J Financ Serv Res (2017) 51:195–219
DOI 10.1007/s10693-016-0245-2

The governance, risk-taking, and performance of Islamic banks

Sabur Mollah[1] · **M. Kabir Hassan**[2] · **Omar Al Farooque**[3] · **Asma Mobarek**[1]

Received: 3 March 2015 / Revised: 17 February 2016 / Accepted: 15 March 2016 /
Published online: 14 April 2016

Abstract We examine whether the difference in governance structures influences the risk taking and performance of Islamic banks compared to conventional banks. Using a sample of 52 Islamic banks and 104 conventional banks in 14 countries for the period from 2005 to 2013, we conclude that the governance structure in Islamic banks plays a crucial role in risk taking as well as financial performance that is distinct from conventional banks. Particularly, we show that the governance structure in Islamic banks allows them to take higher risks and achieve better performance because of product complexities and transaction mechanisms. However, Islamic banks maintain a higher capitalization compared to conventional banks. These results support the research on Islamic investment and risk taking. Our results add a new dimension to the governance research that could be a valuable source of knowledge for policy makers and regulators in the financial services sector.

Keywords Corporate governance · Risk-taking · Firm performance · Islamic banks

JEL Classification G34 · Y90 · G01

✉ Sabur Mollah
sabur.mollah@sbs.su.se

M. Kabir Hassan
mhassan@uno.edu

Omar Al Farooque
ofarooqu@une.edu.au

Asma Mobarek
asma.mobarek@sbs.su.se

[1] Stockholm Business School, Stockholm University, Stockholm, Sweden

[2] Department of Economics and Finance, New Orleans University, New Orleans, LA, USA

[3] UNE School of Business, University of New England, Armidale, NSW, Australia

1 Introduction

In the field of banking and finance, the world has experienced in the last few decades the evolution of the Islamic mode of banking and its rapid growth in Muslim countries. In particular, Muslim countries contain more than a quarter of the world's population.[1] In addition, Islamic finance has seen substantial expansion in non-Muslim countries in terms of global financial assets and market share. The financial assets of the Islamic financial sector totalled US$1.7 trillion in 2013 and grew 50 % faster than the overall banking sector with an average annual growth of 17.6 % from 2008 to 2012 (Ernst and Young 2012). Further, Islamic bank assets are expected to reach US$3.4 trillion by 2018 (Ernst and Young 2013) and US$6.5 trillion by 2020 (IFSB 2010; Cihak and Hesse 2010). Despite the progress made by Islamic banks, the Islamic banking industry should not be viewed in isolation. The specific codes of behavior in the Muslim religion (see, e.g., Abedifar et al. 2013) and the distinctive character of Islamic banking have led to increasingly unique differences between Islamic and conventional banks.

The difference between Islamic and conventional banking is that Islamic banking discards the conventional interest-based financial system and follows the principles of Islamic law promoting property rights, profit-risk sharing, and the sanctity of contracts (Zaher and Hassan 2001; Iqbal and Llewellyn 2002). The prohibition of interest or usury (*riba*) in Islam does not mean that credit is prohibited, capital is not rewarded, or that risk is not priced. By developing a Shari'ah-compliant alternative, Islamic banks offer a distinct business model from the conventional banks. [2] Unlike their conventional counterparts, Islamic banks have developed specific forms of financial contracts to replace the interest rate mechanisms in financial transactions.

Furthermore, due to Shari'ah supervision on risk taking, Islamic banks are not equally exposed to external shocks.[3] Hence, these banks are less susceptible to insolvency because of the nature of Islamic financial contracts that have a wider range of arrangements for risk and liability sharing between the bank and their clients compared with conventional banks. These differences provide for social, ethical, and moral financial solutions to economic problems in transactions through conformity with Shari'ah principles. Moreover, while conventional banks provide financial intermediation services on the basis of a rate of interest on assets and liabilities, Islamic banks can act as both an intermediary of funds and as an entrepreneur and financier of real business activities in their own right.

What distinguishes Islamic banks from their conventional counterparts is not only the replacement of interest but also the significant monitoring role that Shari'ah law plays in the governance structure as opposed to conventional banks (Mollah and Zaman 2015). In Islamic

[1] In 2014, Muslim population was 2038.04 million, which was 28.26 % of the total world population of 7151.51 million. Muslim countries in Asia and Africa had 27.56 % Muslim population (i.e., 1971.08 million), while non-Muslim counties in North America, Europe, Oceania, and South America had 0.7 % (i.e. 66.96 million) (see http://muslimpopulation.com/World).

[2] Islamic banking offers a two-tiered business model: mark-up financing (*murabaha*) and profit-sharing financing (*mudaraba* and *musharaka*). Overtime, the former became the dominant mode of financing in Islamic banks given that there are some inherent problems in applying the latter in practice, such as moral hazard.

[3] Islamic banks are neither exposed to toxic securities nor offered products like CDOs or MBS due to the prohibition by the Shari'ah (Ahmed 2009). The derivative products like CDS are prohibited under Islamic law due to the existence of risky or hazardous sale. In fact, Islamic law prohibits any transactions involving unnecessary uncertainty (*gharar*) and gambling (*maysir*), which includes short selling, arbitrage, betting and speculation (Aziz et al. 2009).

banks, while the customary board of directors performs the executive role, they also enforce the authority of the Shari'ah board to perform either supervisory or advisory roles, or both. Chowdhury and Hoque (2006) consider the Shari'ah board as a *supra authority* that is an integral part of Islamic banks' governance.[4] Further, in a study covering Islamic banks in 25 countries, Mollah and Zaman (2015) find a positive impact of the Shari'ah board's supervisory role on the performance of Islamic banks.

The key question of this paper is: how strong is the governance structure of Islamic banks? We argue that the natures, qualities, and commitments of the regular board of directors in Islamic banks and in conventional banks are different. This is because the former is charged with adhering to Islamic doctrine, which demands that specific codes of behavior be followed and reflected in financial arrangements and transactions. Thus, the governance structure in Islamic banking is unique because of the Shari'ah board's supervision.

Accordingly, there is an open empirical research question as to whether the different governance structure explains the risk taking and performance in Islamic banks. Therefore, given the distinctions between Islamic banks and conventional banks, this study examines whether their governance structure influences risk taking and performance differently. By using a sample of 52 Islamic banks and 104 conventional banks in 14 countries over the period from 2005 to 2013, we conclude that the governance structure in Islamic banks plays a crucial role in increased risk taking as well as enhanced financial performance, which is different from conventional banks.

This study contributes to the literature on banking in several ways. First, this is the first cross-country study that examines the influence of the governance structure on the risk taking and financial performance of Islamic banks. By simultaneously analyzing both Islamic banks and conventional banks, we complement the works of Cihak and Hesse (2010), Hasan and Dridi (2010), Abedifar et al. (2013), Beck et al. (2013), and Mollah and Zaman (2015). These studies provide comparative analyses on financial stability, risk management, performance, and efficiency between these two types of banks.

Second, this study constructs a unique database by using 12 hand-collected governance items, which has not been done in previous banking governance research. This data set captures a wider spectrum of measures of board and CEO structures, board competence, and board diversity for both Islamic banks and conventional banks. Therefore, this study provides a new governance dimension to the banking literature.

Finally, in examining the effect of governance on risk taking and performance, this study also extends pooled sample estimations by splitting the sample into big and small banks, Gulf Cooperation Council (GCC) and non-GCC banks, Muslim majority population and non-Muslim majority population banks, and high Islamicity and low Islamicity banks.[5] In a cross-country environment, these extended analyses capture some interesting findings. In particular, the governance-performance relations for small Islamic banks, Islamic banks in GCC countries, and the low Islamicity and non-Muslim majority regions. These results provide additional valuable insights into the nature and role of Islamic banks' governance structure in performance and risk taking.

[4] Although the governance structure of conventional banks in some countries like Germany or Austria includes a supervisory board, the monitoring mechanism of the Shari'ah Supervisory Board (SSB) is much more effective (Mollah and Zaman 2015).

[5] We take the definition of Islamicity from Rehman and Askari (2010).

The paper is organized as follows: Section 2 presents the theory and hypotheses of the study. The data and method are described in section 3. Section 4 presents the empirical results, and section 5 concludes the study.

2 Theoretical motivation and hypotheses development

The corporate governance and bank risk-taking literature emphasizes shareholder and manager incentives. Similar to other corporations, bank shareholders have a preference for excessive risk taking due to the moral hazard problem, limited liability, and convex pay-off systems (Galai and Masulis 1976; Jensen and Meckling 1976; John et al. 1991). However, due to the higher level of information asymmetry in banks, dispersed and unsophisticated debt holders cannot prevent the shareholders from excessive risk taking by initiating complete debt contracts on an ex-ante basis (Dewatripon and Tirole 1994). Therefore, bank shareholders have strong incentives to undertake excessive risky investments to maximize their benefits at the expense of deposit insurers and taxpayers. In addition, John et al. (1991) conclude that risk-adjusted deposit insurance premiums and risk-adjusted capital requirements fail to mitigate the moral hazard problem and fully control banks' risk-taking incentives. In such a context, the bank managers' opportunistic behavior depends on the governance structure. Akhigbe and Martin (2008) and Pathan (2009) highlight the disclosure, governance, and risk-taking practices of U.S. banks surrounding the Sarbanes-Oxley Act of 2002.

