Shari'ah Supervisory Board Composition Effects
On Islamic Banks' Risk-Taking Behavior

Mahir Alman*

Bamberg University
Department of Management, Business Administration and Economics
Kirschaeckerstr. 39, D-96045 Bamberg
Tel.: (+49) 951-863-2536, Fax: (+49) 951-863-2538
e-mail: alman.finanz@sowi.uni-bamberg.de

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Abstract

Islamic banks underlie the fundamental principles of the *Shari'ah*, which encompass all business activities, financial contracts, and transactions. The *Shari'ah* Supervisory Board (SSB) monitors and certifies compliancy and is unique to the governance structure of Islamic banks compared to their Western counterparts. This study addresses the question of how the compositional characteristics of the SSB influence the loan portfolio risk-taking of Islamic banks. As such, we analyze to which degree the legal supervisory functions of a SSB affect the banks' risk-taking behavior. Over the period from 2000 to 2010, we regard cross-country bank-level data from the Middle East and Northern Africa as well as from Southeast Asia. Our results reveal evidence that the loan portfolio risk-taking of Islamic banks is positively influenced by increasing size of the SSB, as well as when top ranked *Shari'ah* scholars with multiple memberships have board mandates and when annual changes occur in the composition of a SSB, regarding particularly previous period variables with second lags. We find that supervisory effectiveness and disciplining power of individual bank SSBs towards the risk-taking in the loan portfolio of Islamic banks decreases in a decentralized *Shari'ah*-compliant governance structure. The reverse causality analysis shows strongly that SSB factors affect primarily loan portfolio risk-taking, not the other way around.

Key Words: Islamic Banking, *Shari'ah*-Board, Bank-Risk, Corporate Governance

JEL classification: G21, G32, G18

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Abstract

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1 Introduction

A specific characteristic in the governance structure of Islamic banks in contrast to their counterparts operating in accordance with Western industrialized countries (simply referred to as Western in the following), is the *Shari'ah* Supervisory Board (SSB). It exists in addition to typical bank board governance structures, but its functions are mainly to certify (ex-ante) and to monitor (ex-post) all financial contracts, transactions, and further activities of a bank on behalf of shareholders, stakeholders, and clients to ensure that they are compliant with the *Shari'ah*. Because deposit insurance is non-existent and the banks are dependent mainly on the refinancing on deposits, the functions of a SSB includes also protecting the interests of the depositors from excessive risk-taking on the asset side of an Islamic bank (see El-Hawary 2007, Van Greuning and Iqbal 2007, Grais and Pellegrini 2006, Warde 2010, Deloitte 2010).

In the literature, understanding the determinants of board structure as well as its influence on the management is a very important research question. The causal relationship between board characteristics and firm attributes is a key issue in empirical studies that requires robust econometric methods to control for endogeneity (see e.g. Yermack 1996, Hermalin and Weisbach 1998, 2003, Harris and Raviv 2008). In our study, we examine how characteristics of the SSB influence the loan portfolio risk-taking of Islamic banks. Thus, we address primarily the manner in which the business model of Islamic banks is adjusted to the composition of the SSB. Our intention is to examine the role of a SSB in the risk governance of a bank as a result of its tasks in monitoring and certifying *Shari'ah* compliance in all contracts, transactions, and business activities. Hence, we analyze empirically the supervisory effectiveness and the disciplinary power of individual bank SSBs on the loan portfolio risk-taking of Islamic banks. To shed some light on the explanatory factors, we examine the characteristics of individual bank SSBs and further

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investigate individual bank and macroeconomic control variables. In this study, we also analyze the reverse causality in terms of adjustments in the compositions of SSBs to the business model of Islamic banks. According to this, we are able to control for problems of endogeneity, especially regarding the research question addressed in this study.

The characteristics of the SSB cover the total number of *Shari'ah* scholars as well as their belonging to top twenty rankings and annual changes in the overall composition of the SSB. To our knowledge, this is the first cross-country empirical analysis with this research approach. Empirical studies addressing this research question focus mainly on US or on European data. Thus, we do not know much about the relationship between board structure and firm attributes beyond these countries with different legal, institutional, and regulatory systems. This paper contributes to the US and European-based literature by examining the relationship of the SSB's structure and firm attributes for a sample of 82 Islamic banks from 13 countries that cover the Middle East and Northern Africa as well as Southeast Asia over the period from 2000 to 2010. As we focus on individual bank SSB influence factors, one important limitation of our study is to control for country-specific institutional effects on the corporate governance of Islamic banks (see La Porta et al. 1998, 2000, Demirgüc-Kunt, et al. 2004). This is due to the availability of data, because existing country-specific institutional indicators reflect the status of the Western financial system more than the Islamic system. However, the country focus robustness tests helps to gain insights into the relevance of these country-specific determinants.

Islamic banks must conform to the principles of the *Shari'ah*, the unique legislation for Muslims, consisting of primary (*Quran* and *Hadith* (*Sunna*)) and secondary sources (*Ijma* and *Qiyas*). *Shari'ah*-compliant financial contracts prohibit interest, gambling, and speculation in terms of *Riba*, *Gharar,* and *Maysir* and require profit and loss sharing (equity-based) backed by a real asset. The involvements of assets in sectors like defense and entertainment or in companies

that do not fulfill additional capital structure criteria are also forbidden (see Table 1 in the appendix, Quran: 2:275-2:280, Lewis and Algaoud 2001, Mirakhor and Iqbal 2007). There are regional specificities in the development of the Islamic financial system where it can exist alone or in parallel to a Western financial system (see Wilson 2009). Iran, Pakistan, and Sudan are the only countries entirely based on an Islamic financial system. Further directions for development are distinguishable when you consider the *Shari'ah*-governance structures of Islamic banks with either centralized or decentralized solutions (see Gintzburger 2011, Hasan 2011, Warde 2010). In principle, the Islamic financial sector will need innovations on the product portfolio level accompanied by regulations on the institutional level to solve the restrictions in refinancing and subsequently to be competitive with their Western counterparts. Regulations have to focus on income contracts that are typical to the *Shari'ah* (equity-based) due to their higher contribution to systemic bank-risk compared to fixed-income (debt-based) contracts (see Sundararajan 2007, Van Greuning and Iqbal 2007, Brunnermeier et al. 2010).

We find empirical evidence for our theoretical predictions. The results confirm especially for previous period explanation factors with two lags that loan portfolio risk-taking of Islamic banks is positively associated with increasing SSB size, multiple memberships of top-twenty ranked *Shari'ah* scholars in the board as well as with annual changes in total composition of the SSBs. The supervisory effectiveness and the disciplining power of individual bank SSBs towards the loan portfolio risk-taking of Islamic banks are weakened particularly in a decentralized *Shari'ah*-compliant governance structure. On the whole, our analysis of reverse causality shows that the business model of Islamic banks in terms of loan portfolio risk-taking adjusts to factors related to the composition of the SSB and not the other way around.

The remainder of the paper is organized as follows: Section 2 presents a review of the related literature on regulation, SSBs as well as on risk-taking in banks and how this study

extends the existing work. In Section 3, we derive our hypotheses and describe our dataset and methodology. The discussion of our results is treated in Section 4, while Section 5 concludes our paper.

2 Related Literature

Although the functions of a SSB are not really comparable to a supervisory board in Western financial institutions, our literature review covers theoretical and empirical research findings referring to the latter, in which corporate governance issues have been analyzed extensively.

The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and the Islamic Financial Services Board (IFSB) are the main bodies that set standards for Islamic financial intermediaries, and they have each compiled a list of guiding principles for *Shari'ah* governance. These standards refer to appointment, composition, and tasks of the SSB and require mainly independence, competence, confidentiality, consistency, and disclosure. According to the AAOIFI, the SSB should consist of at least three members who are recommended by the board of directors before they are appointed by the shareholders of an Islamic bank (see Nienhaus 2007a/2007b, Dar and Presley 2000, El-Hawary et al. 2007). This nomination and election process leads in practice to a SSB being dependent on the board of directors and shareholders, more so when SSB members are interested in continuing their mandates (being reelected) (see also Rammal 2006, Farook and Farooq 2011). So, a SSB is subject to a conflict of interest between *Shari'ah* governance and the economic success of a bank. As the secondary sources of the *Shari'ah* are especially relevant for certification and monitoring, they allow a scope in the interpretation and transformation so that SSB members can differentiate beyond strictly prohibited (*Haram*) and permissible (*Halal*) elements (see e.g. Alexander 2010,

Rider 2012). Thus, according to the model by Adams and Ferreira (2007), a less independent SSB may decide in the interest of the management and the shareholders under the assumption that both share the same motives and it may not monitor the management too intensively (see also Hermalin and Weisbach 1998). It can be even more difficult to achieve a trade-off between *Shari'ah*-compliance and the economic success of a bank when bank market competition either among Islamic banks or with their Western counterparts is increasing and decisions about the compliance of financial innovations, which also cover the loan portfolio risk-taking, play an important role in holding or strengthening the market position. This could explain the changing behavior of SSBs over time from rather restrictive in an effort to maintain the origins and uniqueness of Islamic finance to more permissive, more focused on the demand side and attempting to fulfill tasks complementary to those of the Western financial system (see Nienhaus 2007a/2007b, Gintzburger 2011, Wilson 2009, El-Gamal 2002).

