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Risk management strategies for banks

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Abstract

We analyze optimal risk management strategies of a bank financed with deposits and equity in a one period model. The bank's motivation for risk management comes from deposits which can lead to bank runs. In the event of such a run, liquidation costs arise. The hedging strategy that maximizes the value of equity is derived. We identify conditions under which well known results such as complete hedging, maximal speculation or irrelevance of the hedging decision are obtained. The initial debt ratio, the size of the liquidation costs, regulatory restrictions, the volatility of the risky asset and the spread between the riskless interest rate and the deposit rate are shown to be the important parameters that drive the bank's hedging decision. We further extend this basic model to include counterparty risk constraints on the forward contract used for hedging.

JEL classification: G1; G21; G28
Keywords: Bank; Bank risk management; Corporate hedging

1. Introduction

The focus of this paper is to study the rationale for banks' risk management strategies where risk management is defined as set of hedging strategies to alter the probability distribution of the future value of the banks' assets.

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There is a broad literature on these decisions for firms in general, beginning with Modigliani and Miller (1959): Their famous theorem states that in a world of perfect and complete markets, financial decisions are irrelevant as they do not alter the value of the shareholder's stake in the firm. The only way to increase shareholder's wealth is to increase value of the firm's assets. Neither the capital structure nor the risk management decisions have an impact on shareholder's wealth.

Some important deviations from the perfect capital markets in the Modigliani–Miller setting have been identified, giving motivations for firms to care about risk management, such as taxes, bankruptcy costs, agency costs and others (Froot et al., 1993; Froot and Stein, 1998; Smith and Stulz, 1985; DeMarzo and Duffie, 1995; Stulz, 1996; Shapiro and Titman, 1986). When these reasons for risk management are incorporated into the firm's objective function, one finds the following basic result: When all risks are perfectly tradeable the firm maximizes shareholder value by hedging completely (Froot and Stein, 1998; Broll and Jaenicke, 2000; Mozumdar, 2001). [1]

However, the Modigliani–Miller-theorem as well as the aforementioned hedging motives are ex ante propositions: Once debt is in place, ex post financial decisions can alter the equity value by expropriating debt holders. This strategy is known as asset substitution (Jensen and Meckling, 1976). Because of limited liability, the position of equity holders can be considered as a call option on the firm value (Black and Scholes, 1973). This implies that taking on as much risk as possible is the optimal ex post risk management strategy. In summary, theory is inconclusive regarding the question of the optimal hedging strategy of firms.

Turning to the question of optimal hedging and capital structure decisions of banks, a first finding is that the analysis within the neoclassical context of the Modigliani–Miller-theorem would be logically inconsistent. Banks are redundant institutions in this case and would simply not exist (Freixas and Rochet, 1998, p. 8). The keys to the understanding of the role of banks and their financial decisions are transaction costs and asymmetric information. These features have been dealt with extensively in the banking literature, departing from the neoclassical framework (Baltensperger and Milde, 1987; Freixas and Rochet, 1998; Merton, 1995; Schrand and Unal, 1998; Bhattacharya and Thakor, 1993; Diamond, 1984, 1996; Kashyap et al., 2002; Allen and Santomero, 1998, 2001):

- Banks have illiquid or even nontradeable long term assets because of the transformation services they provide.
- Part of the illiquidity of banks' assets can be explained by their information sensitivity; banks can have comparative informational advantages due to their role as delegated monitors. Examples include information about bankruptcy probabilities and recovery rates in their credit portfolio. This proprietary information

[1] This result is a consequence of the payoff-function's concavity induced by the risk management motives and the application of Jensen's inequality.