The studies by Sierra et al. (2006), Andres and Vallelado (2008), Adams and Mehran (2012), Aebi et al. (2012), Francis et al. (2012), Wintoki et al. (2012), and Pathan and Faff (2013) investigate the governance mechanism and its effect on firms' performance and value. Sierra et al. (2006) suggest that a strong board can improve a bank's performance. Adams and Mehran (2012) produce similar results for the board's size, but they fail to identify any relation between performance and independent directors. Andres and Vallelado (2008), on the other hand, show a positive but concave effect for both banks' boards and independent directors on performance. Furthermore, Wintoki et al. (2012) report no relation between a board's size or independence and the firm's performance, but Francis et al. (2012) show that better governed firms perform well during financial crises. Despite the well-known governance literature in the context of the banking industry, there is a relative lack of research on the relation between governance and risk taking in Islamic banks.

The literature often separates the examination of issues pertaining to Islamic and conventional banks into the differences between their respective business models (Beck et al. 2013). Islamic banks differ from conventional banks through the imposition of certain religious principles on the products offered, which are free from the establishment of interest (*riba*) (see, e.g., Obaidullah 2005) and excessive uncertainty (*gharar*) (Abedifar et al. 2013). Accordingly, Islamic banks have developed different operational mechanisms such as profit-loss sharing (*Mudaraba*) and nonprofit-loss sharing (*Murabaha and Ijara*) (Khan and Ahmed 2001) as alternatives to time deposits, debt financing, and lease financing in conventional banks. The Shari'ah board, which ensures banking operations and products are compliant with Islamic principles, is an important part of Islamic banks' governance.

The prohibition of receipts and payments of interest is the center of the Islamic financial system and is supported by other principles of Islamic doctrine that advocate for risk sharing, property rights, and the sanctity of contracts (Zaher and Hassan 2001). While conventional banks typically apply the concept of interest as a return on capital, Islamic banks rely on more

sales-type products and services. These products and services are based on profit-loss sharing, mark-up financing and leasing, and relationship-type banking. The interest-free financial system has attracted considerable attention from corporations, policy makers, and other stakeholders. Beck et al. (2013) find few significant differences between the business models of Islamic banks. They find evidence that Islamic banks are less cost effective but have a higher intermediation ratio, higher asset quality, and better capitalization. Cihak and Hesse (2010) find that the risk management of Islamic banks, compared to conventional banks, depends on the size of the banks. Abedifar et al. (2013) extend this finding by examining the relation between investor religiosity and a bank's size.

The religious convictions of the depositors and the operational mechanisms for profit-loss sharing can help Islamic banks maintain pro-cyclical protection and reduce the risk of withdrawal because of loyalty to the banks in times of adverse conditions. However, Islamic banking practices can also increase investors' risk aversion due to the banks' relatively limited access to wholesale funding (Abedifar et al. 2013). Thus, there is no universal argument defining the risk and return behavior of Islamic banks compared with those of conventional banks.

Some features can make Islamic banks less vulnerable to risk than conventional banks. For example, Islamic banks are better able to pass negative shocks on the asset side (e.g., loss sharing) through to the investment depositors (a profit sharing arrangement). The risk-sharing arrangements on the deposit side provide another layer of protection for the Islamic bank beyond its book capital (Abedifar et al. 2013). In addition, Islamic requirements that limit negligence or misconduct (operational risk) and difficulty in accessing liquidity put pressures on Islamic banks to be more conservative. This pressure results in less moral hazard and risk taking (Cihak and Hesse 2010). Furthermore, because investors (depositors) share in the risks and typically do not have deposit insurance, they have better incentives to exercise tight oversight of a bank's management. Finally, Islamic banks have traditionally held a comparatively larger proportion of their assets in reserve accounts with central banks or in correspondent accounts than commercial banks (Cihak and Hesse 2010).

The complexities associated with the administration of Shari'ah compliance represent an additional risk faced by Islamic banks. In addition, the profit-loss sharing mode of financing does not require any collateral or guarantees, which can increase credit risk for Islamic financial institutions. On the other hand, lower leverage and higher solvency through reserved liquid assets can allow Islamic banks to meet stronger demand for credit and maintain a stable external rating (Hasan and Dridi 2010). So, even if Islamic investments are more risky than conventional investments due to the complexities of the products and the transaction mechanisms involved (Abedifar et al. 2013; Olson and Zoubi 2008), the question arises as to whether the higher risks are compensated for by higher returns. Thus, the research is not sufficient to address whether the risk-taking behavior of Islamic banks depends on their governance. This study brings new evidence to the Islamic banking literature.

Islamic banks exhibit diverse operations and relations among depositors, banks, and investors. The large number of depositors and investors in Islamic banks are particularly concerned that their funds are invested in a Shari'ah-compliant manner (Chapra and Ahmed 2002). In general, the agency problems in conventional banks arise when managers deviate from their obligation to maximize shareholders' wealth. In the case of Islamic banks, there is an additional potential source of agency problems pertaining to whether all transactions and products properly conform to Shari'ah requirements, in particular profit-sharing contracts

(*mudarabah*). The operations of Islamic banks suggest that the Islamic principles underlying the contracts result in unique agency relations (Safieddine 2009).

Additionally, profit-loss sharing mechanisms use equity financing and risk sharing, as compared to conventional banks that use debt financing (Beck et al. 2013) and risk transference (Hasan and Dridi 2010). Relationship banking in Islamic banks can also act to reduce adverse selection and moral hazard problems through monitoring by depositors. Although these problems are expected to occur more often in the profit-sharing paradigm, an argument can be made that there is a higher level of trust between Islamic banks and their clients and, hence, the moral hazard risks are less. In conventional banks, relationship banking is confined to private banking services for prime clients, but in Islamic banking a close relationship between the bank and the client comes from shared values, trust, and mutual respect. Thus, some of the risks of Islamic banks can be mitigated by reducing transaction costs and mitigating agency conflicts through monitoring by depositors rather than government intervention, such as deposit insurance (Beck et al. 2013). Alman (2012) elaborates that Shari'ah supervision mitigates risk taking. However, the empirical evidence shows that more studies in this area are needed in order to establish the relation between risk taking and the governance structure (Aggarwal and Yousef 2000; Khan 2010). Accordingly, we first test the difference in governance structures between Islamic and conventional banks and its impact on risk taking in Hypothesis 1.

Hypothesis 1 Governance and risk taking in Islamic banks

> H_{01}: The difference in governance structures between Islamic and conventional banks does not distinguish risk taking between these bank types.

A rejection of H_{01} implies that the distinct characteristics of Islamic banks' governance structure, driven by differences in the financial contracts offered by the banks and the establishment of the Shari'ah supervisory board, affect their risk-taking behavior.

The foundation of Islamic banking stems from Islamic Shari'ah (Islamic Common Law), and Islamic banks comply with the basic principle that exploitative contracts based on interest, uncertainty, or contracts that involve risk or speculation are unenforceable. Financial transactions under these guidelines call for operations and financial products that yield fair, legitimate profits and economic social 'added-value' (Siddiqi 1999). Safieddine (2009) stresses that the governance structure in Islamic banking is unique because it also must ensure that all operations adhere to ethics and morality as outlined by Shari'ah (Abu–Tapanjeh 2009; Chowdhury and Hoque 2006). Mollah and Zaman (2015) address the role of the Shari'ah board and its impact on the performance of Islamic banks compared to conventional banks and report that performance increases in the presence of the Shari'ah board's supervisory role. Accordingly, we further investigate the role that corporate governance plays in affecting performance in Islamic banks in Hypothesis 2.

Hypothesis 2 Governance and performance in Islamic banks

> H_{02}: The difference in governance structures between Islamic and conventional banks does not influence the performance of these bank types.

The rejection of H_{02} implies that the governance structures in Islamic banks that drive differences in risk taking also affect their performance.

The current banking governance literature tends to separate the examination of performance between Islamic and conventional banking institutions. In addition, the literature pertaining to the impact of Islamic banks' governance and its impact on risk taking and performance remains relatively sparse, and the empirical relations remain unclear. While the establishment of Shari'ah principles is often intended to reduce the use of unfair and risky financial products and, thus, the operating risk of Islamic banks, the risks associated with the establishment of the Shari'ah board, limited access to wholesale capital, and credit risk stemming from exclusive Islamic financial contracts make the theoretical relation between Islamic banks' governance structure and risk taking and performance unclear. Thus, our study extends the literature on Islamic banks' governance structure and the risk-return relation.

3 Data and method

We use Bankscope's database to form our primary sample for all Islamic banks during the period from 2005 to 2013. We find data for 169 Islamic banks and filter them by keeping only those having codes C1, C2, and C*[6] because banks with these codes publish consolidated financial statements. We then filter the remaining banks with an independence indicator defined by Bureau van Dijk (BvD) as equal to A or B.[7] Next, by following Beck et al. (2013), we filter the remaining banks based on three principles: (1) countries having both Islamic and conventional banks; (2) countries with at least four banks; and (3) banks with at least 3 years of data. After the filtering process, the final sample has 52 Islamic banks and 104 conventional banks in 14 countries. The banks in our sample come from Bahrain, Bangladesh, Jordan, Kuwait, Lebanon, Malaysia, Pakistan, Qatar, Saudi Arabia, Sudan, Syria, Turkey, Yemen and the United Arab Emirates. Table 1 reports the country-wise distribution of the sample.

