Monetary policy with a touch of Basel

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ABSTRACT

The unfolding subprime crisis and the challenges facing central banks in using monetary policy to resolve the possible credit crunch, highlight the importance of understanding the relationship between monetary policy and risk-based capital requirements. We explore the implications of risk-based capital requirements, à la Basel, for the conduct of monetary policy. A "bank balance-sheet channel" of monetary policy is identified, which operates through bank capital and influences the bank's loan decision. Using a dynamic banking model, we endogenize the capital decision and show that banks are likely to hold capital above the regulatory minimum to avoid being constrained. We derive the option value of holding capital, and show how this value is affected by monetary policy, level of economic activity, structure of the banking industry, and by changes in the level of regulatory capital.

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1. Introduction

The ongoing subprime crisis illustrates the interconnection between regulatory constraints and the effectiveness of monetary policy.[1] The top 25 banks in the United States (Europe), which had 8.3% (8.1%) Tier 1 capital and 11.4% (11.6%) in the form of total capital in the third quarter of 2007 (right before the substantial losses due to subprime lending), had to raise more than $270 Billion of new capital to increase their ability to issue new loans.[2] More recently the stress test of the 19 largest

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  [1] See VanHoose (2008), Giles and Tett (2008), and BIS (2008).
  [2] See Thomson Financial (2007). More specifically, CitiGroup announced in their Fourth Quarter 2007 Earnings Review that they raised $12.5 Billion of capital January 15, 2008. This action raised their Tier 1 capital ratio (Total capital ratio) to 6.6% (8.2%), since their Tier 1 capital ratio fell from 6.7% (8.3%) in the first quarter of 2007 to 5.7% (7.1%) in the fourth quarter of 2007. The Tier 1 capital ratio must be above 6% for a bank to be classified as "well capitalized" in the United States.

banks in the United States estimated that the banks would have to raise an additional $362.9 Billion over and above the 208.6 Billion in TARP funds to weather the adverse scenario developed by its Treasury Department.[3] Thus the ability of the Federal Reserve and the ECB to stimulate the economies of countries affected by the subprime crisis was limited by the availability of required capital.

A growing body of research has now documented the implications of the new risk-based capital requirements for the banks' behavior, in particular for asset portfolio allocation and lending behavior.[4] Over the last twenty years, the Basel Accord, originally developed for the G-10 countries, was gradually adopted by a large percentage of countries in the world.[5] While some of the implications were clearly intended by the designers of the Basel Accord, there is now consensus on the unintended effects of the capital requirements on the banks' behavior. A number of papers have pointed out that Basel type risk-based capital requirements may have contributed to the credit crunch of the early 1990s in the US and in other emerging economies, and induced banks to engage in what is now referred to as "regulatory capital arbitrage."[6] This has given rise to a debate on the optimal design of bank regulations and supervision measures that rely on capital as a sufficient statistic, but which recognize the incentive effects of risk-based capital requirements on bank behavior. With the push towards global harmonization of bank regulations and the increased reliance on capital adequacy ratios to control bank behavior, the question now becomes, what are the implications for the conduct of monetary policy?

In this paper, we show that, under Basel-type capital requirements, monetary policy will influence a bank's capital and, as a result, its lending behavior. We develop a dynamic model in which risk neutral banks are assumed to maximize the present value of all future profits, subject to a total capital constraint in an imperfectly competitive banking industry. To mimic the Basel Accord the loans are restricted based on the amount of total capital determined in the previous quarter. This industry structure implies that the optimal net interest margin on loans is usually above the marginal resource cost of deposits and loans such that there usually are economic profits. We show that in anticipation of the possibility that the total capital constraint binds, and its negative impact on bank profits, the bank will choose an optimal level of total capital this quarter to minimize the possibility of the total capital constraint binding next quarter subject to a marginal cost of total capital. Thus, banks in this world find it optimal to hold capital above the regulatory level.[7]

Monetary policy, in this model, influences the bank's decision to extend credit, by affecting the option value of holding bank capital, and the bank's equity decision. For example, a tight monetary policy, which raises the federal funds rate, will induce the bank to raise its current and future deposit rate. In the presence of an imperfectly competitive loan market, the bank will also reduce the net interest rate margin between loan and deposit rates. Moreover, the persistent increase in the deposit rate will raise the marginal cost of funding, which all else being equal, reduces the supply of future loans and the probability that the capital constraint will bind during the next quarter. This reduces the option value of holding more capital. As a result, the bank will hold less equity this quarter, which further reduces the supply of loans issued next quarter. Thus, contractionary monetary policy, through the decline in the bank's total capital, leads to a decline in loans in the next quarter. By affecting the bank capital, monetary policy affects the capacity of banks to lend. This gives rise to a "bank capital financial accelerator" in our model, which is distinct from the well known financial accelerator discussed in the literature; the latter arises due to the impact of the monetary policy on the balance sheet of borrowers, and, consequently, on the demand for loans. Nevertheless, the two effects, one arising from the supply side of loans and the other from the demand side for loans, together amplify the impact of monetary policy on the economy.

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[3] See Financial Times May 8, 2009.

[4] In fact, most banks focus on capital as the binding constraint in deciding whether to issue a loan. A bank identifies the risk-adjusted rate of return on a particular loan. This rate of return must exceed the return on capital for the loan to be funded.

[5] See Barajas et al. (2004) for adoption dates for 125 countries.

[6] See Bernanke and Lown (1991), Chiuri, Ferri, and Majnoni (2002) and Jones (2000), among others. See also Kupiec (2001) for a critique.

[7] Barajas et al. (2004) provide evidence that the total capital and Tier 1 ratios are significantly above the Basel regulation for 125 countries.