conventional monetary policy rules and macroprudential policy in the form of capital controls. The model follows the financial accelerator mechanism developed by Bernanke, Gertler, and Gilchrist (1999), augmented by nominal rigidities and extended to an open economy so that agents can borrow domestically and internationally. Unsal shows that when investors' perception of risk declines, then easier credit conditions and capital inflows arise, increasing borrowers' leverage.

Interestingly, in her normative analysis, only under positive shocks to risk perception are macroprudential policies beneficial: in fact, when the economy is hit by productivity shocks, macroprudential policies are welfare worsening. Moreover, she shows that exchange rate policy is crucial since under a fixed exchange rate regime, the nominal exchange rate does not serve as a shock absorber and positive financial shocks have a higher destabilizing effect.

Starting from these analyses, in what follows I will first discuss the link between capital requirements and capital controls. The idea is to point out that different types of macroprudential policy tools can be substitute conditional on the underlying assumptions that are made. Then I will survey briefly an alternative approach for rationalizing macroprudential policies in the context of a pecuniary externality environment.

3. Link between Capital Requirements and Capital Controls

Before going into the details of the pecuniary externality literature, I will review an equivalence result between capital controls and capital requirements as in Bianchi (2011). For this purpose we could consider a simple model in which banks make loans to households at rate r^L and impose a constraint to private agents in order to limit their ability to borrow so as to guarantee repayment. Banks finance these loans by accepting deposits from the rest of the world at rate r and issuing equity in the domestic markets. We assume that the required return on equity r^E is higher than the rate on deposits. Bianchi (2011) further assumes that financial intermediation is costless and that banks are essentially just financial intermediaries and last only for one period, and every period new banks are set up with free entry into banking. Suppose now that the regulator imposes that banks are required to finance a fraction γ of their assets with equity and that that imposes a reserve requirement so that a fraction ϕ of deposits is held in the form of unremunerated reserves. The balance sheet of the bank is given by the following:

Assets	Liabilities
L: loans	E: equity
R: reserves	D: deposits

Banks maximize shareholder value and, given that holding reserves and equity capital is costly, they limit their amount to the regulatory constraints. In equilibrium, the return from assets must be equal to the return on liabilities so that

$$r^L(1-\phi(1-\gamma)) = \gamma r^E + (1-\gamma)r.$$

A capital controls policy would generate in this simple framework a gap between foreign (r) and domestic (r^L) interest rates such as $(1+r^L) = (1+\tau)(1+r)$. So, for given return on equity r^E, it is possible to map capital controls policy in terms of a combination of reserve and capital requirements (γ, ϕ).

This example shows that there are some special cases in which there is a link between capital controls and capital requirements. In the specific example constructed by Bianchi (2011), the return on equity r^E is orthogonal to the policy tools, while in general it should be considered endogenous; moreover, the modeling of the banking sector is very stylized, as it essentially assumes the role of a passive financial intermediary borrowing funds from foreigners and allocating them to domestic residents, abstracting from other key aspects of the banking process (e.g., maturity mismatch) and the fact that there might be externalities related to interconnectedness caused by the propagation of shocks across systemic institutions.[1]

Nevertheless, I see this as a useful starting point to create a bridge between macroprudential policy at the banking level (i.e., capital requirements) and at the country level (i.e., capital controls): in fact, in this particular example there are conditions for which the two are perfect substitutes. More generally, this example would suggest that one area of interest would be to further investigate the interaction among alternative macroprudential tools like loan-to-value ratio, reserve, and capital requirements.

4. Pecuniary Externality and Policy Analysis

There is a fast-growing literature that, building on the seminal work by Mendoza (2010), is studying policy analysis in a context in which

[1]See De Nicolò, Favara, and Ratnovski (2012) for a discussion of this aspect.

the key market failure is given by a pecuniary externality. What are the main features of this class of models?

First, the heterogeneity that is needed in order to examine borrowing and lending decisions is studied from a very simple perspective. In fact, these models usually consider the case of a small open economy in which private agents borrow from international financial markets. This simplification allows us to model only borrower behavior and to take as given the interest rate at which agents borrow from foreign investors.