3.1 Measures of dependent and explanatory variables

We investigate the link between risk taking, performance, and the governance structure of Islamic banks. The risk-taking variable is the log of the Z-score (Log_Z), and the bank's performance is measured by the return on assets (ROA).

To capture the governance structure, we construct a composite corporate governance index (CGI) based on 12 governance variables listed in Table 6 of the

[6] Bankscope database offers six accounting consolidation codes: C1, C2, U1, U2, C*, and U*. Banks having accounting consolidation codes C1, C2 and C* indicate that the financial statements of the parent bank is consolidated with its subsidiaries, but the financial statements of the parent bank are not consolidated with its subsidiaries for the codes U1, U2, and U*. Thus, un-consolidated statements do not offer a complete financial picture of those banks.

[7] This independence indicator consists of five categories. The categories A and B include companies where the main shareholder holds less than 50 % of the total ownership of a company. We made this choice because in non-independent banks the governance mechanisms are influenced by the parent bank.

Table 1 Sample distribution. This table describes the sample of the study. The study considers 156 banks (52 Islamic and 104 conventional) in 14 countries for the period from 2005 to 2013. The country-wise distribution of the banks, observations, and percentages are in columns 2–6

Country	Islamic banks	Conventional banks	Pooled sample (Banks)	Observations	Percentage (%)
Bahrain	5	11	16	144	10,256
Bangladesh	9	10	19	171	12,179
Jordan	2	9	11	99	7,051
Kuwait	8	6	14	126	8,974
Lebanon	1	7	8	72	5,128
Malaysia	5	12	17	153	10,897
Pakistan	1	6	7	63	4,487
Qatar	3	7	10	90	6,410
Saudi arabia	1	8	9	81	5,769
Sudan	4	4	8	72	5,128
Syria	2	6	8	72	5,128
Turkey	2	2	4	36	2,564
Yemen	1	3	4	36	2,564
United Arab Emirates	8	13	21	189	13,462
Total	52	104	156	1,404	100

appendix. The other explanatory variables include firm and country-specific variables. The full descriptions of the variables are in Table 2.

To test hypotheses (H_{01}–H_{02}), we use the following models (1) – (2):

For risk-taking, we use:

$$Risk\ Taking_{b.c.t} = \alpha_0 + \alpha_1 *Islamic + \beta_1 CGI_{b,c,t-1} + \beta_2 Islamic*CGI_{b,c,t-1} + \gamma *X_{b,c,t-1} + \delta *ME_{c,t} + \varepsilon_{b,c,t} \quad (1)$$

For firm performance, we use:

$$Performance_{b.c.t} = \alpha_0 + \alpha_1 *Islamic + \beta_1 CGI_{b,c,t-1} + \beta_2 Islamic*CGI_{b,c,t-1} + \gamma *X_{b,c,t-1} + \delta *ME_{c,t} + \varepsilon_{b,c,t} \quad (2)$$

The variables for all of the models are:

$Risk\ Taking_{b,c,t}$	is the risk taking of bank b in country c at time t.
$Performance_{b,c,t}$	is the performance of bank b in country c at time t.
$CGI_{b,c,t-1}$	is the lag of the corporate governance index of bank b in country c at time t.
$X_{b,.c,t-1}$	is a matrix of the lag of firm-level variables.
ME_c	is a matrix of country-level macroeconomic and supervisory variables.
$\varepsilon_{b,c,t}$	is the error term; α_0 is the constant; and α, β, γ, and δ are the vectors of coefficient estimates.

Table 2 Description of the variables. This table presents the descriptions of the governance and other firm- and country-specific variables and includes the calculation procedure for each variable

		Dependent variable(s)
Name	Bbreviation	Calculation procedure
Default risk	Log_Z	The *Z-score* is the distance to default estimated as the average ROA plus capital to asset ratio divided by the standard deviation of the ROA. Source: Beltratti and Stulz (2012), Fu et al. (2014), Laeven and Levine (2009) and Pathan (2009). The higher the value of the z-score, the lower the risk taking of the banks. We use the log of the Z-score as a proxy for the insolvency risk. Source: Authors' estimation
Firm performance	ROA	Net income divided by average total assets. Source: Bankscope
		Corporate governance index (CGI)
Corporate governance index	CGI	The corporate governance index is constructed based on 12 boardroom characteristics. The characteristics are: (1) Board Size: Is the board size of this bank smaller than the median board size of the sample? If yes, then one, otherwise zero. (2) Independent Directors: Is the value of board's independence larger than median of the sample? If yes then one, otherwise zero. (3) Female Director: Is there any female director on the board? If yes then one, other wise zero. (4) Board Meeting: Are the number of board meetings larger than the median board meetings of the sample? If yes, then one, otherwise zero. (5) Board Attendance: Are the percent of board attendance larger than 75 %? If yes, then one, otherwise zero. (6) Board Committees: Are the number of board committees larger than the median board committees of the sample? If yes, then one, otherwise zero. (7) Chair Independence: Is the chairman independent? If yes then one, otherwise zero. (8) Chair/CEO Split: Are the roles of Chair/CEO split? If yes, then one, otherwise zero. (9) Internal CEO: If the CEO is not internally recruited, then one, otherwise zero. (10) CEO Qualification: MA or higher then one, otherwise zero. (11) CEO Banking Experience: If the CEO has more than the median years of experience in the sample, then one, otherwise zero. (12) CEO Tenure: If the CEO has more than the median tenure in the sample then one, otherwise zero. The de scriptive statistics for all 12 board characteristics are in Table 6 of the appendix. Source: Hand Collected
		Bank-specific variables
Asset size	Log_TA	Log of total assets. Source: Bankscope
TIER 1 capital	Tier1	Tier 1 capital. Source: Bankscope
Leverage	Lev	Customers' Term Deposit/Equity. Source: Bankscope
STD Of Returns	Stdroa	Standard deviation of ROA.
Loans	Loans	Loans/Total Assets (Loan). Loan is a liquidity ratio. This liquidity ratio indicates what percentage of the assets of the bank is tied up in loans. The higher this ratio is the less liquid the bank is. Source: Bankscope
Bank concentration	HHI	Hirschman-Herfindahl Index (HHI) is a proxy for bank concentration. $HHI_{c,t} = \sum_{i=1}^{n} \left(Total\_Assets_{i,t,c} / \sum_{i=1}^{n} Total\_Assets_{i,t,c} \right)^2$. The HHI has a value between zero and one. The higher the value, the more the concentration. Authors calculation
Legal system	Legal	This a dummy variable for the legal system in the country. We use the value of zero if the country does not have Shari'ah law in

Table 2 (continued)

		its legal system, and the value one for countries that consider Shari'ah together with other legal system, and the value two if the legal system is based exclusively on Shari'ah law.
Islamic bank	Islamic	Islamic is a dummy for Islamic banks. If the bank is an Islamic Bank then one, otherwise zero.
		Country-specific variables
Gdp growth rate	GDP_growth	Annualized growth rate of GDP per capita.
Muslim population	Muslim_population	Percent of Muslim Population. Muslim Population Data is collected from http://muslimpopulation.com/World.
Islamicity index	Islamicity	We use the Islamicity index by Rehman and Askari (2010). The higher the value, the lower the Islamic value in the country.
Inflation rate	Inflation_rate	Year-on-year change of Consumer Price Index (CPI).
Deposit insurance	Dinsur	Deposit insurance is a score for the explicit deposit insurance from Caprio et al. (2007) (updated in 2008) using the World Bank (http://econ.worldbank.org) and Demirguc-Kunt et al. (2007) (http://www.luclaeven.com/Data.htm).
Bank supervisory variables		Bank Supervision, Bank Capital Oversight, Bank Regulatory Restriction, and Bank Private Monitoring. Bank Supervision is a score for the power of the commercial bank supervisory agency, Bank Capital Oversight is a score for regulatory oversight of bank capital, Bank Regulatory Restriction is a score for regulatory restrictions on the activities of banks, and Bank Private Monitoring is a score for monitoring on the part of the private sector. The regulation variables are from Barth et al. (2004) and Caprio et al. (2007) that use data downloaded from the World Bank (http://econ.worldbank.org).

3.2 Estimation method

We use a random-effects GLS method for the regression analyses. We apply this technique, developed by Baltagi and Wu (1999) for several reasons. First, an OLS ignores the panel structure of the data (Gambin 2004). Second, a time-invariant parameter cannot be estimated with fixed-effect methods. Third, the CGI does not vary much over time, so the fixed-effect estimation could be inappropriate (Wooldridge 2002, p. 286) and could lead to a loss in degrees of freedom (Baltagi 2005, p. 14). Recent studies such as Pathan (2009) and Mollah and Zaman (2015) also use the random-effect GLS technique in their studies. Further, for a robustness check of our findings, we also use a two-step GMM method.

