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Borsa İstanbul Review

Borsa İstanbul Review 19-S1 (2019) S34–S43

http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

Does competition make banks riskier in dual banking system?

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Received 30 April 2018; revised 25 July 2018; accepted 28 September 2018
Available online 3 October 2018

Abstract

This paper investigates competition and risk-taking behaviour of Islamic banks taking a sample of 59 Islamic banks and 149 conventional banks from 10 highly developed Islamic banking countries between 2006 and 2016. The level of competitiveness between the two types of banks is determined using Lerner index and estimations show that Islamic banks have lower market power than conventional banks. After controlling all the bank and country-specific variables, the results show that competition and risk are positively related for the overall banking system and inversely related for Islamic banks which undoubtedly emphasize that inherent difference between risk-competition relationships among these two distinct bank types. Overall, in the case of Islamic banks, the results provide evidence in favour of "competition stability view" where higher competitive market associated with fierce competition from conventional banks and its peers' reduce Islamic banks' risk-taking behaviour.

JEL classification: G20; G21; G28

Keywords: Banking; Competition; Risk taking; Islamic banking; Regulation; Risk management

1. Introduction

One of the interesting issues to look at in the banking literature is the contrast of risk-taking behaviour of different banks and the factors that cause the banks to adopt different structures of risk. According to Saurina, Jimenez, and Lopez (2007), "excessive competition among banks could threaten the solvency of particular institutions and, at an aggregate level, hamper the stability of the entire banking system", meaning bank failures always come together with an increased competition in the banking market. Hence, the effect of competition in banking-sector is one of the key determinants that impact on bank risk-taking. Nevertheless, existence theory and empirical evidence on this subject produced mixed and contradictory results.

The traditional view from the previous economic and finance literature hold that there is a positive relationship between the risks that banks take and the competition that the banks face (Hellmann, Murdock, & Stiglitz, 2000; Repullo, 2004; Forssback & Shehzad 2011). It means that the incentive of banks to take on more risk is increased as competition increases. This relationship is based on this "competition-fragility view", which is also called "charter value hypothesis" or "franchise value paradigm" (Allen & Gale, 2004). Charter or franchise value can be stated as the value of a bank being able to continue its business in the future (Saurina et al., 2007). Thus, the competition-fragility view assumes that banks in excessive competition banking systems are less concentrated and have less market power which will erode the charter values of the banks. Banks have less market power to extract the monopoly benefits from the charter values which will eventually lead them to take on more risks with riskier policies such as lowering the level of capital or acquire more credit risk in the loan portfolio, in order to maintain its former profits

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Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

https://doi.org/10.1016/j.bir.2018.09.002

(Keeley, 1990). This traditional competition-fragility view also assumes that bank competition occurs only in deposit market and contracting problems like moral hazard effects in which private information and borrowers' actions depend on the interest rates charged by banks do not occur under this view (Boyd, De Nicolo & Al Jalal 2006).

Contrary to this view, a recent literature based on work by Boyd & De Nicolo, 2005; Boyd, De Nicolo & Al Jalal 2009 (the BDN model) which is also known as "competition-stability view" suggested that the risk-taking behaviour of banks and competition within the sector have a negative correlation. This correlation is based on the existence of the contracting problem; that the moral hazard problem occurs within the BDN model. The model is founded on the study and comparison of both deposit and loan market competition concurrently which is different from the traditional view which only analyzes the deposit market competition. The model suggests that reduced competition in banking-sector can lead to higher interest rates being passed onto the business loans.

According to this competition-stability view, the offset between stability in the banking sector and the competition implied by the deposit market competition based on "competition-fragility view" could be eliminated by the loan market competition since the recent view incorporates both approaches. This recent view basically provides the only incentives to the banks to maintain the traditional asset side policies from the economic rents earned from the depositors. A "risk-shifting paradigm" proposed by this recent model indicates more competition in loan and deposit markets could promote the stability of the banking market by lowering the borrowers' default risk over the long run. A positive correlation between banks' overall default risk and banking concentration shown in empirical evidence hints that more competition in banking sector should be correlated with lesser bank risk-taking behaviour and thus create a greater bank stability provided by (Boyd & De Nicolo, 2005; Boyd, De Nicolo & Al Jalal 2006; Boyd, De Nicolo & Al Jalal 2009 and Nicolo et al., 2004).

