



Risk shifting in the US banking system: An empirical analysis



Miguel A. Duran*, Ana Lozano-Vivas¹

University of Malaga, Dpt. Teoria e Historia Economica, Facultad de Economicas, Campus de El Ejido, 29.013 Malaga, Spain

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ABSTRACT

This paper contributes to the empirical literature on risk shifting. It proposes a method to find out whether risk shifting is present in the banking industry and, if so, what type. The type of risk shifting depends on the group of debt holders to whom risk is shifted. We apply this method to the US banking sector in 1998–2011. To study the relationship between risk shifting and the 2008 crisis, the sample is also split into pre-crisis, crisis, and post-crisis periods. Our results suggest that the same type of risk shifting is present in the entire sample and in the pre-crisis and crisis subsamples. We find no evidence of risk shifting after the crisis. Furthermore, holding capital buffers seems to disincentivize risk shifting. This finding appears to provide support for the conservative buffer included in Basel III.

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1. Introduction

According to agency theory, risk shifting, or asset substitution, is a standard moral hazard problem between shareholders and creditors. After raising debt, shareholders have incentives to transfer wealth away from creditors by investing in risky, negative net present value projects. As Jensen and Meckling (1976, p. 334) state in their pioneering paper, shareholders “have a strong incentive to engage in activities (investments) which promise very high payoffs if successful even if they have a very low probability of success.” If those investments turn out well, shareholders “capture most of the gains, if they turn out badly, the creditors bear most of the costs.” In industries such as the banking sector, where firms are highly leveraged, this conflict is even more severe.

Risk taking by banks is a more general problem than risk shifting. The latter focuses on a moral hazard conflict that results in risk taking not being aligned with creditor interests (Hovakimian et al., 2003). This conflict, however, is a key issue for banking regulation. Indeed, one of the main arguments in favor of raising minimum

capital requirements is that it forces shareholders to keep more “skin in the game” and thus reduces the incentives to engage in risk shifting (Demirgüç-Kunt et al., 2010).

At a given level of the capital-to-assets ratio, any risk-increasing change in a bank’s asset portfolio implies risk shifting: It is an investment strategy that increases the probability of losses, which would be mainly absorbed by creditors, whereas if the strategy turns out to be profitable, the bulk of the returns would go to the shareholders. Nevertheless, shareholder incentives to engage in risk shifting are stronger if their stake in the bank is reduced. In this case, shareholders have even less to lose if a risk-increasing strategy fails, so the risk-shifting problem is exacerbated. It is the same argument that supports augmenting capital requirements, but upside down: If shareholders reduce their skin in the game, *ceteris paribus*, their risk-avoiding incentives are weakened.

This view on risk shifting provides the basis for this paper, which empirically analyzes the presence of such moral hazard conflict in the banking system. Specifically, we consider that a banking system faces risk shifting if, for risk-increasing banks, changes in risk and the capital-to-assets ratio are negatively related. Focusing on risk-increasing banks is essential to our analysis for two main reasons. First, increasing risk is a crucial feature of the definition of risk shifting itself. Second, focusing on risk-increasing banks allows us to interpret a potential negative relationship between capital and risk adjustments in a straightforward way; specifically, this

* Corresponding author. Tel.: +34 952 13 12 49; fax: +34 952 13 12 99.

E-mail addresses: maduran@uma.es (M.A. Duran), avivas@uma.es

(A. Lozano-Vivas).

¹ Tel.: +34 952 13 12 56; fax: +34 952 13 12 99.

negative relationship would imply that, on average, banks that reduce their capital ratio more increase their risk more as well.¹

The banking literature has widely studied risk shifting. As a contribution to the empirical part of that literature, this paper analyzes risk shifting in the US banking system. However, we depart from the standard analysis that mainly focuses on how the safety net and regulation incentivize or hamper risk shifting (for reviews, see Berger et al., 1995; Van Hoose, 2007; Freixas and Rochet, 2008; Degryse et al., 2009) by proposing a method to find out whether risk shifting is present in the banking sector and, if so, what type.

The starting point of our research is the analysis of the relationship between changes in capital and risk by Shrieves and Dahl (1992). To analyze and classify risk shifting, however, the approach is generalized to consider the whole financial structure of banks, that is, capital, deposits, and other debt. This allows us to split the agents that hold bank liabilities into depositors and non-depository creditors. Thus, depending on the group to which shareholders shift risk, we propose a four-type classification of risk shifting: double sided (risk is shifted to both depositors and non-depository creditors), deposit based (risk is shifted to depositors), other debt based (risk is shifted to non-depository creditors), and unclassified (the group of debt holders to whom risk is shifted is unclear). To the best of our knowledge, this is the first paper that examines the relationship between changes in risk and different forms of debt in the banking system. It is also the first to present a taxonomy of risk shifting. In addition, our method enables us to find out whether variables such as a capital buffer larger than the legal requirement favor or hamper risk shifting.