The standardization process of Islamic financial contracts, transactions as well as other business and governance structures has increased through the foundations of AAOIFI and IFSB. This raises the question of the remaining functions of individual SSBs when most of the Islamic banks, as in our database (approx. 80% of the total sample), are members of at least one of these two international, Islamic standard-setting organizations and follow their rules in several fields. Thus, the remaining functions include less the certification than the internal *Shari'ah* compliance and regulation as well as marketing functions concerning the reputation of SSB members. The certification process for individual SSBs becomes relevant in the event of financial innovations (see Nienhaus 2007a, El-Gamal 2002). The guiding principles of the AAOIFI or the IFSB do not include detailed information about the duration, dismissal, and reappointment of a SSB member. There are also no statements regarding multiple memberships of *Shari'ah* scholars. An informal standardization is given through the fact that only a limited number of *Shari'ah* scholars have the

required qualifications, which leads them to have multiple memberships. Thus, the top twenty scholars hold 621 positions, which constitutes almost 54% of the total available seats (see Ünal 2011, Farook and Farooq 2011). This concentration of SSB positions leads to further conflicts of interest because one scholar or scholar network has access to internal bank data of competing Islamic banks (see Grais and Pellegrini 2006, Wilson 2009, Rider 2012). There are mixed findings in the literature regarding whether the costs or the benefits outweigh from numerous and simultaneous board memberships. While the costs likely result from decreasing effectiveness of monitoring and thus of corporate governance, there may be beneficial effects from having board members that gain more experience or reputation (see e.g. Ferris et al. 2003, Fich and Shivadasani 2006). DeAngelo (1981) argues that auditors with more clients have "more to lose" by failing to report an issue.

Islamic banks are mainly financed by deposits because of restricted refinancing sources. Their deposits have mainly two forms – current accounts (*Wadiah*, *Qard Hassan*) and investment accounts ((un-)restricted *Mudarabah*). Although they share risks with an Islamic bank, investment account holders have no governance and monitoring rights. In addition, in compliance with the *Shari'ah,* there is no implicit or explicit deposit insurance, which leads to incentives for increased capitalization by banks, for decreased risk-taking by banks as well as for stronger monitoring incentives by depositors. However, beside these incentives that result from the lack of deposit insurance, a SSB is responsible for protecting the interests of depositors from excessive risk-taking behavior (see El-Hawary 2007, Van Greuning and Iqbal 2007, Errico and Farahbaksh 1998, Merton 1977). As mentioned above, this function is weakened through the dependence of a SSB on the management and on the shareholders that result from the nomination and election processes. This weakened function results also from the fact that a SSB is not liable for losses from excessive risk-taking and that there is no contractual principal agency relationship between

a SSB and depositors. However, Archer et al. (1998) pointed out that there is a bilateral dependency such that investment account holders depend on shareholders in monitoring the loan portfolio risk, while shareholders depend on investment account holders as a source for generating profit. Furthermore, particularly top ranked SSB members with multiple memberships have to consider reputational losses from excessive loan portfolio risk-taking and the potential losses resulting for depositors. Thus, a SSB underlies less the interests of the management and shareholders as can be first assumed by the nomination and election processes. Because Islamic banks are mainly funded by deposits, they have to keep in balance the maturity of assets and liabilities, which explains the typical domination of short-term fixed-income contracts with a share of about 80%, although profit and loss sharing is a main principle of the *Shari'ah*. While equity-based contracts that are typical for the *Shari'ah* span forms of *Mudarabah* and (Diminishing) *Musharakah*, debt-based contracts span mainly *Murabahah, Ijarah, Salam* and *Istisna*. These forms of equity-based and debt-based contracts are recognized by the most important international standard setting organizations (AAOIFI, IFSB); therefore, Islamic banks are not subject to legal uncertainty or operational risk when using them (see Khan and Mirakhor 1987, Visser 2009, Gintzburger 2011, Ali 2008, Archer and Haron 2007).

The *Shari'ah*-compliant governance and the Islamic finance as a whole developed differently, especially when comparing the member states of Gulf Corporation Council[1] (GCC) with Malaysia, which represent the two main markets (see Gintzburger 2011, Hasan 2011, Warde 2010). The most significant difference between the two is that the SSB governance structure is ruled independently on an institutional bank level in the GCC, while it is organized on a state level in Malaysia with additional individual SSBs in Islamic banks. In such, the decentralized (internal) solution in the GCC is more oriented towards the market and thus innovation, while the

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[1] The *Gulf Cooperation Council (GCC)* consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. It was founded in 1981 in Abu Dhabi as cooperation in the fields of economics, politics, and culture.

centralized (external) approach as in Malaysia is more governance-related in the sense of the *Shari'ah*. However, there is a continuing harmonization and convergence between both complementary and substitutive approaches especially through the AAOIFI and IFSB (see Gintzburger 2011, Ali 2008, Sundararajan and Errico 2002).

Our study deals primarily with the research question of how the *Shari'ah*-compliant certification and monitoring function of a SSB towards all financial contracts, transactions, and business activities encompass also tasks of bank-risk governance. We look at how the characteristics and composition of the SSB influence the loan portfolio risk-taking of Islamic banks. Thus, we examine SSB determinants including the number of total scholars, the seats held by top twenty ranked *Shari'ah* scholars, and annual changes of total SSB compositions. We consider the size of the SSBs because Jensen (1993) argues that increasing board size is related to free-riding problems and longer durations for making decisions (see also Raheja 2005, Harris and Raviv 2008). These inefficiencies might be due to agency problems, but also because of coordination problems and the need for compromises (see Cheng 2008). However, this relationship is weakened when the size of the board increases in the complexity of a bank that is proxied such as its size in total assets (see Fama and Jensen 1983, Demsetz and Lehn 1985, Yermack 1996, Coles et al. 2008, Adams and Mehran 2011). Therefore, we can make a contribution to the question regarding the degree to which the loan portfolio risk-taking behavior of Islamic banks is determined by characteristics of the SSB beyond the scope of limited bank incentives to excessive risk-taking that arises from an increasing amount of liability capital (see Stiglitz and Weiss 1981). Thus, we consider the supply factors of the share of equity-based contracts on the Islamic banks' assets side. There are numerous related studies on supervisory effectiveness and bank-risk taking incentives with different theoretical and empirical approaches, which can be found in the literature for Western banks based on US or European data (for

literature review, see Delis and Staikouras 2011). As mentioned in the introduction, the causal relationship between board characteristics and firm attributes is a key issue in this research field. Thus, if the structure of the SSB impacts firm-specific measures (risk-taking, performance) rather than vice versa is the most relevant endogeneity problem. Most studies analyze one direction of the causal relationship, working hard to find the most suitable econometric method to handle endogeneity issues. In our study, we achieve additional robustness by examining the reverse direction of our primary research question in terms of how individual bank determinants (risk-taking, performance) influence the composition of the SSB. To our knowledge, this is the first study with this research approach that focuses entirely on Islamic banks based in the Middle East and Northern Africa as well as in Southeast Asia. We examine how the disciplinary effectiveness of SSBs, a specific characteristic of the governance structure of Islamic banks compared to their Western counterparts, differ according to legal, institutional, and regulatory systems in Islamic countries that are included in this study. The distinctive nature of SSBs results from its compliance to the *Shari'ah*, but also from the high concentration of SSB positions. Therefore, this study contributes to prior research by analyzing the consequences of having SSB scholars with multiple memberships on the banks' risk-taking behavior. Finally, this study also contributes to the literature regarding which role individual bank SSBs play between the interests of shareholders and other important bank stakeholders, such as depositors and regulators.

