Bank Interest Margin and Default Risk under Basel III Capped Capital Adequacy Accord and Regulatory Deposit Insurance Fund Protection

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Abstract
We study the optimal bank interest margin and default risk under the capped ratio schedule of government capital instruments in the Basel III Capital Adequacy Accord and the Deposit Insurance Fund arrangement program. We show that an increase in the capped ratio (a decrease in the capped government capital injection) increases the default risk in the bank’s equity return at a reduced interest margin. Regulatory deposit insurance fund protection reinforces the reduced bank interest margin and the increased default risk. The capped ratio schedule as well as the fund protection program makes the bank more prone to loan risk-taking, thereby adversely affecting the stability of banking system. This paper suggests that the two means of government intervention in response to the recent financial crisis might be not appropriate for a bank in distress, particularly from the standpoint of bank failure.

Keywords: Basel III, deposit insurance fund, government capital injection, bank interest margin, default risk

1. Introduction

“At the Basel III meeting, the central bank’s governors agree … Government capital instruments that no longer qualify as non-common equity Tier 1 or Tier 2 capital will be phased-out over a 10-year period beginning on January 1, 2013. Beginning in 2013, the recognition of these instruments as qualifying capital will be capped at 90% of the minimal amount of such instruments outstanding, with the cap declining by 10% in each subsequent year.” Eubanks (2010). Such a schedule is called the capped ratio schedule of government capital instruments in the Basel III Capital Adequacy Accord (BCAA), which provides an opportunity to reexamine bank distress liquidity management related to the stability of the banking system. It is realized that a liquidity shock is an event where banks suddenly need resources.

Parallel to the development of the BCAA, there has been an ongoing discussion about the role of deposit insurance fund protection to influence bank behavior and make banks more robust against shocks, i.e., to “strengthen the soundness and stability of banks” in the Deposit Insurance Fund (DIF) protection. The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) requires that the DIF reserve ratio reach 1.35 percent by September 30, 2020 (Note 1). Hamilton (2013) reports that the reserve ratio is at 0.45 percent at the end of 2012 that the fund has much less than it required ratio of 1.35 percent of the deposits it insures and the Federal Deposit Insurance Corporation (FDIC) expects to reach goal by 2020. This also provides an opportunity to reinvestigate bank distress liquidity management related to the stability of the banking system. It is realized that a liquidity shock is an event where banks suddenly need resources.

The bank interest margin, that is the spread between the loan rate and the deposit rate, represents one of the principal elements of bank’s net cash flows and earnings. This margin is often used in the literature as a proxy for the efficiency of financial liquidity. Prior research examines ex ante and ex post bank reactions to introduction of government capital injections but fails to consider the impacts of the capped ratio of BCAA and the regulatory deposit insurance protection on bank interest margin and further on bankruptcy prediction (for example, Lin et al.,
2012). This omission is critical because capital on bank performance is influenced by the capped ratio schedule of the BCAA and insurance fund on bank performance is also affected by the regulatory protection of the Dodd-Frank Act. The purpose of this paper is to incorporate a capped schedule into a regulatory barrier option framework of a bank in distress. It is shown that an increase in the capped ratio (a decrease in the capped government capital injection) increases the default risk in the bank’s equity return at a reduced margin. Furthermore, regulatory insurance fund protection reinforces the reduced margin and the increased default risk. Government intervention in response to a financial turmoil as such makes the bank more prone to risk-taking, thereby adversely affecting the stability of the banking system.

Basel III received harsh criticisms from the banking industry and regulators (Note 2). We add to the criticism arguing that a decreasing cap on qualified capital under the regulatory capital requirement of Basel III makes banks more prone to risk-taking. The cap schedule in BCAA favors banks with a higher level of either private capital or government capital injections. Our argument is consistent with the demonstration of Eubanks (2010) that European banks are most critical of the proposal, arguing that Basel III favors U.S. banks because they have historically maintained a higher level of capital (Note 3). The cap schedule as such also favors a lower level of risk-based system of capital standards. Moreover, Basel III may conflict with countries’ own regulatory efforts. For example, the United States (the Dodd-Frank Act) and Germany (the Act for Strengthening of Financial Markets and Insurance Supervision) have pushed for tougher rules and are moving ahead with additional regulatory restrictions on their financial institutions (Eubanks, 2010) (Note 4). The suggestion of Eubanks (2010) needs to be more nuanced due to our argument: regulatory insurance fund protection reinforces the effect of BCAA on the reduced interest margin and the increased default risk in the bank’s equity return. However, Basel III is not a treaty, but is a work in progress that is far from completion, and the regulatory authorities may modify the agreement to suit their financial regulatory structures.