3.3 Description of the data

Table 3 presents the descriptive statistics of the variables. The mean values of the log Z-score are 2.480 and 3.097 with standard deviations of 1.090 and 0.804 for Islamic and conventional banks respectively. The ROAs are 1.5 and 1.6 % for the Islamic and conventional banks respectively. The t-tests offer comparisons between the means of the two samples. The

Table 3 Descriptive statistics. This table presents the descriptive statistics for the variables used in the models for both Islamic and conventional banks. We report the paired sample mean difference (*T*-test) in column 14. See Table 2 for the definitions of the variables

	Islamic banks						Conventional banks						
	Observations	Mean	Std.	Median	Skewness	Kurtosis	Observations	Mean	Std.	Median	Skewness	Kurtosis	Paired *T*-test (Islamic Vs. Conventional)
Log_Z	347	2.480	1.090	2.510	−0.660	5.190	869	3.097	0.804	3.098	−.384	3.468	−10.940***
ROA	349	0.015	0.060	0.010	−2.130	17.640	871	0.016	0.038	0.014	−9.656	291.885	−0.149
Islamic	468	1.000	0.000	1.000	–	–	936	0	0	0	–	–	–
CGI	346	0.475	0.157	0.417	−0.026	2.737	769	0.385	0.179	0.417	−.145	2.419	8.007***
Log_TA	349	14.788	1.899	14.618	1.297	6.585	872	22.487	1.653	22.712	−.380	2.481	−70.409***
Tier1	307	22.784	17.819	17.400	3.671	23.690	700	15.258	6.782	13.930	2.455	14.459	9.109***
Lev	337	4.830	3.711	4.229	1.057	4.451	858	7.056	4.992	6.284	8.331	147.218	−7.042***
Stdroa	351	3.886	4.984	1.454	1.494	3.851	871	1.141	3.033	0.605	7.825	66.756	11.733***
Loans	337	0.483	0.252	0.561	−0.419	1.966	856	0.537	0.168	0.577	-.818	3.249	−4.387***
HHI	468	0.243	0.120	0.190	0.643	2.248	936	0.245	0.131	0.180	0.823	2.394	–
Legal	468	0.731	0.486	1.000	−0.524	2.455	936	0.711	0.599	1.000	0.215	2.400	–
GDP_growth	440	4.892	4.776	5.520	−0.017	7.153	881	5.304	4.454	5.585	0.379	8.916	–
Muslim_population	468	81.154	10.613	81.000	−0.247	2.633	936	82.173	13.061	81.000	−0.365	1.973	–
Islamicity	468	81.066	33.114	60.000	0.917	2.863	936	86.868	32.150	85.000	0.737	2.572	–
Inflation_rate	468	60.637	34.963	59.000	0.080	1.942	936	60.053	35.868	60.000	0.067	1.837	–
Dinsur	306	0.252	0.208	0.286	0.013	1.668	675	0.266	0.214	0.285	−0.001	1.565	–
Bank Supervision	306	0.811	0.118	0.857	−0.495	1.697	675	0.837	0.118	0.857	-.614	1.948	–
Bank Regulatory Restriction	306	0.471	0.107	0.400	0.032	2.118	675	0.472	0.133	0.400	−0.561	2.287	–
Bank Private Monitoring	306	0.661	0.217	0.750	−1.659	5.821	675	0.606	0.268	0.750	−.716	2.981	–
Bank Capital Oversight	306	0.549	0.168	0.556	−0.104	2.161	675	0.496	0.156	0.444	0.340	2.613	–

The ***, **, and * represent p-values of 0.01, 0.05, and 0.10

conventional banks preserve a significantly higher level of financial stability, even though their mean ROA is nonsignificantly different between the two bank types.

The CGI for the Islamic banks (the conventional banks) is 0.475 (0.385), respectively. The *t*-test statistics indicate that the Islamic banks attain significantly better CGI as compared to the conventional banks. These primary results indicate that the governance structures in the Islamic banks are relatively better than those of the conventional banks.

Table 3 also reports the firm and county-level control variables. The descriptive statistics for asset size (Log_TA) indicate that a conventional bank's size is significantly larger than that of an Islamic bank. The Islamic banks maintain 22.784 % regulatory capital, while the conventional banks maintain 15.258 %. This difference is significant. However, the conventional banks are highly leveraged compared to the Islamic banks (7.056 % vs. 4.830 %), which is significant. The conventional banks also hold more loans, compared to Islamic banks (53.7 % vs. 48.3 %), which is also significant. Furthermore, the return volatility (STDROA) is higher for Islamic banks compared to conventional banks (3.886 vs. 1.141). Nevertheless, there are country-level variations in the macroeconomic variables, banking regulation, and supervision but these differences are theoretically nonsignificant across bank types.

4 Empirical results

4.1 The impact of corporate governance on risk taking

We present the regression results from investigating the impact of the CGI on risk taking as measured by the log Z-score. Our particular variable of interest is the interaction term between an Islamic bank dummy and the governance index variable (Islamic*CGI_{t-1}). For some explanatory variables, including the corporate governance index (CGI_{t-1}), we test the lagged effects by restricting the contemporaneous effects. Also, different classes of control variables, such as bank-level characteristics and macroeconomic and country-level indicators are included in different specifications denoted by R-squared, which improves the explanatory power of our models. We also control for year and country fixed effects by using year and country dummies. Table 4 shows the results for the baseline estimations of Islamic and conventional banks (models 1–5),[8] big versus small banks (models 7 and 8), GCC versus non-GCC (models 9 and 10), Muslim majority population versus non-Muslim majority population (models 11 and 12), and high Islamicity vs. low Islamicity (models 13 and 14). We test the crisis impact by using a difference-in-difference specification (i.e., by adding the Islamic and crisis dummies and the interaction term 'Islamic*CGI*crisis') (see model 15).

Models 1–5 show that, reflecting the Shari'ah-supervised governance structure, Islamic banks tend to be more risk-adaptive than conventional banks, irrespective of year and country fixed effects. The sign of the interaction variable (Islamic*CGI_{t-1}) is consistently negative and significant at the 5 % level. These findings reject the null hypothesis H_{01} (governance difference between Islamic banks and conventional banks does not influence the risk taking by Islamic banks). However, both the Islamic bank dummy and the CGI variables individually

[8] We discuss model 6 (GMM) in subsection 4.3

Table 4 Difference in governance between Islamic and conventional banks and its impact on risk taking. This table presents the regression results for the governance difference between conventional and Islamic banks and its impact on risk taking. The risk-taking proxy is Log_Z. We use a corporate governance index (CGI) as the proxy for governance. See Table 2 for definitions of the other bank-specific and country-specific variables. Robust standard errors are reported in the parentheses

	Baseline estimation					Robustnes check	Big vs. small		GCC Vs. non-GCC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Random effect	Random effect	Random effect	Random effect	Random effect	GMM model	Big	Small	GCC
Islamic	0.446 (0.346)	0.289 (0.361)	0.379 (0.360)	0.091 (0.519)	0.091 (0.383)	0.106 (0.269)	0.567*** (0.142)	0.572 (0.463)	−2.464** (1.110)
CGI_{t-1}	0.082* (0.047)	0.105* (0.057)	0.098* (0.056)	0.103* (0.059)	0.103* (0.062)	0.224* (0.118)	0.159** (0.066)	−0.115 (0.140)	0.177* (0.106)
$Islamic*CGI_{t-1}$	−0.808** (0.343)	−0.473** (0.192)	−0.525** (0.192)	−0.615*** (0.235)	−0.615** (0.272)	−0.198** (0.101)	0.127 (0.125)	−0.308 (0.339)	−0.369 (0.338)
Log_TA_{t-1}		−0.018 (0.031)	−0.016 (0.031)	−0.067 (0.049)	−0.067* (0.038)	−0.164** (0.078)	−0.148* (0.076)	−0.031 (0.050)	−0.404*** (0.079)
$Tier1_{t-1}$		0.016*** (0.003)	0.015*** (0.003)	0.015*** (0.003)	0.015*** (0.003)	0.015*** (0.003)	0.019*** (0.005)	0.010** (0.005)	0.024*** (0.004)
Lev_{t-1}		−0.002 (0.001)	−0.002 (0.002)	−0.001 (0.001)	−0.001 (0.002)	−0.046 (0.008)	0.001 (0.001)	−0.038*** (0.012)	0.003 (0.002)
$Stdroa_{t-1}$		−0.252*** (0.045)	−0.232*** (0.046)	−0.236*** (0.047)	−0.236*** (0.039)	−0.142*** (0.042)	−0.798*** (0.104)	−0.232*** (0.041)	−0.231*** (0.058)
$Loans_{t-1}$		−0.132 (0.228)	−0.041 (0.234)	−0.094 (0.227)	−0.094 (0.165)	−0.286 (0.132)	0.252 (0.320)	−0.848*** (0.310)	−0.165 (0.275)
HHI		−0.240 (0.569)	−0.145 (0.602)	−0.022 (0.625)	−0.022 (0.654)	−0.265 (0.344)	−0.481 (0.761)	1.076 (1.246)	0.382 (0.874)
Legal		0.262 (0.374)	7.801** (3.051)	0.228 (1.504)	11.215** (5.207)	1.861 (0.699)	−3.770** (1.651)	2.291 (3.231)	0.841 (4.302)
GDP_growth		0.001 (0.004)	0.001 (0.004)	0.004 (0.003)	0.004 (0.004)	0.007 (0.005)	0.002 (0.004)	0.009 (0.009)	0.008 (0.007)
Muslim_population		−0.019 (0.016)	−0.274* (0.165)	−0.039 (0.062)	−0.430* (0.228)	−0.005 (0.006)	0.234*** (0.054)	−0.027 (0.087)	−0.044 (0.278)
Islamicity		0.002 (0.006)	0.106** (0.044)	0.007 (0.022)	0.143* (0.078)	0.004 (0.010)	−0.090*** (0.021)	0.032 (0.043)	0.248 (0.305)
Inflation_rate		−0.001*** (3.47e-02)	−0.001*** (3.526e-02)	−0.001* (3.46e-02)	−0.001 (3.811e-02)	−4.93e-02 (2.6e-02)	−3.75e-02 (4.55e-02)	−0.001 (0.001)	−0.001 (0.001)
Dinsur		1.055* (0.626)	6.351* (3.497)	−0.388 (1.967)	4.913** (2.150)	2.013** (0.986)	−0.643 (1.976)	6.587 (4.582)	1.09e-03 (2.43e-03)
Bank supervision			−9.415*** (3.216)		−12.581** (5.002)		−1.101 (2.610)	−1.919 (4.262)	1.286 (0.965)
Bank private monitoring			3.524 (4.260)		6.316 (5.086)		−7.522*** (2.389)	−0.794 (3.050)	0.873 (0.764)
Bank capital oversight			3.252 (3.137)		3.144 (1.898)		2.110 (1.903)	3.638 (3.151)	1.445 (1.371)
Bank regulatory restriction			2.126** (0.892)		3.749 (4.101)		9.615** (4.230)	1.906 (1.433)	2.091* (1.252)
Crisis									
$Islamic*Crisis*CGI_{t-1}$									
Log_Z_{t-1}						0.676*** (0.048)			