3 Empirical Framework

3.1 Development of Hypotheses

Jensen (1993) argues that increasing board size is related to free-riding problems and longer durations for making decisions. Beside these inefficiencies concerning to agency problems

(see e.g. Raheja 2005, Harris and Raviv 2008), there are in addition coordination problems and the need for compromises (see Cheng 2008). Although, Harris and Raviv (2008) argue that the empirical relation between board size and firm-specific measures may be misleading due to endogeneity problems, the arguments in the literature suggest that a bigger board might be related to higher risk. Thus, we expect that the supervisory effectiveness and the disciplinary power of individual bank SSBs on loan portfolio risk-taking in Islamic banks decreases with a higher number of SSB members. Therefore, we analyze the following hypothesis:

Hypothesis 1: Increasing the total number of SSB members leads to additional loan portfolio risk-taking by Islamic banks.

Due to multiple memberships of top twenty *Shari'ah* scholars, we expect that their supervisory effectiveness and the disciplinary power on loan portfolio risk-taking suffer. In light of the highly concentrated positions on SSBs, we assume that the costs associated with decreasing effectiveness of monitoring and thus corporate governance outweigh the benefits of gaining more experience or solidifying their reputations (see e.g. Ferris et al. 2003, Fich and Shivadasani 2006, Ünal 2011, Farook and Farooq 2011). Thus, we state the following hypothesis:

Hypothesis 2: Increasing the number of top twenty-ranked SSB members leads to additional loan portfolio risk-taking by Islamic banks.

Finally, according to the nomination and election process, SSB members are dependent from the board of directors and shareholders, especially when they are interested in continuing their terms on the board (being reelected). Thus, a SSB is affected by the conflict of interest between *Shari'ah*-compliant governance and the economic success of an Islamic bank. To achieve the latter aim, it should require SSB members who are more permissive than restrictive and who allow more loan portfolio risk-taking. So, we expect that an annual change in the

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composition of a SSB is associated with more risk-taking by an Islamic bank, more so when there is a change in the chairman position. From the discussion above, we derive the last hypothesis of our study:

Hypothesis 3: Annual changes in the composition of a SSB lead to additional loan portfolio risk-taking by Islamic banks.

3.2 Dataset

Our sample consists of an unbalanced panel of annual and unconsolidated report data from Islamic banks between 2000 and 2010. The sources of the bank and SSB data used for the empirical analysis are as follows: Bankscope (Bureau van Djik Electronic Publishing), Islamic Banks and Financial Institutions Information System (IBIS), Funds@Work (see Ünal 2011), Islamic Finance Information Service (IFIS), and our own research of the information presented on the web pages of Islamic banks in the sample to complete and to countercheck the selected data. We restrict our study to Islamic banks that operate in dual financial systems (Islamic and Western in parallel) to consider the possible influence of the Western bank market on the loan portfolio risk-taking behavior of their Islamic counterparts and so to, in principal, be able to compare the Islamic banks considered here. Furthermore, we include only banks that are full-fledged Islamic banks; thus, Western financial institutions with separate Islamic departments ("Islamic windows") are excluded. A further criterion for data selection is that the banks are based in countries where Muslims form the majority of the population. Finally, for comparability under similar development conditions, we regard only Islamic banks from high-income to lower-middle-income economies according to the classification by the World Bank. As provided in Table 2, the total sample which fulfills these criteria consists of 82 banks across 13 countries. Based on the last available year, we found 314 available overall SSB positions in which the top

twenty scholars of our dataset hold 154 positions (see Table 3). Considering the concentration of seats belonging to top-twenty SSB members, our dataset is representative to previous research (see e.g. Ünal 2011). When regarding the nationalities of SSB members, we can indicate in our dataset that over 60% are from GCC and that members from Bahrain and Kuwait dominate the boards. Among SSB members from Non-GCC, members with Malaysian and Syrian nationalities dominate the boards. If we consider strictly chairman positions, there is a similar picture regarding the nationalities included, but the distribution of these positions between GCC and Non-GCC is exactly the same.

Please insert Tables 2 and 3 about here.

3.3 Methodology

Our regression model for analyzing the relationship between the (credit) risk in the loan portfolio of Islamic banks, individual bank SSB and other control variables as well as macroeconomic control factors is based on the following equation:

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\begin{aligned}
Risk_{i,j,t} = {} & \beta_0 + \beta_1 Risk_{i,t-1} + \beta_2 SSBSize_{i,t-m} + \beta_3 SSBTop20_{i,t-m} + \\
& \beta_4 \Delta SSBTot_{i,t-m} + \beta_5 Equ_{i,t} + \beta_6 \ln(TA_{i,t}) + \beta_7 Liq_{i,t} + \\
& \beta_8 Inflation_{j,t} + \beta_9 GDPCAP_{j,t} + \beta_{10} EFI_{j,t} + \varepsilon_{i,j,t}, \qquad (1) \\
& m = 1,2,
\end{aligned}
$$

with $Risk_{i,j,t}$ as a loan portfolio risk variable of bank i in country j at time t. We use the following two variables to proxy the loan portfolio risk-taking of Islamic banks: Loan loss reserves to gross loans (LLR) and loan loss provisions to gross loans (LLP). These loan portfolio risk proxies are used widely in the literature (see e.g. Dinger and Von Hagen 2009) and they indicate reserves or provisions, respectively, for losses expressed as the percentage of total loans. The higher the ratio of LLR and alternatively of LLP, the poorer the quality of the loan portfolio will be (see

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Bankscope glossary). Other measures of bank risk which are extensively used in the literature as the Z-index[2], the standard deviation of return on assets, and the ratio of non-performing loans to total loans (see e.g. Laeven and Levine 2009, Delis and Staikouras 2011) could not be considered due to the small amount of data and its low availability.

The composition characteristics of the SSB in the following encompass $SSB\_Size_{i,t-m}$ defined as the number of members in a SSB to account for free-riding and coordination problems. Then, we regard the percentage of SSB members with top-twenty rankings to consider multiple membership effects, reputational effects as well as the influence of network effects between top-ranked *Shari'ah* scholars. Finally, we use annual changes of the entire board to consider the influence of continuity (reelection) in the SSB on loan portfolio risk-taking. At the individual bank level, we include the following explanatory control variables: $Equ_{i,t}$ as the capitalization of a bank captured by equity to total assets, while $\ln(TA_{i,t})$ proxies the size of total assets in USD in natural logarithm to account for non-linear relations. Further, $Liq_{i,t}$ measures the liquidity as the ratio of liquid assets to total assets. This measure captures the split between liquid and illiquid assets and is associated with the uncertainty on the asset side that could be shielded with liquid assets. The individual bank control variables are included as a means for differentiating between the influences of capitalization, bank size, or liquidity and the characteristics of the individual bank SSB on loan portfolio risk-taking. At the macro-economic level, we consider the following three macroeconomic control variables of the institutional development status: 1) inflation ($Inflation_{i,t}$), 2) per capita GDP ($GDPCAP_{i,t}$) and 3) the index of economic freedom ($EFI_{i,t}$) according to the Heritage Foundation/Wall Street Journal. The index covers ten benchmarks of economic and institutional development, such as business freedom, property rights, and fiscal

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[2] The Z-index is defined as the sum of return on assets and equity to assets in the numerator and the standard deviation of return on assets in the denominator.

freedom to proxy the status of a country's financial system. Finally, we include ε_{it} as the error term.

To shed some light on the causal relationship between board characteristics and firm attributes, we also analyze the reverse of our primary research question, addressing the question of how bank individual determinants (risk-taking, performance) influence the composition of the SSB, which is based on the following equation:

$$SSB_{i,j,t} = \beta_0 + \beta_1 Risk_{i,t-m} + \beta_2 ROA_{i,t-m} + \beta_3 Equ_{i,t} +$$
$$\beta_4 \ln(TA_{i,t}) + \beta_5 Liq_{i,t} + \beta_6 Inf_{j,t} + \beta_7 GDPCAP_{j,t} +$$
$$\beta_8 EFI_{j,t} + \varepsilon_{i,j,t}, \tag{2}$$
$$m = 1,2,$$

wherein we also regard $ROA_{i,t-m}$ defined as return on average assets to include potential performance effects on the composition of SSBs. Table 4 reports the descriptive statistics of these variables used in the equations (1) and (2).

Please insert Table 4 about here.

As provided in Table 5, correlations between the variables used in the empirical analysis are not critical enough to consider multicollinearity problems.

Please insert Table 5 about here.

