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Capital accumulation and regulation

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ABSTRACT

This paper sets up a dynamic model that analyzes a bank's capital decision and the impact of this decision on her default risk and lending that affects aggregate output in the economy under regulation. The model shows that even though capital regulation may reduce the default risk of the bank, it may lead to credit crunch, hence the ensuing decline in output in the real sector. Furthermore, it appears that the risk-based capital requirement changes the composition of both liability and asset of the bank's balance sheet.

1. Introduction

The policy discussions on the regulation of banks have mainly been concerned with capital adequacy and this has been reinforced by the work of the Basel Committee that makes refinements of existing capital adequacy rules the core part of its regulatory reform work known as "Basel II". The capital regulation suggested by "Basel II" is mainly intended to control the moral hazard (excessive risk-taking) induced by limited liability, which is a widely accepted explanation for the large number of bank failures that occurred in the 1980s and 1990s.

The Basel II accord recognized that the risk sensitiveness of capital requirements should be enhanced to strengthen the soundness and stability of the banking system over the world. Hence it forces banks to hold minimum capital requirements with respect to the risk they undertake[1].

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[1] Value at Risk (VaR) is one of the most popular tools used in risk measurement. The concept of VaR has now been incorporated in the Basel II to measure especially credit risk. This approach includes not only the exposure of risk factors but also the volatility of the risk factors. Although there are some drawbacks of this approach (for this see Danielsson (2003)), it is expected that VaR based capital requirements provide a stronger incentive for well capitalized banks to reduce asset risk by rewarding low-risk banks with lower capital requirements.

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However, the risk-based capital requirements have been criticized for not taking into account their impact on banks' lending. Hence, in this paper, we are also concerned with the impact of revised capital regulation on lending, in addition to its impact on risk taking.

Effects of capital adequacy rules on banks' behavior have been analyzed in the literature before. Two strands of the literature try to clarify capital regulation-related issues. The first strand focuses on whether capital requirements are an effective tool for limiting the risk on an asset portfolio, which is analyzed in a static or dynamic framework. The static models mainly take bank capital as exogenous and abstracting from dividend and recapitalization choices. For example, for value-maximizing banks, while Furlong and Keeley (1989) demonstrate that capital requirements reduce risk-taking incentives, Flannery (1989), in contrast, concludes that the regulation may lead to higher risk taking. In a mean-variance framework, Kim and Santomero (1988), Kohen and Santomero (1980), and Rochet (1992) show that improperly chosen risk weights may increase the riskiness of banks. Some other authors argue that capital requirements reduce monitoring incentives, which reduces the quality of banks' portfolios (e.g., Besanko & Kanatas, 1993; Boot & Greenbaum, 1993).

However, static models do not consider the banks' franchise value (expected future income) and, therefore, they give an incomplete explanation of banks' capital. Hence dynamic models are more appropriate for analyzing the impacts of risk-based capital requirements. Taking into account the dynamic aspects of the problem, some studies show that capital requirement can be an effective tool for reducing risk-taking, while some other studies indicate that the capital regulation can induce risk-taking or have an ambiguous impact.

For example, in a dynamic model, Hellmann, Murdock, and Stiglitz (2000) show that capital requirements force banks to have more of their own capital at risk so that they can be induced to invest in the prudent asset. Repullo (2004), following the main framework of Hellmann et al. (2000), finds out the similar results: if the capital requirement is imposed, the bank becomes more prudent, holding less risky assets. Similarly, Milne (2004) finds that in the short run, negative cash flow and higher capital requirements reduce risk-taking and lending, with greatest impact on severely undercapitalized banks. In contrast to these results, for example, Blum (1999) demonstrates that capital adequacy rules may increase the bank investment in the risky asset because raising equity may be excessively costly, the only possibility to increase equity tomorrow is to increase risk today under binding capital requirements. Pelizzon and Schaefer (2003), in a multi-period model under a VaR constraint, find the similar results to those of Blum (1999), i.e., capital regulation can induce a bank to undertake more risk due to her intertemporal concerns. However, Keppo, Kofman and Meng (2008) indicate that the impact of the capital regulation on default probability can be ambiguous. They find out that risk-based capital requirement may cause both positive (fall in the cash flow volatility) and negative (fall in the recapitalization level) effects on the default probability. That is, it is not guaranteed that the capital requirement has positive (or negative) effects on the default probability.

The second strand of the literature analyzes the macroeconomic implications of capital requirements. One of the earliest attempts to examine the macroeconomic implications of bank capital regulation is Blum and Hellwig (1995). They show that since there is a bank lending channel of monetary policy, reductions in bank credit brought about by risk-based capital requirements can constrain real investment expenditures. Thakor (1996) also suggests that capital regulation potentially reduces the ability of monetary policy expansions to induce bank lending. In a different context, Kopecky and VanHoose (2004) conclude that binding capital requirements lead to a decline in aggregate loans and induce banks to hold more non-loan, security assets. Tanaka (2002) reaches an analogous conclusion within an IS-LM-style framework. He finds that the immediate effect of binding capital requirements is to alter the interest sensitivity and investment relationship and demonstrates that the monetary transmission mechanism is weakened if banks are poorly capitalized. On the other hand, Miyake and Nakamura (2006) provide a very different analysis of the macroeconomic effects of bank capital regulation. Utilizing a dynamic overlapping-generations model, they find that the imposition of bank capital regulation may lead to a reduction in equilibrium income.

The second strand of the literature also provides an argument for linking capital requirements to the business cycle—the cyclicality issue. By cyclicality, it is commonly meant as the amplification of the business cycle due to the reduction in credit availability in recession periods (and vice versa in expansion periods). If the capital requirement is risk-sensitive, it is likely to increase during recessions