Table 4 (continued)

	Baseline estimation					Robustnes check	Big vs. small		GCC Vs. non-GCC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Random effect	Random effect	Random effect	Random effect	Random effect	GMM model	Big	Small	GCC
Constant	2.726* (0.406)	4.540*** (0.134)	13.319*** (0.881)	7.269** (0.457)	22.784** (0.175)	0.377*** (0.109)	6.235*** (0.682)	3.160*** (0.368)	1.038*** (0.510)
Chi2	143.32***	103.88***	154.96***	124.39***	170.60***	99.47***	60.71***	141.33***	83.41***
Observations	904	415	415	415	415	341	279	136	161
Overall R2	0.363	0.502	0.545	0.526	0.526		0.534	0.555	0.397
Year FE	NO	NO	NO	YES	YES	YES	YES	YES	YES
Country FE	NO	NO	NO	NO	YES	YES	YES	YES	YES
AR(1)-*p*-value						0.009			
AR(2)-*p*-value						0.626			
Hansen-J- *P*-value						0.938			

	GCC Vs. non-GCC	Muslim maj. vs. non-Muslim maj		High Islamicity vs. low Islamicity		Crisis impact
	(10)	(11)	(12)	(13)	(14)	(15)
Variables	Non-GCC	+90 % Muslim	−90 % Muslim	High slamicity	Low Islamicity	Random effect
Islamic	0.184 (0.334)	0.525* (0.288)	−0.078 (0.567)	1.362*** (0.429)	−2.464** (1.110)	0.016 (0.269)
CGI_{t-1}	0.102 (0.064)	0.073 (0.064)	0.157 (0.107)	0.118 (0.146)	0.177* (0.106)	0.080 (0.060)
$Islamic*CGI_{t-1}$	0.362 (0.382)	−0.168 (0.350)	−0.591 (0.375)	−2.067** (0.907)	−0.369 (0.338)	
Log_TA_{t-1}	0.001 (0.028)	0.021 (0.037)	−0.049 (0.048)	−0.001 (0.021)	−0.404*** (0.079)	−0.025 (0.027)
$Tier1_{t-1}$	0.002 (0.004)	0.009* (0.005)	0.017*** (0.005)	−0.013 (0.014)	0.024*** (0.004)	0.016*** (0.003)
Lev_{t-1}	−0.026*** (0.008)	−0.046*** (0.011)	0.000 (0.003)	−0.058*** (0.011)	0.003 (0.002)	−0.002 (0.002)
$Stdroa_{t-1}$	−1.207*** (0.139)	−0.781*** (0.106)	−0.201*** (0.041)	−1.351*** (0.124)	−0.231*** (0.058)	−0.235*** (0.034)
$Loans_{t-1}$	−0.182 (0.257)	−0.116 (0.282)	−0.057 (0.277)	−0.557 (0.486)	−0.165 (0.275)	−0.016 (0.163)
HHI	−0.593 (0.884)	0.382 (0.807)	−0.749 (0.970)	0.866 (2.613)	0.382 (0.874)	−0.085 (0.611)

Table 4 (continued)

	GCC Vs. non-GCC	Muslim maj. vs. non-Muslim maj		High Islamicity vs. low Islamicity		Crisis impact
	(10)	(11)	(12)	(13)	(14)	(15)
Variables	Non-GCC	+90 % Muslim	−90 % Muslim	High slamicity	Low Islamicity	Random effect
Legal	−2.482*** (0.482)	0.056 (0.447)	0.761 (0.478)	2.499 (2.091)	0.841 (4.302)	7.622** (3.358)
GDP_growth	0.003 (0.004)	0.003 (0.005)	−0.000 (0.005)	−0.005 (0.036)	0.008 (0.007)	1.40e-02 (0.004)
Muslim_population	0.124*** (0.025)	0.030* (0.017)	0.028 (0.019)	0.040*** (0.008)	−0.044 (0.278)	−0.273 (0.167)
Islamicity	−0.046*** (0.009)	0.004 (0.009)	0.047*** (0.014)	0.007 (0.005)	0.248 (0.305)	0.104** (0.049)
Inflation_rate	−0.001* (4.00e-02)	4.41e-03 (3.83e-02)	−0.001** (0.001)	0.000 (0.001)	−0.001 (0.001)	−0.001** (0.000)
Dinsur	−0.381 (0.952)	1.693 (2.133)	0.649* (0.391)	1.257 (0.956)	2.338* (1.381)	5.949** (3.018)
Bank supervision	2.470*** (0.662)	−1.093 (1.278)	0.281 (1.288)	−2.951 (3.144)	−0.875 (1.005)	−9.105** (3.585)
Bank private monitoring	−2.920*** (0.901)	1.105 (1.091)	2.994 (2.031)	3.630 (2.791)	6.593** (3.199)	3.549 (3.919)
Bank capital oversight	2.498 (2.098)	−0.085 (0.539)	−1.805 (1.765)	1.025 (0.996)	3.073 (2.973)	2.966 (2.605)
Bank regulatory restriction	2.346 (1.681)	1.009 (0.820)	3.179 (1.592)	4.279* (2.547)	4.449 (3.129)	1.278 (0.947)
Crisis						−0.028 (0.021)
Islamic*Crisis*CGI_{t-1}						0.058 (0.132)
Log_Z_{t-1}						
Constant	11.099*** (0.701)	4.148*** (0.298)	6.014*** (0.710)	2.993*** (0.602)	3.009*** (0.408)	13.658*** (0.612)
Chi2	73.09***	56.46***	43.26***	50.83***	48.16***	143.84***
Observations	254	218	197	88	161	415
Overall R2	0.518	0.540	0.548	0.542	0.397	0.537
Year FE	YES	YES	YES	YES	YES	NO
Country FE	YES	YES	YES	YES	YES	YES
AR(1)-*p*-value						
AR(2)-*p*-value						
Hansen-J- *P*-value						

The ***, **, and * represent p-values of 0.01, 0.05, and 0.10

indicate a positive effect on the Z-scores that suggest the Islamic banks have a lower insolvency risk compared to conventional banks, which is consistent with Cihak and Hesse (2010). While the governance features of Islamic banks encourage risk-taking, they still have lower insolvency risk than their conventional counterparts. Aligned with a distinct governance style, such risk-taking behavior as well as lower insolvency risk for Islamic banks are generally supported by a number of controlling factors, such as capital adequacy, deposit insurance, profit volatility, country-level bank supervision, and the inflation rate.

The control variables generally have the expected signs. Specifically, capital adequacy ($Tier1_{t-1}$) tends to have higher Z-scores because the coefficients are persistently positive across all specifications. Similarly, deposit insurance (*Dinsur*) has a positive link to the Z-scores, albeit weak in some specifications. These results indicate that, with a strong capital base and deposit insurance in place, Islamic banks can comfortably accept higher risks. Again, the Z-scores tend to decrease with profit volatility ($Stdroa_{t-1}$), size (Log_TA_{t-1}), country-level supervision, and the inflation rate, as expected. These factors might encourage Islamic banks to take higher risks.

In models 7 and 8, we report substantial differences between large and small Islamic banks. Both the Islamic bank dummy and CGI variables are positive and significantly associated with big banks only, which means they are well equipped to keep risk taking under control, which is not the case for small banks. The interaction term ($Islamic*CGI_{t-1}$) shows no significant relation in either big or small banks; however, the sign is different, that is, positive with big banks and negative with small banks. Unlike big banks, the negative sign of the corporate governance index (CGI_{t-1}) and the interactive term ($Islamic*CGI_{t-1}$) in small banks suggests that small Islamic banks are more prone to risk taking. These findings make sense, considering the resource constraints and lack of economies of scale faced by small Islamic banks.