Given the endogeneity problems in the sample, estimations based on ordinary least squares (OLS) would produce inconsistent results. Thus, to control for endogeneity and to account for unobserved heterogeneity on the individual bank level, we use a dynamic panel regression based on generalized method of moments (GMM) as suggested by Arellano and Bond (1991) and by Blundell and Bond (1998) with predetermined and lagged endogenous variables in first differences. The dynamic panel regression is used because the composition of the SSBs is

unlikely to affect the loan portfolio risk-taking of Islamic banks in the immediate term. To consider the possible influence that SSBs could have on loan portfolio risk-taking, lags of composition characteristics of SSBs have to be considered, as it would take time before the adjustments in the bank-risk governance are put into banking practice. In the estimations, our dataset allows us to consider only first and second lags of SSB variables to control the robustness of the results. To account for potential endogeneity of some explanatory variables, we use up to three-year lagged values as instruments. When using the dummy indicator for the annual change of SSB as dependent variable, we use a Probit-Model for estimation. For each regression, we test for first-order (AR1) and second-order (AR2) autocorrelation as well as for over-identifying restrictions (Sargan Test). Further controls for robustness are the estimations for alternative bank-risk proxies in the loan portfolio and different subsamples according to the criteria of country focus (GCC vs. Non-GCC) and bank size focus (large vs. small) as far as it is possible because of the restricted number of observations. The subsamples that focus on specific countries are constructed according to the different approaches of *Shari'ah*-compliant governance for Islamic banks in GCC and in Non-GCC (decentralized vs. centralized; see Gintzburger 2011, Hasan 2011, Warde 2010). This country distinction allows us to also consider possible influences on loan portfolio risk-taking that result from higher Islamic bank market competition in GCC than in Non-GCC (see Al-Hassan et al. 2010, Espinoza et al. 2010, Keeley 1990, Laeven and Levine 2009). As discussed in the introduction, our country focus robustness tests shed light onto how country-specific institutional characteristics affect the corporate governance of Islamic banks (see La Porta et al. 1998, 2000, Demirgüc-Kunt, et al. 2004).

The subsamples with a focus on the size of the banks are constructed especially to consider the effects that SSBs have on loan portfolio risk-taking in complex (large) and non-complex (small) Islamic banks (see Adams and Mehran 2011). We use the median bank size in

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total assets (ca. 1,857 million USD) as the cutoff criterion to achieve comparable weightings between both the two subsamples. Alternative subsample compositions to control for the robustness of our results and to avoid time period-specific biases could be achieved by examining different sub-periods, differentiating particularly between years of global financial crisis and non-crisis years. Because of lack of data, this is not possible and it should be left for further research. However, several empirical studies confirm the financial stability of Islamic banks, considering the years of financial crisis as well as in comparison to their Western counterparts, which result from higher capitalization and higher liquidity reserves (see Beck et al. 2010, Cihak and Hesse 2010, Al-Hassan et al. 2010, Hasan and Dridi 2010). Therefore, we assume that the years of financial crisis do not have a significant impact on the results based on the total sample of Islamic banks. As Table 6 reports, the tests for statistical differences that apply the Mann-Whitney U-Test strongly support the robustness checks with subsample compositions that include country-specific and bank-size focuses.

Please insert Table 6 about here.

4 Empirical Results

4.1 Entire Sample of Islamic Banks

In our broad sample and based on our primary risk-taking proxy LLR, we find significant negative evidence at the 1% level that a higher number of SSB members in the prior year decreases the risk-taking behavior of Islamic banks with a coefficient value of at least -1.88. This finding differs when regarding two years prior, as the influence is very significantly positive with a coefficient value of at least 3.2. Our alternative bank risk measure (LLP) has very significant positive coefficient values of at least 1.3 for the first and second lag variables. Thus, there is

strongly significant evidence that our first Hypothesis is confirmed for second lags in such that the supervisory effectiveness and the disciplinary power of the SSB suffer under free-riding and coordination problems with an increasing number of members (see Jensen 1993, Raheja 2005, Harris and Raviv 2007). Garas (2012) also finds that the number of SSB members does not significantly impact their control of the activities of Islamic financial institutions according to the *Shari'ah*. However, our finding is contrary to the results by Pathan (2009) and by Minton et al. (2011) for financial firms as well as by Cheng (2008) for non-financial firms: They show that risk is negatively related to the size of the board as it is the case in our estimation specifications with LLR and first lag variables of SSB characteristics. Hence, this result supports our expectation that the SSB of an Islamic bank is a specific characteristic in the governance structure of Islamic banks in which there is no counterpart for Western banks. Continuing with the second SSB composition variable, we find ambivalent significant influences for our primary risk-taking variable LLR with different signs by the top twenty ranked SSB scholars, while there is consistent and robust influence (min. 4.7%) on the alternative risk proxy LLP. From this point of view, there is evidence for our second Hypothesis that SSB members having multiple memberships lower their effectiveness in disciplining Islamic banks in their risk-taking behavior (see Fich and Shivadasani 2006). As more than three-fourths of the top twenty ranked scholars are from GCC member countries, our results confirm that permissive behavior in loan portfolio risk-taking has a tendency to outweigh restrictive behavior. Next, when regarding the effect of an annual change in the composition of the SSB, there is very significant evidence on the 1% level that a new composition in the previous year has a negative influence on loan portfolio risk-taking with a coefficient value of at least -1.012, while it is positive in the case of two years prior, which is not significant for the alternative risk proxy. Thus, there is evidence for our third Hypothesis from the perspective that changes in the composition and structure of the SSB two years prior are

associated with the choice of members who bear more the risk-taking interests of the board of directors and shareholders, if we assume that both share the same motives. The different influence of the annual change variable referring to the composition of a SSB in the estimation specification with first and second lag variable implicates that at the beginning of the terms of new scholars, they are more restrictive due to the fact that they need time to understand the loan portfolio risks on the asset side before they can permit them. On the individual bank level, we find strong evidence that loan portfolio risk taking in terms of LLR decreases with capitalization. In contrast to the "risk-absorption" hypothesis (see e.g. Bhattacharya and Thakor 1993, Repullo 2004, Von Thadden 2004), increasing amount of liability capital reduces the incentives to take excessive risks (see Stiglitz and Weiss 1981, Diamond and Rajan 2000, Koziol and Lawrenz 2009). This relationship is not robust for the alternative risk variable of LLP, in which the influence is very significantly positive. The different specifications do not show consistent results for the variable pertaining to the size of the banks. We would expect that larger banks profit from widespread deposit-gathering networks and from loan portfolio risk diversification (see Deep and Schaefer 2004, Berger and Bouwman 2009), especially when regarding the restrictions in refinancing posed on Islamic banks. Further, we find evidence that illiquidity lowers the amount of risk shield on the asset side of an Islamic bank, leading to a decrease in loan portfolio risk-taking (see Diamond and Dybvig 1983, Diamond 1996). However, this result is not robust for the alternative risk proxy. On the macroeconomic level, we find significant but contrary results for the influence of inflation on the two loan portfolio risk-taking measures. There is no clear evidence that higher inflation makes risk-taking in the loan portfolio more attractive. Moreover, while we find no explanatory effect of per capita GDP, there is evidence that increasing economic and institutional development are accommodative to loan portfolio risk-taking due to lower degrees of asymmetric information, liquidity constraints, and capital costs. The null hypothesis

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for over-identifying restrictions is rejected through the Sargan Test, thus suggesting that the instruments are valid. Our first-order (AR1) and second-order (AR2) autocorrelation tests reject the presence of a serial correlation. The results of the entire sample are summarized in Table 7.

Please insert Table 7 about here.

4.2 Checking for Robustness

The following results aimed at controlling the robustness and consequently their interpretations should be treated cautiously due to the restricted number of observations that are available for Islamic banks that fulfill the criteria specified above and due to the endogeneity problem. In the following, the discussion of the subsample results is focused on our primary loan portfolio risk measure LLR, as the estimations with our alternative proxy LLP do not have enough observations. The results with reverse causality analysis in terms of adjustments to the compositions of SSB on the business model of Islamic banks are discussed only with the bank risk proxy of LLR, as the estimations with the alternative variable lead to similar results. Hence, the results of the latter proxy are not reported for brevity. The same argument explains why we only report our results for the entire sample, as the results for subsamples with country and bank size focus lead to similar conclusions. We employ several econometric methods to achieve robust and valid results, as discussed in the methodologies mentioned above.

