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Macroprudential regulation and the monetary transmission mechanism☆

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ABSTRACT

The paper presents a simple dynamic macroeconomic model of a bank-dominated financial system that captures some of the key credit market imperfections commonly found in middle-income countries. The model is used to analyze the interactions between monetary and macroprudential policies, involving, in the latter case, changes in reserve requirements. In addition to a qualitative analysis, a calibrated version is used to study numerically the transitional dynamics and steady-state effects of an increase in the reserve requirement ratio, under alternative parameter values. The analysis shows that understanding how these tools operate is essential because they may alter, possibly in substantial ways, the monetary transmission mechanism.

1. Introduction

The global financial crisis highlighted the need to make financial frictions front and center in macroeconomic analysis and monetary policy formulation. Among the various approaches that have been developed to address these issues, much interest has focused on extending models in the tradition of Bernanke et al. (2000), where agency costs—which arise endogenously—are the main source of credit market frictions and operate essentially through the cost of investment in physical capital. A key result of these models is that variations in borrowers' net worth (or collateral values) tend to magnify the impact of monetary shocks on prices and the supply side through a financial accelerator effect. Some of these extensions have taken the form of introducing banking systems and capital regulation in New Keynesian models, with more recent emphasis on the integration of countercyclical regulatory rules and how they interact with monetary policy.[1]

By and large, almost all the recent literature has focused on industrial countries. However, because there are significant differences between the financial systems in developed and developing countries, it is important to develop models that are appropriate for the latter group, instead of simply "importing" models that may turn out to be misleading for policy analysis.

Accordingly, the purpose of this paper is twofold. First, it presents a simple dynamic macroeconomic model of a bank-dominated financial system that captures some of the key credit market imperfections commonly found in middle-income countries.[2] The model builds on the static framework developed by

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[1] An integrated overview of the recent literature—which, admittedly, is evolving at a torrid pace—is sorely lacking. See Agénor and Alper (2012) and Brunnermeier et al. (2012), and the references therein, for the literature on New Keynesian models with banking and Agénor et al. (2012) for the literature on bank capital regulation in these models.

[2] We focus on middle-income countries because in most of them the financial system is sufficiently developed to allow monetary policy to operate through the manipulation of a short-term interest rate whose "pass-through" effect on market rates is fairly rapid, as in more developed countries. In many low-income countries, by contrast, monetary policy continues to be based on indirect instruments. At the

Agénor and Montiel (2008a,b) and extended by Agénor and Pereira da Silva (2012a). Even though its aggregate demand relationships are not derived from first principles, they are fairly intuitive and consistent with the evidence.[3] It provides in our view a better starting point to think about monetary policy in middle-income countries, compared to, say, the simple New Keynesian model (as described in Galí and Gertler, 2007 for instance), which by now is largely discredited. The days of studying monetary policy in models without money (and credit) are over, and we believe that some of the insights of our analysis may also prove useful in a developed-country setting.

Second, the paper uses the model to analyze how monetary and macroprudential policies interact to shape macroeconomic outcomes and mitigate the degree of procyclicality of the financial system.[4] This issue has received growing attention in the recent literature, but much of it is based on full-blown numerical models, where the intuition regarding the key mechanisms at play is not always clear. By contrast, we do so in a fairly transparent setting, and this is important to draw some general lessons. Our goal is to highlight, using a fully articulated macroeconomic framework, that understanding how macroprudential tools operate requires improved understanding of the monetary transmission mechanism, and that this in turn requires models in which credit market imperfections take center stage. Equally important, however, is the fact that macroprudential policy regimes may alter the monetary transmission mechanism, and understanding why and how this occurs is critical to the conduct of monetary policy.