In the regression analysis that splits the sample based on GCC and non-GCC, we find more risk exposure in GCC countries than non-GCC. Given that governance systems are not quite as strong in GCC countries, Islamic banks are potentially more prone to high risk taking. A similar comparison is made between Muslim majority population (i.e., >90 % Muslim) and non-Muslim majority population samples (models 11 and 12) and high Islamicity and low Islamicity samples (models 13 and 14), and we confirm no notable difference in models 11 and 12. However, in models 13 and 14, high Islamicity Islamic banks display more risk taking. This is consistent with our baseline findings that these banks have strong and distinct governance structures that could lead them to take more risks. Finally, we analyze the crisis' impact (model 15) and find no effect on the Islamic banks' risk taking. This lack of an effect signifies that these banks are resilient in a crisis as compared to their conventional counterparts because of their higher capitalization.

4.2 The impact of governance on financial performance

We follow a similar process in investigating the impact of the CGI on financial performance as measured by ROA. First, we test the lagged effects of the firm-level independent variables and different classes of control variables denoted with R-squared. This test improves the explanatory power of our models, Table 5 presents the results. In models 1–5,[9] we find that across the

[9] See footnote 8 for model 6.

Table 5 Difference in governance between Islamic and conventional banks and its impact on financial performance. This table presents the regression results for the governance difference between conventional and Islamic banks and its impact on financial performance. The performance proxy is ROA. We use a corporate governance index (CGI) as the proxy for governance. See Table 2 for definitions of the other bank-specific and country-specific variables. Robust standard errors are reported in the parentheses

	Baseline estimation					Robustness check	Big vs. small	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Random Effect	Random Effect	Random Effect	Random Effect	Random Effect	GMM Model	Big	Small
Islamic	−0.021** (0.009)	−0.029** (0.014)	−0.029** (0.014)	−0.027** (0.013)	−0.026** (0.013)	−0.018** (0.009)	0.009 (0.017)	−0.056 (0.045)
CGI_{t-1}	−0.004 (0.009)	−0.002 (0.008)	−0.002 (0.008)	−0.001 (0.008)	−2.97e-02 (0.008)	−0.002 (0.010)	0.001 (0.002)	−0.008 (0.029)
$Islamic*CGI_{t-1}$	0.064*** (0.019)	0.066*** (0.026)	0.070*** (0.026)	0.066** (0.027)	0.066** (0.027)	0.206** (0.082)	−0.016 (0.039)	0.103* (0.059)
Log_TA_{t-1}		0.002* (0.001)	0.002* (0.001)	0.002* (0.001)	0.002 (0.001)	0.009* (0.005)	0.001 (0.001)	0.001 (0.005)
$Tier1_{t-1}$		6.07e-02* (3.16e-02)	0.001* (3.19e-02)	0.001* (3.17e-02)	0.001* (3.16e-02)	0.003 (4.23e-02)	4.87e-03 (1.17e-02)	0.001 (0.001)
Lev_{t-1}		1.96e-02 (2.75e-02)	1.46e-02 (2.81e-02)	1.77e-02 (2.87e-02)	1.74e-02 (2.87e-02)	4.67e-002 (2.17e-02)	2.39e-02*** (7.84e-03)	2.46e-02 (0.002)
$Stdroa_{t-1}$		0.314*** (0.045)	0.309*** (0.045)	0.303*** (0.045)	0.288*** (0.046)	0.368** (0.147)	0.502*** (0.039)	0.258*** (0.086)
$Loans_{t-1}$		0.056*** (0.011)	0.072*** (0.014)	0.074*** (0.014)	0.071*** (0.014)	0.021*** (0.007)	0.014** (0.006)	0.101*** (0.034)
HHI		0.105** (0.042)	0.012 (0.096)	0.027 (0.104)	0.030 (0.104)	0.033 (0.098)	0.015 (0.027)	−0.001 (0.322)
Legal		0.033** (0.017)	0.223** (0.098)	0.194* (0.106)	0.157 (0.130)	0.090 (0.056)	0.070** (0.035)	0.033 (0.175)
GDP_growth		9.73e-02* (5.45e-02)	0.001* (0.001)	3.59e-03 (0.001)	1.59e-03 (0.001)	0.001 (0.001)	2.98e-02** (1.51e-02)	0.003 (0.002)
Muslim_population		−0.002** (8.48e-02)	−0.010** (0.004)	−0.009** (0.004)	−0.008* (0.005)	−0.007** (0.003)	−0.003* (0.002)	−0.001 (0.005)
Islamicity		0.001** (3.05e-02)	0.003** (0.001)	0.003** (0.001)	0.003 (0.002)	3.03e-02 (0.003)	0.001** (4.78e-02)	3.29e-02 (0.002)
Inflation_rate		−5.90e-06 (4.86e-03)	−2.53e-08 (5.36e-03)	−7.45-03 (6.06e-03)	−7.39e-03 (6.03e-03)	−3.35e-06 (9.09e-03)	−2.78e-03* (1.55e-03)	−2.88e-03 (1.66e-02)
Dinsur		−0.022 (0.015)	0.009 (0.090)	0.010 (0.050)	−0.022 (0.060)	−0.074* (0.037)	0.019 (0.029)	−0.032 (0.300)
Bank supervision			−0.256* (0.145)		−0.154 (0.185)		−0.079* (0.047)	−0.071 (0.356)
Bank regulatory restriction			−0.085 (0.041)		−0.105 (0.097)		0.017 (0.030)	0.029 (0.342)
Bank private monitoring			0.173* (0.096)		0.169 (0.110)		0.044 (0.033)	−0.019 (0.128)
Bank capital oversight			−0.014 (0.067)		−0.019 (0.063)		0.013 (0.022)	0.017 (0.200)
Crisis								
$Islamic*Crisis*CGI_{t-1}$								
ROA_{t-1}						0.309*** (0.027)		
Constant	1.014*** (0.004)	1.021*** (0.040)	0.377** (0.025)	0.334** (0.024)	1.323*** (0.236)	3.002*** (0.162)	0.109*** (0.004)	0.297** (0.147)
Chi2	17.83***	158.83***	163.15***	176.64***	184.73***	141.85***	54.89***	55.40***
Observations	906	417	417	417	417	345	279	138
Overall R2	0.026	0.284	0.291	0.311	0.322		0.577	0.306

Table 5 (continued)

	Baseline estimation					Robustness check	Big vs. small	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Random Effect	Random Effect	Random Effect	Random Effect	Random Effect	GMM Model	Big	Small
Year FE	NO	NO	NO	YES	YES	YES	YES	YES
Country FE	NO	NO	NO	NO	YES	YES	YES	YES
AR(1)-*p*-value						0.033		
AR(2)-*p*-value						0.381		
Hansen-J-*P*-value						0.879		

	GCC vs. non-GCC		Muslim maj. vs. non-Muslim maj		High Islamicity vs. low Islamicity		Crisis impact
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Variables	GCC	Non-GCC	+90 % Muslim	−90 % Muslim	High Islamicity	Low Islamicity	Random Effect
Islamic	−0.096** (0.045)	−0.004 (0.005)	0.012* (0.007)	−0.120** (0.054)	0.001 (0.009)	−0.086** (0.043)	0.013 (0.008)
CGI_{t-1}	−0.011 (0.024)	0.003 (0.002)	0.003 (0.003)	−0.002 (0.018)	0.006 (0.004)	−0.018 (0.024)	0.004 (0.008)
Islamic*CGI_{t-1}	0.165*** (0.061)	0.009 (0.010)	−0.011 (0.013)	0.134** (0.055)	−0.002 (0.020)	0.133** (0.060)	
Log_TA_{t-1}	−0.005 (0.004)	2.59e-02 (3.27e-02)	0.001* (4.26e-02)	−0.002 (0.004)	−4.04e-02 (4.02e-02)	−0.002 (0.004)	0.002 (0.001)
$Tier1_{t-1}$	0.001 (0.001)	−4.61e-03 (8.98e-03)	−1.33e-02 (1.19e-02)	0.001* (0.001)	0.001** (2.84e-02)	0.001 (0.001)	0.001 (3.12e-02)
Lev_{t-1}	6.94e-03 (5.29e-02)	1.35e-02 (1.37e-02)	−1.19e-02 (2.12e-02)	1.97e-02 (4.55e-02)	1.57e-02 (2.29e-02)	−4.96e-03 (0.001)	1.50e-02 (2.82e-02)
$Stdroa_{t-1}$	0.262*** (0.076)	0.616*** (0.032)	0.485*** (0.039)	0.262*** (0.070)	0.679*** (0.052)	0.270*** (0.077)	0.275*** (0.045)
$Loans_{t-1}$	0.122*** (0.030)	−0.004 (0.005)	0.005 (0.007)	0.099*** (0.024)	−0.002 (0.011)	0.126*** (0.030)	0.076*** (0.014)
HHI	0.019 (0.198)	0.035 (0.025)	0.014 (0.035)	−0.038 (0.196)	0.085 (0.066)	−0.008 (0.201)	0.017 (0.102)
Legal	0.038 (0.108)	0.012* (0.007)	0.012 (0.012)	0.193 (0.231)	0.219* (0.117)	−0.002 (0.081)	0.187 (0.128)
GDP_growth	0.002 (0.001)	2.24e-02* (1.33e-02)	−8.40e06 (2.50e-02)	−0.001 (0.001)	9.23e-03 (0.001)	0.001 (0.001)	−0.000 (0.001)
Muslim_population	−0.002 (0.007)	−0.001 (4.38e-02)	−4.52e-02 (0.001)	0.001 (0.002)	−1.32e-02 (1.72e-02)	4.43e-02 (0.005)	−0.009* (0.005)
Islamicity	0.003 (0.007)	2.26e-02 (1.61e-02)	1.85e-02 (2.49e-02)	0.001 (0.001)	−8.51e-03 (9.63e-03)	−0.001 (0.005)	0.003* (0.002)
Inflation_rate	−5.73e-03 (1.71e-02)	5.08e-06 (1.06e-03)	−1.49e-03 (1.65e-03)	−2.20e-02 (1.49e-02)	3.75e-03 (3.47e-03)	−3.91e-03 (1.72e-02)	−0.000 (0.000)
Dinsur	0.012 (0.038)	−0.021 (0.073)	0.069 (0.074)	−0.031 (0.049)	−0.097 (0.071)	−0.112* (0.066)	−0.011 (0.059)
Bank supervision	−0.093 (0.438)	0.012 (0.010)	−0.129 (0.294)	−0.198 (0.138)	−0.211 (0.561)	−0.102 (0.281)	−0.203 (0.182)
Bank regulatory restriction	0.004 (0.391)	0.113 (0.185)	0.081 (0.213)	0.044 (0.147)	0.160 (0.233)	0.129 (0.310)	−0.089 (0.096)
Bank private monitoring	0.119 (0.337)	0.006 (0.008)	0.010 (0.016)	0.213* (0.128)	0.207 (0.182)	0.206 (0.371)	0.185* (0.108)