For the robustness of our results, we first construct two subsamples of Islamic banks based in GCC or Non-GCC, respectively, concerning to the different approaches of *Shari'ah*-compliant governance. This allows us also to distinguish between Islamic banks operating under comparable macroeconomic and Islamic finance market conditions as in the GCC and Islamic banks operating under more heterogeneous conditions as in the Non-GCC. Except in Malaysia, Islamic banks from GCC conduct their business in a stronger Islamic bank market competition

than their counterparts from Non-GCC (see Al-Hassan et al. 2010, Espinoza et al. 2010). The different impacts of the composition variables of the SSB when considering the effects of previous year and of two years prior continue as in the entire sample. In the GCC sample, the prior year size variables of the SSB have positive insignificant coefficients (min. 0.3) and a significant positive influence on the 10% level for two years prior variables. As in the entire sample, the loan portfolio risk-taking of Islamic banks from Non-GCC is negatively affected by the SSB size indicator with first lag on a significance level of at least 10% with a coefficient value of at least -1.6. The SSB size variable with two lags has a positive, but insignificant influence with a coefficient value of 1.8. Thus, we find weak evidence for our Hypothesis 1 in terms of a positive relationship between the number of SSB members and loan portfolio risk-taking in Islamic banks from GCC. For their counterparts from Non-GCC, we find that increasing number of members in a SSB in previous year lead at the least to more restrictive behavior in the current year. Due to the centralized *Shari'ah*-governance approach that applies particularly to Islamic banks from Non-GCC, we find that the increasing amount of SSB members is more restrictive on loan portfolio risk-taking, while it is more permissive for their counterparts from GCC. Next, when examining the effect that the top twenty ranked members of SSBs have on bank risk-taking behavior, there is significant (min. 10% level) positive influence for previous year variables in Islamic banks from GCC with a coefficient value of at least 0.062. In contrast, one estimated specification shows that there is significant evidence (5%) that the risk-taking behavior of Islamic banks from Non-GCC is negatively affected with a coefficient value of -0.806. Both subsamples have an insignificant negative coefficient of the SSB top twenty variables with two prior years (min. -0.105). In contrast to the Non-GCC sample, the results of the GCC sample support our second Hypothesis such that increasing the number of top twenty ranked SSB members leads to additional loan portfolio risk-taking by Islamic banks. This result

implicates that the supervisory effectiveness and the disciplinary power on loan portfolio risk-taking by scholars with multiple memberships suffer especially under a decentralized *Shari'ah*-governance structure, as the centralized counterpart limits the influence of individual members – either permissive or restrictive - and due to the fact that Islamic banks from Non-GCC prefer to fill SSB positions with members from their home country, which limits the number of seats that any given scholar holds. Aside from one exception, the annual change variable of the compositions of SSBs with first lag confirm for both subsamples the negative significant (min. 5% level) influence of a change on bank risk-taking with coefficient values of at least -2.2. The second lag variables are insignificant with a positive sign for the GCC sample and a negative sign for the Non-GCC sample. Thus, there is no significant evidence for our third Hypothesis, which predicts that annual changes in the composition of a SSB are positively associated with additional loan portfolio risk-taking by Islamic banks. We find evidence that at least in the beginning of their terms, scholars are more restrictive than permissive because new scholars need time to understand the risks before they can permit them. The evidence is stronger for Islamic banks from Non-GCC, as their SSBs have lower levels of multiple memberships and therefore less networking between the scholars; thus, changes in the composition of the SSBs have a greater impact on their decisions. The distinction according to subsamples with country focus shows how the roles of SSBs differ regarding their influence on loan portfolio risk-taking. This finding is due to the different approaches to *Shari'ah*-governance between GCC countries and Non-GCC countries (centralized vs. decentralized), but it also suggests that the role of SSBs at Islamic banks differ in a more competitive bank market such as in countries within the GCC. As discussed in the literature survey, the decentralized approach of *Shari'ah*-compliant governance at Islamic banks in GCC is more orientated towards market and innovation than the centralized approach, which is common mainly in Non-GCC. Concerning to the reason that the overall and

the chairman positions are dominated by *Shari'ah*-scholars from GCC (see Table 3 in the appendix), the probability is relatively high that SSB positions are taken by these scholars who are more permissive than restrictive with a demand side orientation, but our results indicate that the *Shari'ah*-governance structure decisively impacts the role of individual banks' SSBs in governing the risks that are taken at Islamic banks. Compliance to the *Shari'ah* and the economic success of a bank underlies a trade-off which is more difficult to solve when bank market competition among either Islamic banks or with their Western counterparts is increasing, which, in turn potentially increases their risk-taking behavior in the loan portfolio (see Boyd and De Nicol´o 2005). However, this is not in the focus of our study and it should be treated more in detail in an own study. The results for the subsamples of Islamic banks from GCC and Non-GCC are summarized in Table 8.

Please insert Table 8 about here.

Further robustness of our results from the entire sample is achieved when differentiating between larger and smaller Islamic banks. We use the median bank size in total assets (ca. 1,857 million USD) as the cutoff criterion of cutoff to achieve similar weightings between both subsamples. The distinction according to bank size makes it possible to consider effects that SSBs have on loan portfolio risk-taking in complex (large) and non-complex (small) Islamic banks.

The previous year variables regarding the size of the SSB have negative signs for large and small Islamic banks, but they are insignificant in all but one case. In this case, increasing the number of members within a SSB negatively influences the loan portfolio risk-taking attitude of Islamic banks with a coefficient value of -6.4 on a 5% significance level. The second lags of SSB size variables confirm significantly for small Islamic banks (6.2) our first Hypothesis, while the

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coefficient for their large counterparts is insignificant but positive (1.5). This confirms our expectation that the problem of free-riding in disciplining Islamic banks in their loan portfolio risk-taking by SSBs is lower in large and complex Islamic banks than in their small and non-complex counterparts (see Adams and Mehran 2011). For the number of members in a SSB with second lags, this relationship is stronger for small than for large Islamic banks because the latter typically has a higher degree of complexity, and thus requires more time and effort by the top-ranked SSB members. Furthermore, *Shari'ah* scholars should be interested in fulfilling their functions better in large Islamic banks than in their small counterparts to continue their reputational mandates in one of the leading Islamic banks. When considering the influence of top twenty SSB members, we find consistent positive coefficients for the lagged variables in both subsamples with a coefficient value of at least 1.7, despite in one case in which it is significantly (1%level) negative for smaller Islamic banks with a coefficient value of -0.3. Here, we find the tendency of top ranked *Shari'ah* scholars who have multiple memberships in SSBs to concentrate their bank-risk disciplinary effort on large Islamic banks at the expense of their small counterparts. This is typically connected with higher complexity in large banks and with factors concerning scholars' desire to have a position in one of the leading Islamic banks and so to improve their reputation. Next, by regarding the annual change of SSB compositions, the risk-taking behavior of large and small Islamic banks reacts significantly negatively to a new board selection in the previous year. A change in the composition of the SSB two years prior again affects large Islamic banks negatively, while there is an insignificant coefficient with a positive value (0.248) for small Islamic banks. In the beginning of their memberships, new scholars need time to understand the risks before they can permit them. This is especially true for large and complex Islamic banks. The results of the subsamples for large and small Islamic banks are summarized in Table 9.

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Please insert Table 9 about here.

Our empirical results referring to reverse causality analysis in terms of how dependent the composition characteristics of SSBs are on risk-taking (LLR) and performance factors (ROA) in Islamic banks are discussed in the following. The dependent variables of number of SSB members and the dummy variable for an annual change of the total composition of a SSB are not influenced by risk-taking behavior or performance factors for their first lag and second lag specifications. When examining the influence of risk-taking and performance variables on the number of top-twenty ranked SSB members, we indicate a significant negative relationship of the independent variables with first lag, while there is no significant effect by their counterparts with second lag. Increasing loan portfolio risk-taking in the previous period with first lag, decreases the amount of scholars with multiple memberships in a bank individual SSB. Thus, there is evidence that the Hypothesis 2 is true to both directions and this finding implicates that there is endogeneity especially between loan portfolio risk-taking variable and the indicator for multiple memberships. Therefore, we conclude on the whole from reverse causality analysis that there is significant evidence that the business model of Islamic banks in terms of loan portfolio risk-taking is guided by factors related to the composition of the SSB rather than vice versa. The results of reverse causality analysis are summarized in Table 10.

Please insert Table 10 about here.