Our sample comprises US banks in 1998–2011. The results suggest that risk shifting is present in the sample throughout the entire period. In regard to type, banks seem to engage in other debt-based risk shifting. We also study the potential effects of the 2008 crisis on risk shifting. To perform this analysis, we split the sample into pre-crisis, crisis, and post-crisis periods. The same type of risk shifting seems to also be present in the pre-crisis and crisis subsamples, whereas no evidence of risk shifting is found after the crisis.

According to these results, first, public or market mechanisms such as supervision and market discipline do not seem to have been able to prevent risk shifting. Second, the results that suggest that risk shifting was present before the crisis could contribute to explaining the depth and breadth of the 2008 financial crisis. These results seem to indicate that risk shifting helped generate a situation in which banks were insufficiently capitalized in relation to the risk assumed. Indeed, for the Basel Committee on Banking Supervision (2011, p. 3), a lesson from the crisis is the need to ensure that “banks’ risk exposures are backed by a high quality base.” The fact that risk shifting was present during the crisis but not post-crisis suggests that the misalignment between shareholder and creditor interests was corrected during the crisis.

According to our results, capital buffers seem to contribute to disincentivizing risk shifting; that is, the larger the capital buffer, the weaker the incentives for risk shifting. This finding suggests that banks that are prudent in capitalization terms will be prudent in risk shifting. This simple principle gives additional support to the regulatory changes undertaken under Basel III to guarantee that banks build up conservative buffers above the legal capital ratio.

The rest of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 sets up the model, presents the types of risk shifting, and describes the dataset. Section 4 discusses the results. Section 5 concludes the paper.

2. Review of the literature

In their classical paper, Jensen and Meckling (1976) point out a fundamental conflict between shareholders and creditors that results from equity having the payoff structure of a call option on the value of the firm. This conflict is at the root of what is known in corporate finance as risk shifting, or asset substitution. Myers (2001), King et al. (2006) and Herring and Carmassi (2010) synthesize this conflict. In “upside” states of nature, shareholders get the returns generated, whereas creditors receive the amounts agreed upon in the debt contract. In “downside” states of nature, equity stakes define the upper limit to the participation of shareholders in losses, but creditors risk losing even the entirety of their debts. This payoff structure gives rise to opposite risk preferences: Shareholders prefer riskier projects, even if their net present value is negative, whereas creditors prefer safer investments. As a result, after setting the conditions of the debt contract and under asymmetric information, shareholders have strong incentives to engage in risk shifting, that is, to substitute risky assets for safe ones at the expense of creditors.

Since Jensen and Meckling (1976) first defined risk shifting in terms of an agency problem, it has been widely studied by the theoretical banking literature. Indeed, risk shifting is a more severe problem in banks than in other firms, because the debt-to-assets ratio is substantially higher for financial intermediaries than for nonfinancial firms (Freixas and Rochet, 2008). In addition, risk shifting is intensified in the banking sector due to the relative ease with which banks can alter financial risks without being immediately noticed by creditors (Myers and Rajan, 1998) and because of implicit and explicit public guarantees (Battacharya and Thakor, 1993).

Risk shifting is indeed at the core of regulation in the banking industry, particularly, capital regulation (Freixas and Rochet, 2008). As Demirgüç-Kunt et al. (2010) state, minimum capital requirements force shareholders to put some skin in the game and, thus, they moderate the risk-increasing incentives generated by limited liability and amplified by implicit and explicit guarantees (Berger et al., 1995; Van Hoose, 2007). Uniform capital ratio regulation, nevertheless, might not curb those incentives sufficiently and, hence, might not reduce the probability of insolvency (Koehn and Santomero, 1980; Kim and Santomero, 1988; Rochet, 1992).

Despite the attention that theoretical works have paid to risk shifting, it has scarcely been studied empirically. Most of the empirical studies have focused on whether deposit insurance is an incentive for banks to increase risk and leverage (Allen et al., 2011). If this were the case, shareholders would maximize the so-called “deposit insurance subsidy” (Merton, 1977) by shifting risk to taxpayers and the net benefits that deposit insurance can provide would largely rest on the ability of regulators to control risk shifting (Buser et al., 1981). However, the results on the relationship between risk shifting and deposit insurance do not lack ambiguity. First, in contradiction to the hypothesis that banks maximize the deposit insurance subsidy, evidence shows that most banks keep the capital ratio well above the regulatory minimum (Ayuso et al., 2004; Lindquist, 2004; Jokipii and Milne, 2008; Stolz and Wedow, 2011). Second, empirical research suggests that deposit insurance tends to be overpriced (Marcus and Shaked, 1984; Ronn and Verna, 1986; Pennacchi, 1987). Third, evidence about the relationship between deposit insurance and bank risk is not

¹ If we do not focus on risk-increasing banks, a negative relationship between risk and capital adjustments could also describe a situation that can hardly be considered risk shifting, specifically, a situation where, on average, banks that increase their capital ratio more also reduce their risk to a greater extent. Nevertheless, to show that our key results do not depend in a crucial way on using a sample formed just by risk-increasing banks, we repeat the analysis for all banks. Our main results do not qualitatively change.

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