Table 5 (continued)

	GCC vs. non-GCC		Muslim maj. vs. non-Muslim maj		High Islamicity vs. low Islamicity		Crisis impact
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Variables	GCC	Non-GCC	+90 % Muslim	−90 % Muslim	High Islamicity	Low Islamicity	Random Effect
Bank capital oversight	0.019 (0.096)	−0.026 (0.329)	0.027 (0.147)	0.091 (0.192)	0.116* (0.006)	0.216* (0.127)	0.000 (0.000)
Crisis							−0.017**(0.020)
Islamic*Crisis*CGI_{t-1}							−0.080*** (0.020)
ROA_{t-1}							
Constant	1.198*** (0.421)	1.009*** (0.012)	0.954*** (0.067)	0.261*** (0.077)	1.016** (0.409)	1.056** (0.528)	0.378 (0.233)
Chi2	35.11***	43.07***	26.48***	33.86***	27.76***	25.30***	33.91***
Observations	163	254	218	199	88	163	417
Overall R2	0.343	0.727	0.737	0.337	0.886	0.316	0.345
Year FE	YES	YES	YES	YES	YES	YES	NO
Country FE	YES	YES	YES	YES	YES	YES	YES
AR(1)-*p*-value							
AR(2)-*p*-value							
Hansen-J-*P*-value							

The ***, **, and * represent p-values of 0.01, 0.05, and 0.10

models, the distinct governance structure of Islamic banks has a significantly positive effect on performance. Individually, the ROA is negatively and significantly associated with the Islamic bank dummy and negatively but insignificantly related to the CGI. Interestingly their joint effects have a positive and significant relation with the ROA. This finding corresponds to our main result in Table 4 that Islamic banks' governance structures allow them to embrace high risk taking on one hand and enhance financial performance on the other. The sign of the interactive variable (Islamic*CGI_{t-1}) is consistently positive and significant at either the 1 or 5 % levels in models 1–5. These findings reject the null hypothesis H_{02} (the governance difference between Islamic banks and conventional banks does not influence the financial performance of Islamic banks).

For the control variables, both loans and profit volatility ($STDROA_{t-1}$) show a strong positive effect on ROA that indicates high risk taking enhances financial performance. On the other hand, while size, capital adequacy, legal, and Islamicity indicate a weak and positive relation with ROA, Muslim majority population has a negative performance effect; and leverage, bank concentration, GDP growth, inflation, deposit insurance appear to have no significant impact.

As to the other specifications, the governance in small Islamic banks has a positive effect on performance, albeit weak, despite having an insignificant and opposite sign on the Islamic bank dummy and CGI variables. The governance in big Islamic banks shows no effect on performance. Similarly, in models 9 and 10, the GCC tends to be positively associated with ROA, rather than the non-GCC, despite having a negative relation between ROA and the Islamic bank dummy. Again, in models 11 and 12 and models 13 and 14, we find a similar trend where a non-Muslim majority population and low Islamicity indicate a positive impact on ROA. These results are generally consistent with our baseline findings that the distinct governance structure of Islamic banks in each specification tends to cause better financial performance. Finally, we test the crisis' impact on performance by using a difference-in-difference specification in model 15. We show a negative effect from the crisis on performance, although risk taking remains unaffected.

Overall, the key results in Tables 4 and 5 show that the governance structure of Islamic banks plays a crucial role in higher risk taking and enhanced financial performance, which differs from the conventional banks.

4.3 Robustness checks

4.3.1 Two-step GMM regression analysis

We use the two-step GMM approach adopted by Arellano and Bover (1995) and Blundell and Bond (1998) for endogeneity tests of the regression Eqs. 1 and 2. This approach allows us to treat all of the explanatory variables as endogenous by orthogonally using their past values as instruments. It also creates a matching equation of the first differences for all of the variables. The GMM estimates the model by using the lagged values of the right-hand-side variables. The first difference eliminates the unobserved heterogeneity and omitted variable bias. This approach means that we treat all of the bank characteristics as endogenous covariates, while treating the country and macro controls as strictly exogenous. The GMM estimates are obtained using Roodman's (2009) xtabond2 module in Stata.

The regression results for governance and risk taking are reported in column 6 of Table 4, and the regression results for governance and performance are reported in column 6 of Table 5. The results show that the models are well-fitted with statistically insignificant test statistics for both the second-order autocorrelation in the second differences (AR(2)) and the Hansen J-statistics of over identifying restrictions. The residuals in the first difference should be serially correlated (AR(1)) by way of construction but the residuals in the second difference should not be serially correlated (AR(2)). Accordingly, the model fit and diagnostics section in column 6 in Tables 4 and 5 show the desirable statistically significant AR(1) and statistically insignificant AR(2) coefficients. Likewise, the Hansen J-statistics of over-identifying restrictions tests the null of the instrument's validity, and the statistically insignificant Hansen J-statistics indicate that the instruments are valid in the two-step GMM estimation. Overall, the GMM estimates in Tables 4 and 5 are consistent with the main results reported in Tables 4 and 5 (columns 1–5), even after controlling for unobserved heterogeneity, simultaneity, and dynamic endogeneity.

5 Conclusions

The purpose of this study is to test whether the difference in governance structures affect the risk taking and performance of Islamic and conventional banks. By using a sample of 52 Islamic banks and 104 conventional banks in 14 countries for the period from 2005 to 2013, we conclude that the governance structure in Islamic banks plays a crucial role in higher risk taking and enhanced performance, which is distinct from conventional banks. Our results add a new dimension to the governance research on Islamic banks. Despite cross-country variations and a general perception of a conservative approach to risk taking, we provide evidence that the governance structures of Islamic banks help them undertake higher risks and achieve better performance. However, they maintain better capitalization compared to the conventional banks.

The findings of this research are a valuable source of knowledge for policymakers and regulators, particularly in the financial services sector for devising strategies to deal with future financial crises. This research contributes to the comparative banking literature on corporate governance. Additionally, future research could further extend the role of the Shari'ah supervisory board.

Acknowledgments We are grateful to the Editor, Prof. Haluk Ünal, the Managing Guest Editors of the special issue, Prof. M. Shahid Ebrahim, Prof. Phil Molyneux, Prof. Steven Ongena, and two anonymous referees for valuable comments. We acknowledge financial support from Jan Wallenders och Tom Hedelius Stiftelse, Handelsbanken, Sweden, for this research (Project ID P2010-0144: 1). An earlier version of this paper was presented at the 47th Euro Working Group on Financial Modeling, October, 2010, Prague, Czech Republic; at the seminar on Islamic Finance, 14 January, 2011, University of Dhaka, Bangladesh; the 61st Midwest Finance Association 2012 Meeting, 22–25 February, 2012, New Orleans, USA; and the Bangor-JFSR Conference, 15 September, 2014, Bangor, UK. We are thankful to Meryem Duygun for her valuable comments as a discussant at the Bangor-IRTI-JFSR conference. We have hugely benefitted from the comments by the discussants and participants in the conferences. We are also grateful to M. Shahid Ebrahim, Philip Molyneux, Omneya Abdelsalam, and Wares Karim for their comments on the earlier draft of this paper. We are also thankful to Omar Sikder, Sharifur Rahman, Al-Amin, Ziauddin, Zahiduzzaman, Humyra Jabeen, and IK Nahid for research assistance with the hand collected data. The authors are responsible for any remaining errors.