In sum, our empirical results of the entire sample and of the subsamples reveal evidence that the previous composition of individual bank SSBs influence current loan portfolio risk-taking. The empirical results support our method to differentiate between the effects of the compositions of the SSBs in the prior year and in two prior years. Increasing the size of the SSB, multiple memberships of top twenty ranked *Shari'ah* scholars and annual changes in the

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composition of SSBs tend to lead to a decrease in the supervisory effectiveness in disciplining the loan portfolio risk-taking behavior of Islamic banks. The positive relation between board size and risk contradicts the earlier empirical literature (see e.g. Pathan 2009, Cheng 2008, Minton et al. 2011), and confirms that the research focus of this study contributes to the literature. According to the different approaches of *Shari'ah* governance structures at Islamic banks based in GCC (decentralized) and in Non-GCC (centralized), we find evidence that the disciplining function of SSBs towards the risk-taking behavior of Islamic banks, can be better fulfilled in Non-GCC than in GCC countries. Moreover, due to higher complexity in large than small banks, there is weak support that the disciplining power of SSBs regarding a bank's risk-taking in the loan portfolio concentrates more on large Islamic banks. This issue also results from the fact that positions within SSBs in large Islamic banks are associated with better reputations and prestige, so the scholars are more interested in fulfilling their functions in these banks than in their small counterparts. Therefore, scholars who have a mandate in a SSB of a large Islamic bank have "more to lose" by failing to report an issue (see also DeAngelo 1981). As the causal relationship between board characteristics and firm attributes is a key topic in the literature, our analysis of the reverse causality strongly confirms that the business model of Islamic banks adjusts for the differing characteristics of the banks' SSBs. Thus, the analysis of our primary research question and the associated theoretical predictions are supported by our empirical results. On the basis of a series of tests, the estimates find evidence for our hypotheses in which the equations are neither over-identified nor there is evidence of first-order (AR1) or second-order (AR2) serial correlation in most cases.

5 Conclusions

Islamic banks underlie the guidelines of the *Shari'ah* as the unique and global legislation for Muslims, in which interest, gambling, and speculation are prohibited and financial contracts have to be based on real assets and on profit and loss sharing (equity-based). Furthermore, financings have to fulfill specific negative and financial screening criteria which are comparable to a broader case of socially responsible investments (SRI). In contrast to their Western counterparts, a specific characteristic in the governance structure of Islamic banks is the *Shari'ah* Supervisory Board (SSB) which is responsible for monitoring and certifying that all contracts, transactions, and other business activities are compliant to the *Shari'ah*. In our study, we empirically analyze the influence that the individual composition of a bank's SSB has on an Islamic bank's risk-taking behavior in the loan portfolio (credit risk) to examine the supervisory effectiveness and the disciplining power. Thus, we address the question of how the certification and monitoring function of a SSB on behalf of the *Shari'ah* affect the loan portfolio risk-taking behavior. Here, we regard SSB characteristics including the total number of scholars as well as their top twenty rankings and annual changes in the composition of SSBs. Our panel analysis is based on a cross-country sample with Islamic banks based in the Middle East and Northern Africa as well as in Southeast Asia over the period from 2000 to 2010.

Our results confirm that increasing the size of SSBs, multiple memberships of top twenty ranked *Shari'ah* scholars, and annual changes in the composition of SSBs are accommodative to increasing the loan portfolio risk-taking of Islamic banks, especially when previous effects with two lags of the composition variables of SSBs are considered. The supervisory effectiveness and the disciplining power of SSBs towards loan portfolio risk-taking behavior in Islamic banks suffer especially in case of decentralized *Shari'ah*-compliant governance structures as it is practiced in the GCC. When comparing these results with the analysis of reverse causality, there

is evidence that characteristics of the SSB influence primarily loan portfolio risk-taking rather than vice versa. The resulting policy implication is that the Islamic banking market should have a centralized governance approach to bring more bank market stability, to reduce legal risk through harmonization of financial practices (see also Alexander 2010, Deloitte 2010, Rider 2012), to decrease costs of bank individual SSBs as well as to solve the problem of high concentration of seats among the top ranked scholars that lead to further conflicts of interest. Finally, the centralized governance structure promises to maintain the origins and the uniqueness of Islamic finance and to be more governance-orientated instead of a decentralized structure in which the success of an Islamic bank and market side interests underlie stronger a trade-off to the *Shari'ah*-compliant governance.

A possible area for further research would be to examine how the influence of SSB characteristics on Islamic banks' risk-taking in their loan portfolio depends on the degree of separation of ownership and control (see Jensen and Meckling 1976, Fama and Jensen 1983, Demsetz and Lehn 1985, Laeven and Levine 2009). Regarding this, the ownership structure can also affect the relation between the governance effect of SSBs and the loan portfolio risk-taking by Islamic banks. In addition, the determinants of loan portfolio risk-taking can be extended to additional characteristics of SSBs, such as educational background, the financial expertise of *Shari'ah* scholars as well as the degree of independence of SSB members (see Minton et al. 2011, Pathan 2009). Further analyses and robustness tests, especially when more comprehensive data are available, could be done using alternative bank-risk proxies (see e.g. Laeven and Levine 2009, Delis and Staikouras 2011).

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Appendix

Table 1: *Shari'ah*-compliant negative and financial screens.

1. Stage: Negative branch and company individual screens.

Tobacco industry;
Weapons and defence industry;
(Interest-based) Financial intermediaries of western industrial countries;
Producing, selling, distilling or distributing alcohilic beverages;
Producing, selling, slaughting or distributing pork;
Entertainment industry (music, cinema, pornography, theatres, etc.);
Gambling activities (casinos, lotteries, betting);
Companies engaged in products related to aborted human foetuses or in human cloning;
Pollutive companies;
Employee dicsriminating companies.

2. Stage: Company individual financial ratio and income screens.

Debt / market value of equity < 33%;
Liquid assets + interest bearing debt / market value of equity < 33%;
Accounts payable from trade and delivery / market value of equity < 33%;
Revenue generated in the above negative screens / overall revenue < 5%.

Source: Own illustration.
Notes: Controlling for *Shari'ah*-compliance of an asset underlying a financial contract is a two-step procedure according to the disqualifying criteria in the list above. The fulfillment of the first stage builds the precondition for the second stage. First, the spectrum of *Shari'ah*-compliant assets is restricted under qualitative branch and company individual criteria. The second step in the following checks mainly the fulfillment of leverage ratios differing in the maturity. Additionally, this step includes a criterion with a combination of qualitative and quantitative screening in which the isolated checking of an asset is left.

Table 2: Geographic and annual distribution of the sample with Islamic banks.

Country	Number of banks	Annual observations
GCC countries		
Bahrain	22	148
Kuwait	9	59
Qatar	5	33
Saudi Arabia	4	20
UAE	10	56
Non-GCC countries		
Egypt	2	19
Indonesia	2	17
Jordan	3	23
Lebanon	2	6
Malaysia	15	89
Syria	2	8
Turkey	3	15
Yemen	3	28
Total	82	521

Source: Own illustration.

Notes: The *Gulf Cooperation Council (GCC)* consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was founded 1981 in Abu Dhabi to cooperate in several fields as in economy, politics and culture. The decision to regard *GCC* separately is concerning to the following reasons: relative high macroeconomic homogeneity, comparable market shares in the assets managed by Islamic banks, similar SSB governance structure and higher Islamic bank market competition than in *non-GCC*.

Table 3: Shari'ah Supervisory Board (SSB) members by nationality and by ranking.

Nationality	Overall board positions	Chairman positions	Overall board positions of top 20 scholars	Chairman positions of top 20 scholars
GCC Countries				
Bahrain	57	10	36	8
Kuwait	62	14	47	12
Qatar	20	6	17	6
Saudi Arabia	41	11	18	7
UAE	10	0	0	0
Non-GCC Countries				
Egypt	14	10	8	8
Indonesia	7	2	0	0
Jordan	8	2	0	0
Lebanon	4	0	0	0
Malaysia	50	11	4	0
Pakistan	3	1	0	0
Sudan	2	0	0	0
Syria	29	12	24	11
Turkey	1	1	0	0
Yemen	6	2	0	0
Total	314	82	154	52

Source: Own illustration.

Notes: For this listing and ranking we include the SSB memberships of the last available year of an Islamic Bank in our dataset. The *Gulf Cooperation Council (GCC)* consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. It was founded 1981 in Abu Dhabi to cooperate in several fields as in economy, politics and culture. The decision to regard *GCC* separately is concerning to the following reasons: relative high macroeconomic homogeneity, comparable market shares in the assets managed by Islamic banks, similar SSB governance structures and higher Islamic bank market competition than in *non-GCC*.

Table 4: Descriptive statistics over the period 2000-2010.

	Mean	Median	Std. Dev.	Max.	Min.	Obs.
LLR	5.944	2.950	12.130	100.000	-6.900	491
LLP	3.963	1.010	11.594	106.610	0.000	324
ROA	2.480	1.395	9.896	91.460	-45.310	534
SSB_Size	4.035	4.000	1.267	8.000	1.000	521
SSB_Top20	43.515	40.000	36.340	100.000	0.000	537
ΔSSB_Total	0.254	0.000	0.436	1.000	0.000	437
Equ	29.127	17.715	27.808	100.000	0.000	558
TA (Mil. USD)	9,821.263	1,364.640	33,357.249	468,497.000	14.860	561
Liq	28.456	23.900	21.958	100.000	0.000	550
Inflation	4.130	2.618	6.223	55.035	-4.865	902
GDPCAP	17,522.609	13,710.520	16,287.957	91,477.777	532.421	902
EFI	66.146	66.440	8.043	76.332	36.291	773

Source: Own illustration based on Bankscope.