Secondly, private agents (firms or households) are subject to an occasionally binding borrowing constraint. The appealing feature is that the borrowing constraint is occasionally binding: agents' choices, exogenous states, and policy choices themselves determine the state in which the constraint is binding. In fact, these models are characterized by a normal state (or tranquil times) when the constraint is not binding and a crisis state when the constraint binds.

Thirdly, the borrowing constraint is endogenous in the sense that the amount that agents can borrow varies over time and depends crucially on a key market price. In some models (Bianchi 2011, Benigno et al. 2009, 2012a, and Korinek 2010) the key market price is represented by the real exchange rate, while in Bianchi and Mendoza (2010) and Jeanne and Korinek (2012) the key market price that enters the borrowing constraint is given by the price of land.

This literature is usually referred to as Neo-Fisherian since when the constraint binds, an amplification mechanism that resembles the debt-deflation spiral as in Fisher (1933) is set in motion, causing severe contraction in economic activity.

While most of these models are real models and abstract from the modeling of the monetary side, recent works by Benigno et al. (2012b) and Fornaro (2011) combine the Neo-Fisherian approach and the New Keynesian framework and analyze the interaction between price and financial stability and monetary and macroprudential policies.[2]

There are costs and benefits in following this approach. On the benefit side, there is a neat distinction between crisis and non-crisis

[2]As in the paper by Unsal, there are other approaches that have been proposed in order to study the interaction between monetary and macroprudential policies (Angeloni and Faia 2011, Cesa-Bianchi and Rebucci 2012, and Collard et al. 2012).

events (i.e., depending on when the constraint is binding or not). Moreover, the amplification mechanism due to the endogenous borrowing constraint and its dependence on a key market price generates a sharp contraction in consumption without resorting to large shocks. In fact, in the context of a small open economy, Mendoza (2010) has shown the ability of these models in capturing business-cycle properties of emerging markets inside and outside sudden stop periods. On the costs side, the analysis of this class of models is, at this stage, costly from a computational point of view and, for this reason, most of the time the analysis is restricted to a limited set of shocks to reduce the number of exogenous states.

The key issue is to understand where the scope for policy comes from or why the competitive equilibrium is inefficient. The general idea behind policy intervention arises because, in economies with financial frictions, agents do not take into account the consequences of their individual actions on the key market price on which the financial frictions are defined (see Arnott, Greenwald, and Stiglitz 1994). The externality that affects market prices is usually referred to as pecuniary externality: pecuniary externalities would arise also in an environment in which financial markets are complete and agents are price takers, but in that context the first welfare theorem holds and the competitive equilibrium allocation is Pareto efficient. Here, on the other hand, pecuniary externalities would cause an inefficiency because, when the key market price affects the borrowing constraint and when the constraint is binding, individual decisions do not take into account the indirect effect that their choices have on the equilibrium price and their borrowing capacity. For the purpose of rationalizing the scope for prudential policies, the existence of pecuniary externality might induce an inefficient behavior even in normal times when the constraint is not binding.

Following this consideration, this strand of literature (see Korinek 2010, Bianchi 2011, Benigno et al. 2012a, Jeanne and Korinek 2012, and Bianchi and Mendoza 2010) has conducted the policy analysis by comparing the competitive equilibrium allocation with a constrained social planner allocation where the social planner faces the same financial constraint as the competitive equilibrium allocation. It then finds the policy tools that should be used in the decentralized equilibrium to replicate the social planner allocation.

As a vehicle for conveying the main results of the literature, I will use the model used in Bianchi (2011) (see also Korinek 2010 for an earlier three-period version).

