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Bank capital buffer and portfolio risk: The influence of business cycle and revenue diversification

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ABSTRACT

The relationship between macroeconomic developments and bank capital buffer and portfolio risk adjustments is relevant to assess the efficacy of newly created countercyclical buffer requirements. Using the U.S. bank holding company data over the period 1992:Q1–2011:Q3, we find a negative relationship between the business cycle and capital buffer. Our results offer some support for the Basel III agreements that countercyclical capital buffer in the banking sector is necessary to help the performance of the real economy during recessions. We find a robust evidence of inverse relationship between business cycle and bank default risk. Our analysis provides evidence of diversification benefits. The probability of insolvency risk decreases for diversified banks and banks with high revenue diversity achieve capital savings.

1. Introduction

During the recent economic recession, the U.S. banking industry has experienced a significant number of bank failures.[1] The experiences from bank crises have made regulators, shareholders and bank themselves more aware of the importance of sufficient capital buffers. Banks retain capital buffers above the regulatory minimum as a cushion to absorb adverse financial consequences due to unexpected asset returns.[2] Excess capital acts as an insurance against costs that may occur due to unexpected capital shocks and difficulties in raising new capital. A breach of the regulatory minimum capital requirements triggers costly supervisory intervention, possibly even leading to the firm's closure. As a consequence, banks have an incentive to hold a buffer of excess capital to avoid costs associated with supervisory action if they approach or fall below the regulatory minimum capital ratio (e.g., Marcus, 1984; Furfine, 2001). Banks may maintain excess capital as a signal of soundness to the market and satisfy the expectations of rating agencies (Jackson et al., 1999). These market disciplines may lead banks to hold more capital than required by regulators.

As Basel III agreements on banking supervision are recently endorsed, the management of capital buffers over the business cycle is increasingly important to reinforce the financial stability of the banking systems.[3] Under a new regime, banks are required to build up the extra capital above the regulatory minimum requirement that can be used in stress. The new rules create a 'countercyclical capital buffer' within a range of 0–2.5% of common equity that is designed to dilute lending bubbles by requiring banks to increase their capital buffers in cyclical upturns.[4] The proximate objectives of the countercyclical capital buffer regime are to constrain loan growth during a credit boom and to ensure that a sufficient buffer of capital is available to absorb negative capital shocks in downturns (Drehmann et al., 2010; Francis and Osborne, 2012). In other words, the countercyclical buffer requirement is developed to ensure that the banking sector in aggregate has a buffer of capital to protect it against future potential losses and to facilitate the flow of credit in the economy when the whole financial system experiences stress after a period of credit boom.

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[1] According to the failed bank list of the Federal Deposit Insurance Corporation (FDIC), 361 banks have failed from January 2008 to April 2011, while only 27 banks failed between October 2000 and December 2007.

[2] See Berger et al. (1995) for detailed discussions about why banks should hold capital.

[3] The agreement on the Basel III reforms for international banking has reached in September 12, 2010 by the Group of Governors and Heads of Supervision.

[4] The capital buffer will be phased in from January 2016 and will be fully effective in January 2019. The countercyclical capital buffer will be met at 0% before 2016, 0.625% on January 2016, 1.25% on January 2017, 1.875% on January 2018, and 2.5% of common equity on January 2019.

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In this paper, we investigate the question about whether bank's capital buffers behave procyclically or anticyclically over the business cycle. We examine in particular whether capital buffers rise in business upturns and fall in business downturns (positive co-movement) or whether capital buffers exhibit the opposite behavior (negative co-movement) for the U.S. bank holding companies.[5] Our evidence on the relationship between macroeconomic developments and banks' capital buffer adjustments is relevant to assess the efficacy of newly created countercyclical buffer requirements.

The capital shock is likely to be driven by materialization of default (i.e., credit) risk in lending, which tends to be associated with business cycle. In an economic downturn when counterparties are more likely to be downgraded, the expected credit risk will increase, while the expected credit risk will decrease during an economic upturn. Empirical studies show that credit risk is highly correlated with changes in the business cycle. Allen and Saunders (2003) find that credit quality deteriorates and the probability of default gets higher during recessions. Curry et al. (2008) show that the probability of default rises during recession and default risk is decreasing during periods of recovery and expansion.

It is argued in the literature that, given this anticyclical behavior (moving in the opposite direction with the business cycle) of credit risk, banks' behavior on their capital buffers is likely to vary according to the stage of the business cycle and the bank's own financial situation (e.g., Ayuso et al., 2004). A forward-looking bank is likely to expand their loan portfolio during periods of economic upturn. Banks are also expected to build up their capital buffers to provide protection against the associated credit risk. An underlying rationale for building up of excess capital during upturns is that portfolio risks may increase in good times (Crockett, 2001). The building up of capital defenses may help to moderate excessive credit growth in periods when economic conditions are buoyant. These capital buffers would be consumed for credit losses during severe downturns. If the capital buffers were sufficient to conquer a downturn, lending activities would not be strictly restricted. Increasing capital buffer s is actually easier and more cost effective in booms than in economic troughs. Hence, the capital buffer is expected to behave procyclically for the forward-looking bank.