The paper continues as follows. Section 2 provides some background to the analysis, in the form of a brief review of the type of financial market frictions that are prevalent in middle-income countries. Section 3 presents the model. It combines the cost channel of monetary policy with an explicit analysis of the links between bank monitoring, collateral, and bank pricing behavior. The bank lending rate is shown to incorporate a risk premium, which varies—in a manner similar to Bernanke et al. (2000)—inversely with the value of collateral. Moreover, at the prevailing lending rate, the supply of loans is perfectly elastic. There is therefore no endogenous credit rationing, although the nature and intensity of financial frictions do affect indirectly (through changes in the risk premium that banks impose on borrowers) the supply of credit. The central bank's supply of liquidity is perfectly elastic at a target interest rate. Abstracting from collateral considerations and penalty premia by the central bank, this is conceptually similar to assuming that monetary policy is implemented through a standing facility.[5] Section 4 presents the model's solution and characterizes its steady-state properties under two cases, exogenous and endogenous policy rates. Section 5 examines qualitatively the transmission mechanism of monetary and macroprudential policies, namely, increases in the central bank rate and the reserve requirement ratio. We focus on reserve requirements for two reasons. First, central banks in many developing countries (especially in Latin America) have used them extensively, time and again, as a substitute to monetary policy.[6] Second, their potential value as a tool capable of mitigating systemic risk and enhancing financial stability has regained importance in recent years—despite the fact that they may distort the financial intermediation process. We show, in particular, that a financial accelerator effect does exist, but it operates in different ways than in Bernanke et al. (2000); it occurs not through changes in asset prices but rather through changes in loan rates and factor prices. We also emphasize how the transmission process of each policy is affected by the nature of the other policy. In Section 6 the model is calibrated and used to study the transitional dynamics and steady-state effects of an increase in the reserve requirement ratio, under alternative parameter values. The final section considers some possible extensions of the analysis and offers some concluding remarks.[7]

2. Background

In most middle-income countries, commercial banks continue to dominate the financial system. Equity issues remain limited, despite recent progress in deepening local capital markets and changes in the ownership structure of firms. Although in recent years privatization and cross-border acquisitions have been accompanied by a significant improvement in the degree of banking sophistication in many countries, their financial systems continue to lag behind developments in industrial markets. In particular, and despite some exceptions, the expansion of nonbank financial intermediaries, the shift toward the "originate and distribute" model of banking, and the development of opaque, off-balance sheet instruments, have not reached the same importance as they have in advanced economies.[8]

At the same time, financial market imperfections remain pervasive in most of these countries. These imperfections cover a broad spectrum.[9] First, the fact that capital markets remain

same time, however, we also account for the fact that capital markets in middle-income countries remain underdeveloped or illiquid. Thus, firms in these countries have no real alternative but to borrow from commercial banks.

[3] The lack of explicit microfoundations for the aggregate demand side makes the model vulnerable to the Lucas critique. However, replacing these empirically-based behavioral relationships by optimization-based first-order conditions for which knowledge is incomplete or limited does not eliminate the problem; both approaches may end up making unwarranted assumptions about agents' response to a change in the policy environment (see Caballero, 2010). In addition, supposedly structural parameters may exhibit drift over time (see Hurtado, 2014).

[4] See Athanasoglou et al. (2014) for an overview of the literature on procyclicality in banking and Committee on the Global Financial System (2010), Bank of England (2011), International Monetary Fund (2011), and Galati and Moessner (2013) for a general discussion of macroprudential policy tools. Claessens et al. (2013) offer some evidence on the performance of these tools.

[5] In practice, standing facilities take the form of narrow corridors that constrain deviations of a short-term interest rate (typically a money market rate) from its target value, with open-market operations used for smoothing liquidity and dampening interest rate fluctuations. By providing unlimited access (subject to collateral and eligibility rules) to base money at the posted interest rate, these facilities make the supply of liquidity by the central bank endogenous. The implicit assumption here is that there is a zero-width band around the target rate.

[6] See Montoro and Moreno (2011) and Agénor and Pereira da Silva (2013). In recent years reserve requirements were indeed used in a countercyclical fashion to smooth the expansion phase of the cycle and to tighten monetary conditions without attracting capital inflows. During the global financial crisis, reserve requirements were lowered, in order to inject liquidity rapidly in the financial system and to restore market activity affected by sudden reversals in capital flows.

[7] The working paper version of this article considers how the transmission mechanism of monetary policy is altered in the presence of another macroprudential tool, an upper limit on banks' leverage ratio.

[8] In some industrial countries, non-banks—hedge funds, commodities funds, private equity groups, and money market funds—have become essential sources of credit (see Pozsar et al., 2010). Alternatives to conventional bank finance include invoice factoring or discounting (where a business borrows money against its invoices), asset-based financing (where money is borrowed against assets such as plant or machinery), peer-to-peer and consumer-to-business lending (in which individuals agree to lend money to each other or to businesses through an online money exchange). New lending models also involve providing cash advances to businesses (e.g., restaurants and hotels) that derive much of their income through credit card sales. However, some of these new lending models do have high defaults risks, so the cost of finance is not necessarily lower than in conventional banking. Even in industrial countries, they also haven't reached a critical mass of borrowers to be considered serious alternatives to bank finance.

[9] The discussion in this section is based on Agénor and Pereira da Silva (2010, 2013). See also Tornell and Westermann (2004) and Inter-American Development Bank (2005) for a discussion and a review of the evidence for Latin America. The emphasis in Tornell and Westermann is on financing constraints (which affect,