The model consists of a two-sector (tradable and non-tradable) small open economy that borrows from the rest of the world. There is no production, and every period agents receive an exogenous endowment of tradable (Y^T) and non-tradable (Y^{NT}) goods. The households maximize the following utility function:

$$U \equiv E_0 \sum_{t=0}^{\infty} \left\{ \beta^t u\left(C_t\right) \right\}, \tag{1}$$

with C_t denoting the consumption basket for an individual which is a constant elasticity of substitution aggregator of tradable (C^T) and non-tradable (C^{NT}) consumptions and where β is the subjective discount factor. The budget constraint each household faces is

$$C_t^T + P_t^N C_t^N + B_{t+1} = Y_t^T + P_t^N Y_t^N + (1+r) B_t, \tag{2}$$

where B_{t+1} denotes the bond holding at the end of period t, and $1+r$ is a given world gross interest rate with $\beta(1+r) < 1$. P^N is the relative price of non-tradable goods in terms of tradable goods.

Access to international financial markets is imperfect, as we assume that the amount that each individual can borrow internationally is limited by a multiple of the individual's current total income:

$$B_{t+1} \geq -\frac{1-\phi}{\phi} \left[Y_t^T + P_t^N Y_t^N \right]. \tag{3}$$

The key feature of this international borrowing constraint is that it captures currency mismatches in the balance sheet of our small open-economy model (see Krugman 1999 for a discussion). In fact, borrowing in the model is denominated in units of tradable consumption but leveraged on income generated in both tradable and non-tradable sectors. With reference to the previous discussion, P^N represents the key market price that enters the borrowing constraint, and the policy scope would arise because when the constraint is binding, agents will not take into account that by reducing consumption they will lower the relative price and make the constraint

even tighter. The endogeneity of the borrowing constraint amplifies the impact of the initial shock that makes the constraint binding.

The appealing result that emerges from this simple model is that it is possible to implement the constrained social planner allocation (i.e., an allocation constrained by (3)) by imposing capital controls (i.e., a tax on the amount private agents borrow) during normal times. While this result is appealing, there are several qualifications that need to be made:

(i) In the context of the same endowment economy as in Bianchi (2011), Benigno et al. (2012a) show that it is possible to use alternative policy tools (like tax on non-tradable consumption and tradable consumption) to achieve the unconstrained allocation and improve upon the allocation supported by capital controls. These policies are referred to as price-support policies, as their aim is to support the key relative price when the constraint is binding.

(ii) If we consider a production version of the same economy, it is no longer optimal to rely on capital controls to achieve the constrained social planner allocation so that the case of capital controls is weakened (Benigno et al. 2009).

(iii) From a quantitative point of view, the welfare gains for intervening before the crisis strikes are very small and lower than the gains from intervening during crisis periods.

Under which conditions is it then possible to rationalize the adoption of prudential policies?

The main reason for which there is limited scope for macroprudential policies is that crisis events are rare and not very costly in welfare terms. Here I propose two possibilities that could be considered. The first one is to study models of endogenous growth that would imply permanent level effects caused by crisis events. The second direction would be to examine models in which the real interest rate is endogenous so that when the crisis is particularly severe, the real interest rate can become negative. In an environment with nominal rigidities, monetary policy can then become constrained at the zero lower bound and the cost of the crisis could be higher. In this

sense it is important to study models in which nominal rigidities are combined with the Neo-Fisherian financial amplification mechanism.

The combination of elements coming from the New Keynesian literature and the Neo-Fisherian approach is of particular interest since it allows us to examine several policy questions that are part of the current policy debate. For example, it is possible to discuss the implications of monetary policy for financial stability broadly defined in terms of limiting the occurrence of crisis events, it would be possible to examine the extent to which monetary and macroprudential policies should be seen as complementary or substitute policy tools, and also it would allow us to understand the effects of macroprudential policies for price stability.

5. Conclusions

The recent financial crisis has led to a reconsideration of macroeconomic policy and has renewed the focus on financial stability and prudential policy measures aimed at containing systemic risks. There is a fast-growing literature both from an empirical and theoretical point of view that is addressing these policy concerns. In my remarks I point out the importance of understanding the relation among alternative prudential tools and the need to provide robust rationalization of prudential policy measures.

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