Notes: Thjs Table reports the descriptive statistics of the dependent and independent variables which we consider in this study.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

Table 5: Correlation statistics between the variables used in the empirical analysis.

	1	2	3	4	5	6	7	8	9	10	11	12
1. LLR	1.000											
2. LLP	0.348	1.000										
3. ROA	-0.446	-0.249	1.000									
4. SSB_Size	0.115	0.057	0.013	1.000								
5. SSB_Top20	-0.034	0.038	0.081	0.051	1.000							
6. ΔSSB_Total	0.005	-0.076	-0.013	0.211	-0.117	1.000						
7. Equ	0.305	0.217	0.057	-0.077	0.342	-0.144	1.000					
8. TA	-0.008	-0.076	0.060	0.216	-0.078	0.054	-0.056	1.000				
9. Liq	0.046	-0.113	-0.049	0.055	-0.299	0.065	0.015	0.069	1.000			
10. Inflation	-0.018	-0.084	0.051	-0.037	-0.091	-0.134	-0.054	-0.057	0.031	1.000		
11. GDPCAP	-0.056	-0.035	0.196	0.036	0.451	-0.058	0.211	-0.105	-0.272	0.014	1.000	
12. EFI	0.082	0.244	0.087	0.161	0.464	-0.014	0.344	0.014	-0.170	-0.507	0.297	1.000

Notes: This table reports the correlation coefficients between the regarded dependent and independent variables used in the empirical analysis.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

Table 6: Difference tests of dependent and independent variables.

	Total	GCC	Non-GCC	**Mann-Whitney U-Test**	Large	Small	**Mann-Whitney U-Test**
	Median	Median	Median		Median	Median	
LLR	2.950	2.550	3.400	0.000***	3.150	2.510	0.080*
LLP	1.010	0.955	1.210	0.035**	0.830	1.580	0.000***
ROA	1.395	2.160	0.700	0.000***	1.490	1.290	0.801
SSB_Size	4.000	4.000	4.000	0.985	4.000	4.000	0.000***
SSB_Top20	40.000	66.667	0.000	0.000***	40.000	50.000	0.001***
ΔSSB_Total	0.000	0.000	0.000	0.028**	0.000	0.000	0.013**
Equ	17.715	24.870	9.110	0.000***	12.500	28.445	0.000***
TA (Mil. USD)	1,365.000	1,235.000	1,760.000	'0.087*	4,846.000	383.400	0.000***
Liq	23.900	18.310	33.010	0.000***	21.320	27.850	0.004***
Inflation	2.618	2.248	3.288	0.000***	2.618	2.618	0.492
GDPCAP	13,710.520	20,496.910	3,884.220	0.000***	11,126.520	15,452.230	0.380
EFI	66.440	71.200	57.210	0.000***	64.732	69.700	0.000***

Notes: This table reports the results of difference tests between subsamples for the regarded dependent and independent variables in this study. We use the Mann-Whitney U-Test to do the difference tests in which the *p*-values are reported in the table. We built subsamples according to country focus (GCC vs. non-GCC) and to bank size focus (large vs. small). Our Chi-square tests confirm the independence of these subgroups, so that we can exclude biases resulting from relationships between the criteria of bank size and of country focus.

Variable definitions: PLSR = profit and loss sharing ratio in percent; LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; TA = total assets in Mil. USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Table 7: Regression results from estimates with the total sample of Islamic banks over the period 2000-2010.

Dependent variables:	LLR	LLR	LLR	LLP	LLP	LLP
	(1)	(2)	(3)	(4)	(5)	(6)
Bank individual SSB variables						
Lagged dependent	1.391***	1.536***	1.335***	0.501***	0.497***	0.624***
	(0.024)	(0.112)	(0.136)	(0.020)	(0.030)	(0.027)
SSB_Size (-1)	-7.641***	-1.883**		4.361***	4.139***	
	(0.219)	(0.743)		(0.470)	(0.658)	
SSB_Size (-2)			3.238***			1.373**
			(0.463)			(0.524)
SSB_Top20 (-1)	-0.232***	0.045**		0.047***	0.114***	
	(0.008)	(0.022)		(0.017)	(0.030)	
SSB_Top20 (-2)			-0.010			0.225***
			(0.047)			(0.028)
ΔSSB_Total (-1)	-1.012***	-1.823***		-1.083***	-2.846***	
	(0.153)	(0.309)		(0.159)	(0.335)	
ΔSSB_Total (-2)			1.804***			0.372
			(0.410)			(0.329)
Bank individual variables						
Equ	-0.684***	-0.382***	-0.596***	0.329***	0.332***	0.350***
	(0.023)	(0.079)	(0.059)	(0.035)	(0.035)	(0.015)
ln(TA)	0.975***	-0.203	-0.446**	-0.230	0.166	0.187
	(0.173)	(0.252)	(0.207)	(0.196)	(0.284)	(0.240)
Liq	-0.203***	-0.117***	-0.086***	0.009	0.016	-0.017
	(0.011)	(0.019)	(0.011)	(0.011)	(0.012)	(0.014)
Macro variables						
Inflation	-0.458***	-0.332***	-0.422***	0.384***	0.367***	0.102***
	(0.013)	(0.061)	(0.049)	(0.039)	(0.053)	(0.018)
GDPCAP	<0.000**	<0.000**	<0.000**	<0.000	<0.000	<0.001**
	(<0.000)	(<0.000)	(<0.000)	(<0.000)	(<0.000)	(<0.000)
EFI	0.094***	0.208**	0.538***	1.397***	1.083***	0.041
	(0.030)	(0.131)	(0.047)	(0.108)	(0.151)	(0.060)
No. of obs.	178	133	136	115	89	91
AR1	0.002	0.007	0.038	0.000	0.000	0.000
AR2	0.000	0.000	0.003	0.000	0.000	0.001
Sargan test	0.447	0.431	0.365	0.625	0.497	0.368

Notes: This table presents results from dynamic panel GMM estimation with predetermined and lagged endogenous variables in first differences (see Arellano and Bond (1991), Blundell and Bond (1998)) for our empirical model (1) described in Section 3.3. The table reports also the *p*-values for the tests of first- (AR1) and second- (AR2) order autocorrelation as well as for the test of over-identifying restrictions (Sargan test). To achieve robust results, we test for alternative bank-risk (LLR, LLP) variables. Specifications (1) and (4) are estimated with the second lag of the SSB composition variables as instruments. Specifications (2) and (5) are estimated with the second and the third lag of the SSB composition variables as instruments. Specifications (3) and (6) are estimated with the third lag of the SSB composition variables as instruments.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are in parentheses.

Table 8: Regression results of subsamples with country focus (GCC vs. non-GCC) over the period 2000-2010.

	GCC			Non-GCC		
Dependent variables:	LLR	LLR	LLR	LLR	LLR	LLR
	(1)	(2)	(3)	(4)	(5)	(6)
Bank individual SSB variables						
Lagged dependent	0.881***	1.250***	1.125***	0.242	0.335***	0.281
	(0.188)	(0.199)	(0.153)	(0.157)	(0.101)	(0.589)
SSB_Size (-1)	1.844	0.299		-1.680*	-4.849**	
	(1.511)	(1.018)		(0.951)	(2.116)	
SSB_Size (-2)			3.727*			1.843
			(1.995)			(7.489)
SSB_Top20 (-1)	0.062*	0.072**		0.031	-0.806**	
	(0.034)	(0.032)		(0.100)	(0.324)	
SSB_Top20 (-2)			-0.105			-0.386
			(0.073)			(0.703)
ΔSSB_Total (-1)	-4.578**	-1.305		-2.220***	-3.295***	
	(1.988)	(1.746)		(0.337)	(0.999)	
ΔSSB_Total (-2)			0.293			-0.671
			(1.210)			(2.926)
Bank individual variables						
Equ	-0.505***	-0.287*	-0.328*	-0.015	-0.031	-0.033
	(0.125)	(0.155)	(0.182)	(0.094)	(0.274)	(0.106)
ln(TA)	1.915	1.057	2.917*	1.340**	0.001	-1.474
	(2.323)	(1.780)	(1.690)	(0.609)	(0.708)	(4.622)
Liq	-0.309***	-0.044***	-0.230**	0.055	0.259***	0.094
	(0.105)	(0.094)	(0.094)	(0.037)	(0.090)	(0.094)
Macro variables						
Inflation	-0.101	-0.220*	-0.043	0.034	0.002	-0.288
	(0.154)	(0.119)	(0.125)	(0.028)	(0.030)	(0.581)
GDPCAP	<0.000	<0.001	<0.000*	<0.000	0.003***	0.001
	(<0.000)	(<0.000)	(<0.000)	(<0.000)	(0.001)	(0.004)
EFI	0.574**	-0.184	0.107	0.195***	-0.075	0.479
	(0.270)	(0.204)	(0.419)	(0.070)	(0.070)	(0.611)
No. of obs.	98	75	76	74	54	57
AR1	0.863	0.120	0.190	0.051	0.014	0.419
AR2	0.076	0.000	0.015	0.057	0.014	0.351
Sargan test	0.394	0.749	0.336	0.443	0.260	0.522