The emergence of Islamic banking system as an alternative banking system has added another dimension to the competition theory within the dual banking system. The nature and scope of Islamic banks are different from the traditional banking system as Islamic banks are motivated towards a justified distribution of wealth and income which might warrant for additional risk-taking behaviour. In the dual banking system, Islamic banks do not only face competitions from their peers but also from their conventional counterparts. It is evident that Islamic banks are different from their conventional counterparts in terms of sources and uses of funds which will have an implication in their risk-taking behaviour. Islamic banks are also small in size and have fewer opportunities for diversification (due to religious nature of operation) adding more pressure to riskiness in the system. Even though some Islamic bank products are complex in nature, some business mechanisms and governance structures allow Islamic banks to undertake higher-risk transactions, achieve better performance, and maintain superior capitalization than conventional banks (Mollah, Hassan, Al Farooque, & Mobarek, 2016).

The studies regarding the effects of competition on the bank risk-taking behaviour has always been focused on the conventional banks and lacks evidence for Islamic banks (Beck, Demirguc-Kunt & Levine, 2006; Berger, Klapper, & Turk-Ariss, 2009; Demsetz, Saidenberg, & Strahan, 1996; Keeley, 1990; Marcus, 1984; Saurina et al., 2007). There are ample evidence in the conventional banking system which shows that systematic crisis is more evident in the countries where banks are concentrated and have less competition (Beck, Demeirguc-Kunt, Levine, 2006; Schaeck, M. Cihak, S; Wolfe, 2009). On the other hand, studies also observed the existence of the trade-off between competition and stability (Jimenez et al., 2013; Fungáčová, Solanko, Weill, 2014; Leroy & Lucotte, 2017).

Even though there are some of the empirical studies comparing the market power between Islamic banks and their conventional competitors, those studies did not put much focus on how competition may impact risk-taking among Islamic banks. Despite the reality that Islamic banks grow rapidly in today's economy, there is little systematic and regular analysis and studies on the topic of the impact competition have on bank-risk taking among Islamic banks. Majority of the previous studies only focused on the comparison of banking performance, such as the comparison of cost-profit efficiency and financial stability in dual-banking systems, for example, studies provided by (El-Gamal & Inanoglu, 2005; Cihak & Hesse, 2008 and Alam, 2012). Although studies conducted by Weill (2011) or Sahut, Mili, and Krir (2011) focused on the comparison of market power between Islamic and conventional banks; but these studies did not cover any association between competition and risk-taking behaviour among Islamic banks. Only in the last couple of years, there has been a growing interest in the topic specially in the context of the dual banking system. Gonzalez, Razia, Milagros, & Sestayo, 2017 using a sample of MENA banks found that the increase in the competitive environment leads to a decline in the financial stability of the banking system. Authors further highlighted that the non-Gulf banking system had lower competition and thus higher efficiency which is in contrast to the Gulf banking system. While Noman, Gee, & Isa, 2017 found a strong support for competition−stability theory in ASEAN banking system. The study further emphasized that larger banks are more efficient leading to the more stable financial system. However, Kabir and Worthington (2017) found contrasting results. In their studies involving the dual banking system, they found that market power has a positive impact on the stability of both conventional and Islamic banks thus supporting the competition-fragility hypothesis. A more detailed literature on the stability issue within Islamic banking can be also found in Hassan and Aliu, 2018.

Hence, it is not surprising that the effects that competition has on bank-risk taking behaviour in Islamic banking concepts are in a grey zone with unexplored questions. This topic still remains ambiguous in theory and empirically under investigations even though there are relatively large amounts of literature in conventional banks. Additionally, the conflicting

results in the Islamic banking literature make difficult to know whether modification of competition policy and effective competition between financial intermediaries in the dual banking system could constitute an alternative means of improving financial stability.

