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Financial regulations and bank credit to the real economy

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ABSTRACT

We present a new agent-based model focusing on the linkage between the interbank market and the real economy with a stylised central bank acting as lender of last resort. Using this model we address the tradeoff between stability and economic performance for different structures of the interbank market. We also explore the efficacy of recent regulatory reforms using our richer model. Our results suggest that the effects of regulatory leverage ratios on the banking sector's performance can vary in a complex and non-monotonic way with the state of the economy, the degree of connectivity of the interbank market and the amount of information available to market participants on bank risks.

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1. Introduction

Among the most commonly cited factors for the 2008 financial and economic crisis are the excessive leverage that banks had built up under the previous Basel guidelines and the interconnectedness of the banking system which gave it a systemic dimension. In the aftermath of the crisis, a consultative document published by the Basel Committee on Banking Supervision (2009) highlighted both these factors. The document cited, as one of the main reasons that the economic and financial crisis became so severe, the excessive on- and off-balance sheet leverage built up by the banking sector of many countries. At the same time, many banks were holding insufficient liquidity buffers to face stressed and contingency outflows in case of the evaporation of the funding sources.

The banking system therefore was not able to absorb the resulting systemic trading and credit losses nor could it cope with the re-intermediation of large off-balance sheet exposures that had built up in the shadow banking system.

As one of the main shortcomings of the previous regulatory regime, the Basel Committee document identified the placing of too great a focus on idiosyncratic risk, i.e. micro-prudential regulation, at the expense of systemic risk, which would call for macro-prudential regulation. The post-crisis regulatory regime was therefore designed to include a significant macro-prudential component. The new proposals can be summarised as follows: ensuring that an adequate share of a bank's capital consists of 'plain vanilla' common equity, with full loss-absorbing potential; simplification and consistency in

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the definitions of both Tier 1 and Tier 2 capitals, focusing on financial instruments which can absorb losses on a going concern basis and further international harmonisation in the definition and regulation of hybrid and innovative capital.

The new Basel 3 leverage ratio is defined as a minimum of 3% of the capital measure to the exposure measure. The capital measure consists of Tier 1 capital as defined by the risk-based capital framework. The exposure measure is defined as the sum of the following exposures: (i) on-balance sheet exposures; (ii) derivative exposures; (iii) securities financing transaction exposures; and (iv) off-balance sheet items. One of the impacts of this new approach is that it considerably widens the definition of what constitutes leverage in the banking system. Thus even without altering the statutory leverage ratios, it would have considerably increased the burden on banks to either increase their capital or reduce their intermediation activity.

Critics of the new capital requirement, such as Beltratti and Stulz (2012), argue that banks that experienced the strongest decrease in market value were not correlated with those that had the highest leverage ratio and that it represents a sharp deviation from capital adequacy rules calibrated to risk weighted assets. Blum (2007), on the other hand, claims that the new regulation will reduce banks' incentives to understate their true risks, while Haldane and Madouros (2012) empirically support the thesis that the new leverage ratio appears to have greater pre-crisis predictive power than risk-weighted alternatives.

Critics of the new regulations also point to the fact that it is going to push banks towards issuing more equity which is a costlier form of financing than debt since equity holders require higher returns than debt holders. Cecchetti (2010) counter-argues that banks could meet the new rules by a combination of retaining more of their earnings, decreasing remuneration rates on debt liabilities and reducing overhead costs including managerial compensation. In addition, if the reforms make the banking system safer, the cost of raising equity might correspondingly fall. Whether or not the latter happens will in turn depend on whether obliging banks to reduce their leverage ratios will increase systemic safety more than it reduces their intermediating role and capacity to generate profits for shareholders. If that occurs, it will be more likely that the system will move into a long term equilibrium with greater stability and no sacrifice in efficiency.

The aim of this paper is to study this question, using an agent-based model of the banking sector coupled to a simplified real sector. Our model of the banking sector has been developed as part of a longer-term project on creating an agent-based model with endogenous determination of both the real macro-economy and the financial sector. In our model, the real economy is treated as a black box that demands funds from financial intermediaries, produces surpluses which sustain profitability and generates risk that underlies the riskiness of the banking system. This creates a basis for endogenising banks' choices on how much and where to invest their available funds and which sources to obtain funds from (however equity is considered fixed in the present model). The model is used to address the tradeoff between stability and efficiency of the banking system.

The context in which this tradeoff is studied needs to be clarified: ours is not a model of black swan events, *i.e.* large-scale bubbles and crashes, rather it is one in which both real sector lending and interbank lending fluctuate in an ongoing fashion due to defaults arising both from the real sector and within the interbank market. Stability in our model is measured via the rate at which banks default while efficiency is measured by the volume of funds intermediated to the real sector as well as by the aggregate profits generated within the banking and real sector.

A number of agent-based models have considered the interrelation between the credit market and the real economy and the possibly de-stabilising role of feedback loops between the two systems (Grilli et al., 2014; Tedeschi et al., 2012; Battiston et al., 2012; DelliGatti et al., 2009). However, in these models the emphasis is on the behaviour of firms and households, with banks providing credit following somewhat unrealistic rules of thumbs. In our model we take the opposite approach. We provide an agent-based micro-foundation to the strategies of banks while simplifying the role of households and firms, whose behaviour is captured by stochastic processes for deposit fluctuations and demand for loans.

The model builds on Iori et al. (2006) by endogenising (1) the allocation of a bank's funds between firm loans, inter bank loans, and cash reserves; (2) counter-party rating schemes and interest adjustment models; (3) lending as dependent on counter-party credit risk; (4) learning and strategic behaviour of banks; (5) banks decision rules are made contingent on leverage requirements and interbank exposure.

We use the model to study the comparative static effects of regulatory requirements, connectivity between banks and the relative size of the real to the financial sector. We also use the model to study the impact of recent reforms to regulatory policy, namely the Pillar 3 rules of Basel 2 that require the disclosure of information related to bank risk and counter-cyclical capital buffers as proposed under Basel 3.

The results of our model provide some support, albeit qualified, to the concerns raised by critics of the recent tightening of regulatory capital requirements under the new Basel framework. While low ceilings on leverage ratios can protect banks permanently from idiosyncratic as well as systemic risk, they do have an anti-competitive effect which hurts borrowers in the real economy, especially in times when the demand for bank credit is high. At the same time, while dynamically counter-cyclical leverage ceilings can reduce the rate of bank defaults, these too discourage the average level of financial intermediation to the real sector over the course of a business cycle.

Other results include the possibility that greater bank connectivity, which proxies for the removal of financial frictions, can have a non-monotonic effect on bank stability, first increasing the risk of contagion and then decreasing it. Finally, aggregate profitability of banks and firms, our proxy for the economic performance of the system, can also have an ambiguous relationship with both connectivity and regulatory leverages. There thus appears to be no “one-size-fits-all”

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