Appendix

Table 6 Descriptive statistics for corporate governance variables. This table presents the descriptive statistics for the 12 governance items we use in constructing the corporate governance index (CGI)

		Islamic banks						Conventional Banks					
Corporate governance variables	Definition	Observations	Mean	Std. Dev.	Median	Skewness	Kurtosis	Observations	Mean	Std. Dev.	Median	Skewness	Kurtosis
Board size	Board Size	340	9.206	3.069	9.000	1.454	6.173	687	9.643	2.442	10.000	0.776	5.273
Board independence	Ratio between number of independent directors to total board size	327	0.290	0.277	0.273	0.731	2.581	600	0.178	0.139	0.167	4.567	0.873
Female director	Number of female directors on the board	331	0.221	0.653	0.000	4.114	22.965	675	0.412	0.791	0.000	2.660	12.568
Board meetings	Number of board meetings in the year	286	7.888	4.642	6.000	1.810	6.534	553	8.333	4.721	7.000	1.984	7.829
Board attendance	Percent of board attendance	219	80.572	11.513	81.860	−0.462	2.425	456	85.767	11.076	89.185	−0.865	3.387
Board committees	Number of board committees	319	4.078	1.248	4.000	1.681	15.040	630	3.711	1.420	4.000	0.405	3.364
Chair independence	Is the Chairperson Independent? If yes then one, otherwise zero	328	0.259	0.439	0.000	1.099	2.209	611	0.296	0.457	0.000	0.893	1.797
CEO-chair role duality	Are the roles of Chair/CEO duality? If yes, then one, otherwise zero	340	0.156	0.363	0.000	1.897	4.600	719	0.207	0.406	0.000	1.445	3.087
CEO-internal	If the CEO is not internally recruited, then one, otherwise zero	338	0.834	0.372	1.000	−1.798	4.234	671	0.611	0.488	1.000	−0.455	1.207

Table 6 (continued)

		Islamic banks						Conventional Banks					
Corporate governance variables	Definition	Observations	Mean	Std. Dev.	Median	Skewness	Kurtosis	Observations	Mean	Std. Dev.	Median	Skewness	Kurtosis
CEO qualification	We assign one for CEO qualification as high school, two for BA, three MA, four for MBA, and five for PhD or professional accounting (CA) and finance (CFA) qualifications	324	3.346	0.950	4.000	−0.215	1.859	659	3.660	0.934	4.000	−0.252	2.209
CEO banking experience	Years of CEO banking experience	306	24.199	7.956	24.000	0.396	3.830	614	28.016	9.904	29.000	0.162	3.223
CEO tenure	Years of CEO board tenure	325	4.120	3.300	3.000	2.069	9.091	590	7.625	7.717	5.000	1.645	5.223

References

Abedifar P, Molyneux P, Tarazi A (2013) Risk in Islamic banking. Rev Finan 17:2035–2096

Abu–Tapanjeh AM (2009) Corporate governance from the Islamic perspective: a comparative analysis with OECD principles. Crit Perspect Account 20:556–567

Adams RB, Mehran H (2012) Bank board structure and performance: evidence for large bank holding companies. J Financ Intermed 21:243–267

Aebi V, Sabato G, Schmid M (2012) Risk management, corporate governance, and bank performance in the financial crisis. J Bank Financ 32:3213–3226

Aggarwal RL, Yousef T (2000) Islamic banking and investment financing. J Money Credit Bank 32:93–120

Ahmed H (2009) Financial crisis: risks and lessons for Islamic finance. ISRA Int J Islam Financ 11:7–32

Akhigbe A, Martin AD (2008) Influence of disclosure and governance on risk of US financial services firms following Sarbanes–Oxley. J Bank Financ 32:2124–2135

Alman M (2012) Shari'ah supervisory board composition effects on Islamic banks' risk-taking behavior. European Financial Management Association meeting 2012 http://www.efmaefm.org/0EFMAMEETINGS/EFMA%20ANNUAL%20MEETINGS/2013-Reading/papers/EFMA2013_0082_fullpaper.pdf

Andres P, Vallelado E (2008) Corporate governance in banking: the role of board of directors. J Bank Financ 32:2570–2580

Arellano M, Bover O (1995) Another look at the instrumental variables estimation of error components models. J Econ 68:29–51

Aziz A, Pahlavi R, Gintzburger AS (2009) Equity-based, asset-based and asset backed transactional structures in Shari'ah-compliant financing: reflections on the current financial crisis. Econ Pap 28:270–278

Baltagi BH (2005) Econometric analysis of panel data. Wiley, Chichester

Baltagi BH, Wu PX (1999) Unequally spaced panel data regressions with AR(1) disturbances. Econ Theory 15:814–823

Barth JR, Caprio G, Levine R (2004) Bank regulation: what works best? J Financ Intermed 13:205–248

Beck T, Demirgüç-Kunt A, Merrouche O (2013) Islamic vs conventional banking: business model, efficiency and stability. J Bank Financ 37:433–447

Beltratti A, Stulz R (2012) The credit crisis around the globe: why did some banks perform better? J Financ Econ 105:1–17

Blundell R, Bond S (1998) Initial conditions and moment restrictions in dynamic panel data models. J Econ 87:115–143

Caprio G, Laeven L, Levine R (2007) Governance and bank valuation. J Financ Intermed 16:584–617

Chapra MU, Ahmed H (2002) Corporate Governance in Islamic Financial Institutions, Islamic Development Bank, Islamic Research and Training Institute, Periodical Document No. 6

Chowdhury MA, Hoque MZ (2006) Corporate governance in Islamic perspective. Corp Gov 62:116–128

Cihak M, Hesse H (2010) Islamic banks and financial stability: an empirical analysis. J Financ Serv Res 38:95–113

Demirguc-Kunt A, Kane EJ, Laeven L (2007) Determinants of deposit-insurance adoption and design. NBER working paper

Dewatripon M, Tirole J (1994) The prudential regulation of banks. MIT Press, Cambridge

Ernst & Young (2012) World Islamic banking competitiveness report 2013. Available at: http://www.mifc.com/index.php?rp=ey_world_islamic_banking_competi

Ernst & Young (2013) World Islamic banking competitiveness report 2013–2014: the transition begins. Available at: www.ey.com/Publication/vwLUAssets/World_Islamic_Banking_Competitiveness_Report_2013-14/$FILE/World Islamic Banking Competitiveness Report 2013–14.pdf

Francis B, Hasan I, Wu Q (2012) Do corporate boards affect firm performance? New evidence from the financial crisis. SSRN Working Paper: ssrn.com

Fu X, Lin Y, Molyneux P (2014) Bank competition and financial stability in Asia Pacific. J Bank Financ 38:64–77

Galai D, Masulis RW (1976) The option pricing model and the risk factor of stock. J Financ Econ 3:53–81

Gambin L (2004) Gender differences in the effect of health on wages in Britain. http://www2.eur.nl/bmg/ecuity/public_papers/ECuity3wp20GambinGenderhealthonincome.pdf

Hasan M, Dridi J (2010) The effect of the global crisis on Islamic and conventional banks: A comparative study. IMF Working Paper, WP/10/201

Iqbal M, Llewellyn DT (2002) Islamic Banking and Finance. In: Iqbal M, Llewellyn DT (eds) New perspectives on profit-sharing and risk. Edward Elgar Publishing Limited, Cheltenham

Islamic Financial Services Board Report (2010) http://www.ifsb.org/docs/IFSB-IRTI-IDB2010.pdf

Jensen MC, Meckling WH (1976) Theory of firm: managerial behavior, agency costs and ownership structure. J Financ Econ 3:305–460
John K, John TA, Senbet LW (1991) Risk-shifting incentives of depository institutions: a new perspective on federal deposit insurance reform. J Bank Financ 15:895–915
Khan F (2010) How 'Islamic' is Islamic banking? J Econ Behav Organ 76:805–820
Khan T, Ahmed H (2001) Risk management: an analysis of issues in Islamic financial industry, Occasional Paper No. 5, IRTI, Islamic Development Bank, Jeddah
Laeven L, Levine R (2009) Bank governance, regulation and risk taking. J Financ Econ 93:259–275
Mollah S, Zaman M (2015) Shari'ah supervision, corporate governance and performance: conventional vs. Islamic banks. J Bank Financ 58:418–435
Obaidullah M (2005) Islamic financial services. Islamic Economics Research Center, King Abdulaziz University, Jeddah
Olson D, Zoubi TA (2008) Using accounting ratios to distinguish between Islamic and conventional banks in the GCC region. Int J Account 43:45–65
Pathan S (2009) Strong boards, CEO power and bank risk-taking. J Bank Financ 33:1340–1350
Pathan S, Faff R (2013) Does board structure in banks really affect their performance? J Bank Financ 37:1573–1589
Rehman SS, Askari H (2010) How Islamic are Islamic countries? Glob Econ J 10:1–37
Roodman D (2009) How to do xtabond2: an introduction to "difference" and "system" GMM in Stata. Stata J 9: 86–136
Safieddine A (2009) Islamic financial institutions and corporate governance: new insights for agency theory. Corp Govern Int Rev 17:142–158
Siddiqi AM (1999) The growing popularity of Islamic banking. Middle East Lond 291:33–35
Sierra GE, Talmor E, Wallace JS (2006) An examination of multiple governance forces within bank holding companies. J Financ Serv Res 29:105–123
Wintoki MB, Linck JS, Netter JM (2012) Endogeneity and the dynamics of corporate governance. J Financ Econ 105:581–606
Wooldridge JM (2002) Econometric analysis of cross-section and panel data. MIT Press, Cambridge
Zaher TS, Hassan MK (2001) A comparative literature survey of Islamic finance and banking. Fin Mkts Inst Instr 10:155–199