2. The Framework

Consider a bank that makes decisions in a single period horizon with two dates, 0 and 1, \( t \in [0, 1] \). At \( t = 0 \), the bank accepts \( D > 0 \) dollars of deposits. The bank provides depositors with a market rate of return equal to the risk-free rate \( R_D > 0 \) (Lin et al., 2012). The bank’s shareholders contribute equity capital \( K > 0 \) at \( t = 0 \) with a required security-market rate of return \( R > 0 \) on their investment, where \( R > R_D \) reflects the scarcity of shareholders’ wealth. The bank in distress participates in a government capital injection program that provides a source of capital \( gK > 0 \) at \( t = 0 \) for the bank when public market alternatives are unavailable (Bayazitova and Shivdasani, 2012). A rate of return \( R \) on the capital injection is required as well. Equity capital \( K + gK \) held by the bank is tied by regulation with a capped schedule to be a fixed proportion \( q \) of the bank’s deposits \( qD \), where \( 0 < q < 1 \) is the capped ratio and \( q > 0 \) is the required minimum capital-to-deposits ratio. According to BCAA, the recognition of \( gK \) as qualifying capital will be capped at \( 1 - \alpha \) of the nominal amount of such outstanding government capital injection (Eubanks, 2010).

Loans of the bank \( L > 0 \) belong to a single homogeneous class of fixed-rate claim that mature at \( t = 1 \). The demand for loans is governed by a downward-sloping demand function \( L(R_L) \) where \( R_L > 0 \) is the loan rate chosen by the bank (Lin et al., 2012). Loans are risky because they are subject to non-performance. In addition to loans, the bank can also hold an amount \( B > 0 \) of liquid assets on its balance sheet during \( t \in [0, 1] \). These assets earn the security-market interest rate of \( R \). When the capital constraint is binding, the bank’s balance-sheet liquidity constraint is given by:

\[
L + B = D + K + (1 - \alpha)K_g + \alpha K_g = [K + (1 - \alpha)K_g] \left(\frac{1}{q} + 1\right) + \alpha K_g
\]

(1)

where the amount of \( \alpha K_g \) no longer qualifies as non-common equity capital based on the regulation of BCAA.

The bank’s objective is to set \( R_L \) to maximize the expected market value of a path-dependent, barrier option function defined as in term of net worth at \( t = 1 \), subject to Eq. (1). We argue that path dependency is a fundamental characteristic of corporate securities because the distressed bank’s net equity can be knocked out whenever a legally
post-crisis reform proposals tend to focus on how capital regulation and deposit insurance fund arrangement should adapt to prevent future crisis.

5. Conclusion

The barrier options theory of corporate security valuation is applied to the contingent of a bank under a capped ratio schedule of government capital injections in BCAA. Moreover, the modeled barrier structure can explicitly capture the regulatory issue of deposit insurance fund protection in the spirit of the Dodd-Frank Act. Results are derived that should be of interest to investors, bank managers, and policy makers. For example, an increase in the capped ratio (equivalently a decrease in the qualified regulatory capital) when the government capital injection is increased has a negative effect on bank interest margin, and further has a positive effect on default risk. Furthermore, these effects become more significant when the regulatory deposit insurance fund protection is increased. In conclusion, it is shown that the barrier option model is intimately relevant to regulation under the BCAA and insurance fund protection under the Dodd-Frank Act.

Of course, we may question whether government capital injections are a cost-efficient solution and if alternative strategies such as government guaranteed debt issuance programs and/or purchases of distressed assets by the government would have yielded better outcomes. Such concerns are beyond the scope of this research and so are not addressed here. What this research does demonstrate, however, is the important role played by BCAA associated with the Dodd-Frank Act in affecting the stability of the banking system.

References


**Notes**


Note 2. For example, the Institute of International Finance warned in June 2010 that the Basel III proposal would require that these large banks raise $700 billion in common equity and issue $5.4 trillion in long term debt over next five years to meet the standards, which would cause a 3% decline in the U.S. GDP compared with what it would otherwise be in five years (Pruzin, 2010). JP Morgan Chase and Morgan Stanley argued that the Basel III proposal would significantly reduce the availability of credit to the U.S. economy (see http://www.bis.org/publ/bcbs165/jpmorganchase.pdf and http://www.bis.org/publ/bcbs165/morganstanley.pdf). Deutsche Bank’s comment was that the timetable was too short to increase common equity because the prospects for future profits, the main source of common equity, are not good for the short (see http://www.bis.org/publ/bcbs165/deutschebankcap.pdf).

Note 3. The recent financial crisis raises fundamental issues about the role of bank equity capital, particular from standpoint of bank survival (see, for example, Kashyap et al., 2010, Mehran and Thakor, 2011, and Berger and Bouwman, 2013). We add to the literature on bank equity capital by providing a formal illustration of BCAA.

Note 4. Literature on protecting the insurance funds and the stability of the banking system includes, for example, Mazumdar (1997), Bhattacharya et al. (2002), Episcopos (2008), and Chen et al. (2014). Our paper may be viewed as complementary to these studies by adding the issue of BCAA.

Note 5. For simplicity, we consider only the case of a constant barrier, \( H = \beta Z \) in Eq. (2). Brockman and Turtle (2003) develop a model of firms with exactly this structure.

Note 6. However, Brockman and Turtle (2003) present strong evidence that firm-specific barriers are non-zero across firms in their empirical sample.

Note 7. The average barrier estimates by year is form 0.5900 with a corresponding standard deviation of 0.2227 to 0.8395 with a corresponding standard deviation of 0.1405, and the average asset volatility is 0.2904 with a corresponding standard deviation of 0.2608 in the empirical findings of Brockman and Turtle (2003).