Review of Financial Economics 34 (2017) 1–9

Contents lists available at ScienceDirect

Review of Financial Economics

journal homepage: www.elsevier.com/locate/rfe

Bank capital and portfolio risk among Islamic banks☆

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ARTICLE INFO

Article history:
Received 30 June 2015
Received in revised form 27 May 2016
Accepted 13 March 2017
Available online 29 March 2017

JEL classification:
C11
C32
G21
G28

Keywords:
Islamic banks
Asset risks and total capital
Panel data with endogenous treatment
MCMC

ABSTRACT

Minimum capital requirements are often implemented under the notion that increased capital improves bank safety and stability. However, an unintended consequence of higher capital requirements could arise if increasing capital induces banks to invest in riskier assets. Several researchers have examined this relationship between bank capital and risk among conventional banks, and interest around this topic has intensified since the 2007–2008 financial crisis. However, the findings are rather mixed. Moreover, very few studies have focused on Islamic banks, which differ greatly from their conventional counterpart's due to their need to be Shariah-compliant. In this paper a sample of 22 Islamic banks is analyzed over a seven year period from 2007 to 2013. The empirical approach is fully parametric and Bayesian utilizing techniques developed by Kessler and Munkin (2015) and building on previous banking research by Shrieves and Dahl (1992) and Jacques and Nigro (1997). Some evidence is found suggesting that increases in total capital positively affect the levels of asset risks among Islamic banks.

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1. Introduction

Banks maintain a minimum capital requirement because it provides a buffer against negative shocks and acts as insurance against the risk of insolvency. However, the financial crisis of 2007–2008 exposed the fact that many of the world's largest banks held insufficient capital and were not able to cover all of their losses. This apparent mismatch between the 'minimum regulatory capital requirement' and its resulting impact on 'bank solvency' has promoted an intense debate among policymakers, bankers, and academics on the question: "how much capital should banks hold in order to cover their potential losses?" In most countries, the minimum capital requirement is 8% of risk-weighted assets, and is expected to increase to 10.5% under the Basel III accord (Basel Committee on Banking Supervision, 2010).[1] As of today, the debate is still active on how much capital banks should hold.

Capital requirement can be a double-edged sword. While increased capital enhances bank safety, it might induce a bank to assume greater risks. If the latter effect outweighs the former, even well-capitalized banks may face the risk of insolvency. There is a large literature in financial economics studying the relationship between risk-taking and the capitalization of banks. The theoretical literature suggests that risk and capital decisions are simultaneously determined and interrelated.[2] For instance, Gennotte and Pyle (1991) show that an increase in the capital requirement may induce a bank to simultaneously decrease the size of its portfolio and increase its asset risk in hopes of earning higher returns. Diamond and Rajan (2000) offer a model that simultaneously rationalizes the asset and the liability sides of banks. They show that while greater capital

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☆ We are grateful to the participants of the 2012 Islamic Finance Conference in Birmingham for comments and suggestions for improvements. The valuable input of our discussant Marwan Izzeldin has much improved the paper. We also thank Kabir Hassan for his input which he provided at earlier stages of this research.

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[1] Table 1 provides an overview of the capital requirements under Basel II and Basel III.

[2] The literature is vast and comes to contradicting results. For a survey of the theoretical and empirical literature, see Stolz (2007).

http://dx.doi.org/10.1016/j.rfe.2017.03.004
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reduces the probability of financial distress, it also reduces liquidity creation. The empirical literature focuses on testing various predictions of the banking theory with data primarily from the United States and Europe. Conversely, in this paper we examine the financial decisions made by Islamic banks and whether they differ from their conventional counterparts. A brief overview of the empirical studies is provided in the next section.

The minimum capital requirements recommended by the Basel Committee apply for conventional banks and do not make any allowance for Islamic banks. However, the Islamic Financial Services Board (IFSB), the Islamic equivalent of the Basel Committee, is responsible for setting regulatory standards that are in par with Basel standards for conventional banks. The Basel rules on 'capital adequacy ratio' (CAR) have become the cornerstone of safety in modern banking. A bank's CAR is computed by dividing the total capital by total risk-weighted assets. However, unlike their conventional counterparts, defining the denominator (i.e., risk-weighted assets) of the CAR for Islamic banks is not straightforward.[3] This is because of the unique risk profile Islamic banks have with respect to their products and services, which need to be *Shariah*-compliant. For instance, in the case of financing projects using the profit-sharing investment accounts (PSIAs) contracts (e.g., the *Mudharabah* and *Wakala* investment accounts), Islamic banks are reluctant to share losses with their customers because of the fear that disappointed customers might move their funds elsewhere. Thus, although PSIAs provide a buffer in theory, in practice Islamic banks are very sensitive to displaced commercial risk. Furthermore, the higher the level of PSIAs in the capital structure is, the higher are the agency (monitoring) costs faced by Islamic banks. All else equal, higher agency costs will reduce the bank's expected return on assets, which in turn might induce them to increase the riskiness of their portfolios after the imposition of capital requirements (Besanko and Kanatas, 1996; Muljawan, Dar, and Hall, 2002).