Notes: This table reports results from dynamic panel GMM estimation with predetermined and lagged endogenous variables in first differences (see Arellano and Bond (1991), Blundell and Bond (1998)) for our empirical model (1) described in Section 3.3. The table reports also the *p*-values for the tests of first- (AR1) and second- (AR2) order autocorrelation as well as for the test of over-identifying restrictions (Sargan test). Due to low amount of observations, we use only our primary bank-risk variable LLR. Specifications (1) and (4) are estimated with the second lag of the SSB composition variables as instruments. Specifications (2) and (5) are estimated with the second and the third lag of the SSB composition variables as instruments. Specifications (3) and (6) are estimated with the third lag of the SSB composition variables as instruments.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are in parentheses.

Table 9: Regression results of subsamples with bank size focus over the period 2000-2010.

	Large			Small		
Dependent variables:	LLR	LLR	LLR	LLR	LLR	LLR
	(1)	(2)	(3)	(4)	(5)	(6)
Bank individual SSB variables						
Lagged dependent	0.099	0.215**	0.128	1.854***	1.647**	1.668***
	(0.063)	(0.084)	(0.211)	(0.143)	(0.659)	(0.288)
SSB_Size (-1)	-0.505	-0.263		-6.428**	-0.223	
	(0.612)	(0.395)		(2.682)	(3.882)	
SSB_Size (-2)			1.538			6.168**
			(1.829)			(2.890)
SSB_Top20 (-1)	0.056	0.017		-0.315***	0.381	
	(0.037)	(0.031)		(0.092)	(0.349)	
SSB_Top20 (-2)			0.058			0.112
			(0.088)			(0.108)
ΔSSB_Total (-1)	-2.178***	-1.211*		-5.133***	-0.228	
	(0.431)	(0.744)		(1.071)	(4.098)	
ΔSSB_Total (-2)			-2.497**			0.248
			(1.243)			(0.822)
Bank individual variables						
Equ	0.362***	0.158***	0.283***	-0.447***	-0.278	0.094
	(0.079)	(0.033)	(0.090)	(0.071)	(0.403)	(0.130)
ln(TA)	0.336	'-0.104	0.201	-7.492***	-4.306***	2.837*
	(0.723)	(0.948)	(1.105)	(0.987)	(0.737)	(1.514)
Liq	0.120***	0.116***	0.144***	-0.427***	-0.022	-0.177***
	(0.018)	(0.037)	(0.031)	(0.036)	(0.208)	(0.053)
Macro variables						
Inflation	0.042	0.055	0.083	0.208***	0.231	0.047
	(0.058)	(0.115)	(0.268)	(0.029)	(0.206)	(0.097)
GDPCAP	<0.000	<0.000	<0.000	0.001	0.000	0.000
	(<0.000)	(<0.000)	(<0.000)	(0.001)	(0.001)	(0.000)
EFI	0.515**	0.308***	0.332	0.094	-0.298	-0.483
	(0.221)	(0.111)	(0.328)	(0.081)	(0.703)	(0.307)
No. of obs.	99	73	75	73	56	58
AR1	0.018	0.132	0.082	0.002	0.138	0.123
AR2	0.031	0.024	0.005	0.016	0.144	0.092
Sargan test	0.442	0.240	0.286	0.578	0.386	0.342

Notes: This table reports results from dynamic panel GMM estimation with predetermined and lagged endogenous variables in first differences (see Arellano and Bond (1991), Blundell and Bond (1998)) for our empirical model (1) described in Section 3.3. The table reports also the *p*-values for the tests of first- (AR1) and second- (AR2) order autocorrelation as well as for the test of over-identifying restrictions (Sargan test). Due to low amount of observations, we use only our primary bank-risk variable LLR. Specifications (1) and (4) are estimated with the second lag of the SSB composition variables as instruments. Specifications (2) and (5) are estimated with the second and the third lag of the SSB composition variables as instruments. Specifications (3) and (6) are estimated with the third lag of the SSB composition variables as instruments.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are in parentheses.

Table 10: Regression results of reverse causality analysis over the period 2000-2010.

Dependent variable:	SSB_Size		SSB_Top20		ΔSSB_Total	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank individual SSB variables						
Lagged dependent	0.084**	0.127***	-0.206***	-0.040**	0.579***	0.604***
	(0.037)	(0.035)	(0.027)	(0.016)	(0.184)	(0.187)
LLR(-1)	0.001		-0.201***		-0.002	
	(0.001)		(0.024)		(0.009)	
LLR(-2)		0.004		0.024		0.003
		(0.005)		(0.063)		(0.009)
ROA(-1)	0.001		-0.010**		-0.016	
	(0.002)		(0.004)		(0.014)	
ROA(-2)		0.006		-0.003		-0.006
		(0.004)		(0.010)		(0.012)
Bank individual variables						
Equ	-0.002*	0.000	-0.117***	-0.043	0.005	0.003
	(0.001)	(0.003)	(0.019)	(0.035)	(0.005)	(0.005)
ln(TA)	-0.039***	-0.119***	0.016	-0.561	0.144***	0.122**
	(0.014)	(0.045)	(0.239)	(0.515)	(0.056)	(0.058)
Liq	0.004**	0.007***	-0.064***	-0.034***	0.005	0.005
	(0.002)	(0.001)	(0.012)	(0.009)	(0.005)	(0.005)
Macro variables						
Inflation	0.026***	0.022***	-0.184**	-0.034***	-0.062**	-0.069***
	(0.006)	(0.006)	(0.092)	(0.009)	(0.025)	(0.025)
GDPCAP	<0.000***	<0.000	<0.000***	0.001***	<0.000	<0.000
	(<0.000)	(<0.000)	(<0.000)	(<0.000)	(<0.000)	(<0.000)
EFI	-0.001	-0.001	0.258***	-0.265***	-0.034**	-0.030*
	(0.005)	(0.007)	(0.086)	(0.064)	(0.017)	(0.017)
No. of obs.	225	171	223	169	309	297
Sargan test	0.492	0.751	0.665	0.771		
AR1	0.000	0.000	0.462	0.004		
AR2	0.000	0.000	0.330	0.002		
Mc Fadden R²					0.114	0.113

Notes: This table reports results from dynamic panel GMM estimation with predetermined and lagged endogenous variables in first differences (see Arellano and Bond (1991), Blundell and Bond (1998)) for our empirical model (2) described in Section 3.3 for the specifications (1)-(4). A Probit-Model is used for the specifications (5) and (6) due to the dummy variable as dependent variable. The table reports also the *p*-values for the tests of first- (AR1) and second- (AR2) order autocorrelation as well as for the test of over-identifying restrictions (Sargan test). For brevity, we use only our primary bank-risk variable LLR, as there are similar results with the alternative bank-risk proxy LLP. Specifications (1) and (3) are estimated with the second lag of the SSB composition variables as instruments. Specifications (2) and (4) are estimated with the third lag of the SSB composition variables as instruments.

Variable definitions: LLR = loan loss reserves to gross loans; LLP = loan loss provisions to gross loans; ROA = return on average assets; SSB_Size = amount of SSB members; SSB_Top20 = percentage of SSB members with top twenty rankings (see Ünal 2011); ΔSSB_Total = dummy variable indicating one if the SSB composition in total changed annually and zero otherwise; Equ = equity to total assets; ln(TA) = natural logarithm of total assets in USD; Liq = liquidity to total assets; Inflation = annual percentage change of inflation; GDP/CAP = gross domestic product per capital; EFI = Heritage Foundation/Wall Street Journal economic freedom index.

***, ** and * indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are in parentheses.