In contrast, banks may expand their loan portfolios during upturns without increasing their capital buffers accordingly since some banks tend to underestimate potential risks during periods of economic expansion when risks are less likely to immediately materialize. When the economic downturn sets in, raising external capital is extremely costly and retained earnings as a main source of building up capital may not be an option due to lower returns. The inability to raise capital buffer may restrict banks' lending activity. Thus, banks are forced to increase their capital buffers through a reduction in risk-weighted assets. In this case, the capital buffer is expected to behave anticyclically with potentially adverse effects on bank lending during business cycle downturns. The subsequent credit squeeze would contribute to a deeper downturn in the economy that ultimately undermines the stability of banking sector, generating a vicious circle.

These countervailing predictions highlight the importance of empirical studies that would provide evidence on the relationship between banks' building up of capital buffer and business cycle. Some prior studies have investigated the relationship between the capital buffers of banks and the rate of GDP growth, although the evidence is still limited. Ayuso et al. (2004) find a negative relationship between the business cycle and the capital buffers of Spanish banks. Jokipii and Milne (2008) show that the cyclical behavior of European bank capital buffers varies according to size and type of bank. Capital buffers rise in recession for large banks, commercial and savings banks, while capital buffers co-move positively with the business cycle, falling in recession for small banks and co-operative banks as well as those in accession countries. These substantial differences among banks draw attention to further research to elucidate the cyclical behavior of banks' capital buffers.

This paper makes several contributions to the literature in the following aspects. First, as the Gramm–Leach–Bliley Act of 1999 allows full affiliation of banking with underwriting and agency activities in securities and insurance, U.S. banks have expanded their business activities from traditional loan making toward a broader range of financial services that generate fee income, trading revenue and other types of non-interest income. The increased shifts toward non-interest activities provide an interesting environment where we can examine how these diversification choices impact the changes of banks' capital buffer and portfolio risk.

Diversification is an important management strategy for the bank's revenue growth. The motives for diversifying the sources of bank revenue and its effects have received considerable attention in the literature (e.g., DeYoung and Roland, 2001; Stiroh, 2004; Stiroh and Rumble, 2006). Banks might increase the production and sale of fee-based financial services to exploit cost scope economies by sharing inputs in joint production. Banks may take advantage of revenue scope economies by providing cross-selling opportunities to customers who are willing to pay for the extra convenience of financial supermarkets (e.g., Gallo et al., 1996). Banks may reduce their capital requirements if increasing the share of non-interest income in the bank's revenue portfolio mitigates overall earnings volatility. Perold (2001) argues that diversification across business segments diminishes the firm's deadweight cost of risk capital. Despite the potential benefits associated with diversification, one line of research suggests that there may be costs arising from corporate diversification. Berger and Ofek (1995) argue that diversification may lead to inefficient cross-subsidization across segments because of the agency problems that allow poor segments to drain resources from better-performing segments. Managers may seek to diversify in their own interests, sacrificing firm value (Jensen, 1986).

In this paper, we are particularly interested in investigating whether the increased non-interest income is associated with changes in the bank's capital buffer and risk and whether the revenue diversification contributes to lowering the probability of bank default and helps banks build up their capital buffer. To our knowledge, this is the first study that investigates the impact of both revenue diversification and increased non-interest income on the bank's capital buffer and risk adjustments. This is an important question for bank regulators who should take into account diversification effects in assessing the riskiness of banks' portfolio and the adequacy of capital buffer.

Second, we use a series of pooled cross sectional and time-series data over the period 1992–2011, which embraces the most recent economic downturns that has been one of the hardest-hit periods for U.S. banks failures. This study provides new empirical evidence on how banks' capital buffers behave throughout the business cycle in response to counter-cyclicality of the recent Basel III capital legislation for the U.S. bank holding companies.

Third, banks consider risk profile of their portfolios when deciding on the amount of capital buffers. The literature suggests that the level of banks' asset risk will be changed according to the general economic and financial conditions. More importantly, capital buffers and risk exposures are simultaneously determined and closely linked to business cycle. Unlike the previous studies that focus on the cyclical patterns of capital buffer, we incorporate the relationship between banks' capital buffer and risk adjustment and real economy simultaneously in our empirical model.

[5] For brevity, we use banks in referring to the bank holding companies in the remainder of the paper.