Islamic banks also face higher liquidity risk than conventional banks because of the dominance of asset-based financing and lack of short-term traditional instruments like repurchase agreements and certificates of deposit. The lumpy nature of asset-based financing makes it difficult for Islamic banks to exit from these transactions in times of emergency. Indeed, prior to the global financial crisis nearly half of Islamic banks' assets were backed or linked to real estate, and were therefore slashed following the burst of the real estate bubble in the Gulf Cooperation Council (GCC) countries (Al Monayea, 2012). Furthermore, although market, credit, and operational risks are easy to measure according to the specific rules of Pillar I of the Basel II/III, other aspects of risks that are also important to Islamic banks, such as liquidity, concentration of funding, and fiduciary risks are examined in a more subjective manner under Pillar II (Al Monayea, 2012). These risks, which are uniquely important for Islamic banks, make it a challenging task to calculate risk-weighted assets and the resulting capital adequacy ratios cited in the rules of Basel II/III (Ariss & Sarieddine, 2007).

Against the backdrop of Islamic banks' capital buffers to unique risks, we examine the effect of changes in total capital on asset risks for 22 Islamic banks over the period of 2007 through 2013. The relationship between bank capital and risk has gathered pace since the 2007–2008 financial crisis, and a debate has developed over how to prevent a reprise of the recent financial crisis.[4] However, compared to conventional banks, existing evidence on the relationship between capital and risk among Islamic banks is lacking or, at best, slowly emerging. There is, therefore, a need for empirical analysis of the capital-risk relationship to fill the void in the Islamic banking literature.

The empirical tests of bank capital and bank risk, however, are marred by issues of simultaneity biases (i.e., endogeneity) because the level of capital and the amount of risk that a bank can undertake are interdependent (see, e.g., Gennotte and Pyle, 1991; Diamond and Rajan, 2000). In addition, risk and capital are functionally related to each other through the presence of risk-weighted assets in both definitions. To account for the endogeneity between risk and capital, most existing studies have considered traditional simultaneous equation methods such as two- or three-stage least squares (2SLS/3SLS) estimators.

Our empirical model builds on the approach employed by Shrieves and Dahl (1992) and Jacques and Nigro (1997) who utilize a simultaneous equation framework in order to study the effects of new bank regulations on commercial banks in developed countries. However, our paper differs from earlier studies in that we follow the method proposed by Kessler and Munkin (2015), who developed an endogenous treatment estimation procedure for a panel data simultaneous equation model. As will be elaborated below, this procedure has a number of advantages over the 2SLS/3SLS estimators. Furthermore, we rely on a Bayesian method to estimate the model's parameters, thereby allowing for model parameters to assume random distributions. Banks differ in preferences for risk, uncertainty, and capitalization, which might eventually result in a systematic variation in risk parameters across banks (Firestone & Rezende, 2013). However, to date, there has been insufficient attention to potential distributional variation of parameters in the literature on bank capital and risk. Accounting for this is important in making empirical claims and specific suggestions.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the theoretical and empirical literature, with particular attention to empirical studies on the risk-capital relationship under Islamic banking. Section 3 discusses model specification and outlines its estimation. Section 4 presents the empirical results and Section 5 concludes the paper. Steps of the Bayesian Markov Chain Monte Carlo (MCMC) algorithm are given in Appendix A and a numerical example where the data generating process is known and consistent with the introduced model is presented in Appendix B.

2. Related literature

A large body of theoretical literature on how banks adjust their holdings after an increase in the minimum regulatory capital requirements sends mixed signals, predicting that bank capital and risk are both negatively and positively related. For example, Koehn and Santomero (1980) predict a higher risk of failure for the banking industry after a forced increase in capital, because banks will reduce their risk exposure and therefore lower the expected returns to their portfolio. Similarly, Furlong and Keeley (1989) argue that stronger capital requirements actually reduce the gains of holding riskier assets, and therefore dissuade banks from increasing the riskiness of their asset portfolios. Conversely, Milne and Whalley (2001) show that following an increase in regulatory capital, banks first increase capital and decrease asset risk but as soon as they obtain a desired capital buffer, both capital and risk may become positively related.

A few studies have theoretically analyzed the risk-capital relationship for Islamic banks. Al-Deehani, Abdel Karim, and Murinde (1999) demonstrate that because Islamic banks rely extensively on the use of investment accounts for financing, they can increase both their market value and portfolio returns without increasing the bank's risk. This contradicts Modigliani-Miller's irrelevance theorem, which states that the market value of a firm is unaffected by how the firm is financed. They also find support for their theory in a sample of

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[3] A recent survey of Islamic bankers suggests that a number of different practices are used to adjust the denominator of the CAR formula (Song & Oosthuizen, 2014).

[4] See the collection of articles in Danielsson (2015) for a glimpse of this debate.

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