



Should bank loan portfolio be diversified under government capital injection and deposit insurance fund protection?



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ABSTRACT

The barrier option theory is applied to the contingent claims of a regulated bank under multiple loan portfolio diversifications and government capital injections. An increase in capital injection increases the bank's interest margin and decreases the default risk. With increased government capital injection, profitability is increased and stability is reduced when the diversification degree increases. The increased return and the reduced risk are attenuated as the deposit insurance fund protection increases. Although the bank faces the two conflicting capitalization policies, we may suggest that loan portfolio should be as diversified as possible, producing better profitability and greater safety for the bank.

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1. Introduction

Should bank loan portfolio be focused or diversified? Traditional arguments based on Diamond (1984) suggest that bank should be as diversified as possible. Does the extent of loan portfolio focus or multiple diversifications affects default risk in a distressed bank's equity return under (often conflicting) capitalization intervention and regulation? In this paper, we undertake a theoretical analysis of the question. The answer we present suggests that, in accord with the recommendations of traditional portfolio and banking theories, multiple loan portfolio diversifications with government capitalization may produce superior return performance and greater safety for a bank during a financial crisis.

There are several reasons why the loan portfolio focus versus multiple diversifications issue is important in the context of a distressed bank. First, there is a wide-spread view that some banks have taken excessive risks before the onset of the recent banking crisis (Pausch & Welzel, 2012). Credit derivatives are financial diversification contracts that provide insurance against credit-related losses. Several factors complicate the pricing of default risk in the current marketplace. In practice, counterparties may seek to price risk rather than mitigate it; alternatively, counterparties may seek to mitigate risk rather than price it. On a related loan portfolio hedging diversification, banks can attempt to come to some agreement about the degree of credit risk and use that knowledge to price their positions. Banks can use total return swaps to hedging against adverse moves in the credit quality of their loan portfolios (Sorensen & Bollier, 1994). Alternatively, credit swaps are appealing to banks whose loan portfolios are concentrated in particular

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industries. Banks can deal with credit risk by seeking to mitigate it with loan portfolio industry diversification (Neal, 1996). Perhaps, when a bank has some market power in lending (Tsai & Hung, 2013), one way the bank may attempt to diversify its credit risk is by shifting some of its investments to a highly competitive loan market. Rather than pricing or mitigating credit risk separately, we can seek to price and mitigate it, explicitly consider the issue of focus versus multiple diversifications. In addition to being complementary to the literature, our findings have importance and direct implications for the optimal size and scope for the bank under government capital injection.

In addition, a bank in distress faces conflicting capitalization regulations that create an incentive either to diversify or to focus its loan portfolio as argued by Acharya, Hasan, and Saunders (2006), such as the Capital Purchase Program of the Troubled Asset Relief Program (TARP) and the Deposit Insurance Fund of the Federal Deposit Insurance Corporation Improvement Act (FDICIA). The original focus of TARP appears to have been the stabilization of the banking sector. In this respect, TARP is designed to improve the safety and soundness of the banking system through increased capitalization during a financial crisis (Black & Hazelwood, 2013). In parallel with TARP, a mandate of the FDICIA is that prompt correction action should be initiated if the bank fails to meet minimum levels of capital adequacy during a financial turmoil. These levels activate increasingly severe restrictions on banks whose capital base is deteriorating (Episcopos, 2008). Hence, from a policy standpoint, it is interesting to ask whether a distressed bank benefits or gets hurt from diversification of its loan portfolio.

The bank interest margin, i.e., the spread between the loan rate and the deposit rate, is one of the principal elements of bank net cash flows and earnings, and is often used as a proxy for the efficiency of financial intermediation (Saunders & Schumacher, 2000). In practice, spread management is done through a “cost of goods sold” approach in which deposits are the “material” and loans are the “work in process” (Finn & Frederick, 1992). The purpose of this paper is to follow this approach by providing a barrier option model of bank behavior to study the determination of optimal bank interest margins, and further default risks. Our model features a distressed bank facing loan portfolio focus, hedging diversification, industry diversification, or multiple diversifications under government capital injection and deposit insurance fund protection.

It is found that an increase in the government capital injection has a positive effect on the optimal bank interest margin, and further a negative effect on the default risk in the distressed bank’s equity returns. Capital injection as such makes the bank less prone to loan risk-taking, thereby contributing to the stability of the banking system (Bayazitova & Shivdasani, 2012). Furthermore, the positive effect is increased and the negative effect is reduced as the bank becomes more diversified in its loan portfolio. The findings suggest that diversification of bank loan portfolio may produce superior return performance and greater safety for the bank, consistent with traditional portfolio theory wisdom (Diamond, 1984). The positive effect on the margin is reduced and the negative effect on the default risk is reinforced when the regulatory barrier raises. Better protection of the insurance fund by increasing the regulatory barrier tends to reduce bank incentive to take more risk. This result is supported by Episcopos (2008).

One immediate application of this paper is to examine the plethora of loan portfolio focus versus multiple diversification arrangements proposed as alternatives for return and risk performance evaluation during a financial crisis. In particular, one frequent suggestion is that an individual bank may benefit from diversification of its loan portfolio (Diamond, 1984). This paper provides one explanation why this should be expected, in particular under a distressed bank facing conflicting capitalization intervention and regulation. The extent is important because it not only demands evaluations of the impacts of changes in regulatory environment on the banking activities, which might provide motives for individual banks to diversify, but it also mandates careful investigation of the effects of multiple loan portfolio strategies on bank performance. In conclusion, we suggest that multiple loan portfolio diversification strategies may have resulted in decreased risk taking and superior return performance during a financial crisis.

The remainder of the paper is structured as follows. In the next section, we briefly review the related literature. Section 3 delineates the barrier option model of a distressed bank facing loan portfolio focus versus multiple diversifications under capitalization intervention and deposit insurance fund protection. Section 4 derives equilibrium solution and comparative static results. Section 5 presents numerical analysis to explain the comparative static results. We make our conclusions in the last section.

2. Related literature

Our theory of multiple loan portfolio diversifications is related to the following strands of the literature. The first is the literature on the question whether or not to diversify, in which Diamond (1984), Winton (1999), Acharya et al. (2006), and Berger, Hasan, and Zhou (2010) are major contributors. Diamond (1984) concludes that a bank may maximize the gains from delegated monitoring by perfect diversification. Winton (1999) models the tradeoff between diversification and specification and shows that the gains from diversification are most dominant when the bank has a medium risk level. Acharya et al. (2006) demonstrate that diversification is not guaranteed to produce efficient performance and/or greater safety for individual banks. Berger et al. (2010) show that aggressive diversification strategies may have resulted in increased risk taking and inferior performance during the recent financial crisis. Motivated by the ongoing debate, we assess the extent to which loan portfolio focus versus alternative diversification strategies, including swap hedging and/or industry diversifying, affects return and stability performance under bank recapitalization in a financial crisis.

The second strand is the modern bank capitalization literature. Hoshi and Kashyap (2010) and Bayazitova and Shivdasani (2012) indicate that a government capital injection program can stabilize banks in distress by providing a source of capital. Lin, Tsai, and Hung (2014) argue that government capital injections tend to be successful in improving bank equity returns. However, Breitenfellner and Wagner (2010) argue that, with a government capital injection program, there is little incentive for distressed banks to pursue sophisticated risk management strategies. While we also examine government capital injections,

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