2. Methodology

There are several well-established tools in measuring the bank competitiveness in the banking literature, for instance, Panzar-Rosse (1987) H-statistics which often known as PR-H statistic, the Lerner index by Lerner (1934), the concentration ratio (CR) as well as the Herfindahl-Hirschman index (HHI index). For this study, we will use the Lerner index to reveal the level of market power when assessing monopoly pricing power. Lerner index has an advantage against Panzar-Rosse H-statistic or HHI where the index is not a long-run equilibrium measure of competition and can be computed at each point of time (Berger et al., 2009; Sahut et al., 2011). Several recent studies have used Lerner index in measuring the bank competition, for instance, studies by (Berger et al., 2009; Forssback & Shehzad 2011; Ireta, 2012; Sahut et al., 2011; Saurina et al., 2007; Weill, 2011). It is defined as the difference between price and marginal cost, divided by price. To calculate the Lerner index, a translog cost function will be first estimated by constrained linear regression, imposing symmetry and linear homogeneity restrictions (Forssback & Shehzad 2011). The cost function is shown as follows:

$$\ln TC_{it} = \alpha_0 + \alpha_1 \ln Y + \frac{1}{2}\alpha_2 (\ln Y^2) + \sum_{j=1}^{3} \beta_j \ln w_{jit} + \sum_{j=1}^{3} \times \sum_{k=1}^{3} \beta_{jk} \ln w_{jit} \ln w_{kit} + \sum_{j=1}^{3} \gamma_j \ln Y \ln w_j + \varepsilon_{it} \quad (1)$$

where TC denotes total costs, Y denotes one output (total assets), w_{jk} (w_1, w_2 *and* w_3) indicate three input prices (i.e. price of labour, price of physical capital and price of borrowed funds).

The estimated coefficients derived from the cost function are then used to calculate the marginal cost (MC). The derivative of the logarithm of total cost with respect to the logarithm of output is calculated using the cost function in Equation (1). Thus, the estimation of marginal cost is based on the cost function presentation. The translog cost function is estimated with one output (total assets) and three input prices (price of labour, price of physical capital and price of borrowed funds) as already mentioned above. Marginal cost is then given by:

$$MC_{it} = \frac{TC_{it}}{y_{it}} \left[\alpha_1 + \alpha_2 \ln y_{it} + \sum_{j=1}^{3} \gamma_j \ln w_{jit} \right] \quad (2)$$

Finally, once the marginal cost is estimated and price of output is calculated, Lerner index for each bank and year can be calculated in order to obtain a direct measure of bank competition (Berger et al., 2009; Forssback & Shehzad 2011; Ireta, 2012; Sahut et al., 2011; Weill, 2011). The Lerner index indicates the proportion by which price above marginal cost, and is calculated as:

$$Lerner\ index_{\ it} = \frac{P_{TAit} - MC_{TAit}}{P_{TAit}} \quad (3)$$

where P_{TAit} is the price of banking outputs for bank i at time t, MC_{it} is the marginal costs for bank i at time t.

The resulting $Lerner\ index_{\ it}$ is averaged over time under the study for each bank i. It takes values between 0 and 1. When price equal to marginal cost; the Lerner index tends towards zero and the banks are said in a purely competitive market and no pricing power. When the index is high and tends towards one, reflecting there is a high mark-up of price above marginal cost; hence, the banks have a monopoly power and the market power is increased. Generally, Lerner index = 0 indicates perfect competition in a market; whereas Lerner index = 1 indicates monopoly in a market. As stated by Forssback & Shehzad (2011), Lerner index is an "opposite measure of competition where a high Lerner index implies lower competition".

3. Data and sample

Once the competition index of each bank in each year is computed, the next step is examining the effects competitiveness have on banks' risk-taking behaviour. Given the consideration of both theoretical and empirical literature mentioned above, this paper uses the framework to evaluate the correlation between competition and risk by basing on the works proposed by (Alam, 2014; Berger et al., 2009; Forssback & Shehzad 2011; Saurina et al., 2007).

The sample used in this study consists of banks in 10 countries which is mainly located in Gulf Cooperation Council (GCC) and South East Asia (SEA): Bahrain, Bangladesh, Indonesia, KSA, Kuwait, Malaysia, Pakistan, Qatar, Turkey and UAE. The number of observation for Islamic banks is 472 and for conventional banks is 1192. The total bank-year observations stand at 1664. These countries are chosen as the sample in this study because due to the fact that these 10 countries especially Indonesia, KSA, Malaysia, Qatar, Turkey, UAE (refer as QISMUT) together with Bahrain hold two-thirds of Islamic banking assets in the world, (EY report, 2016). Banking data has been taken from the Bankscope database over the period 2006–2016. Additionally, a number of bank-specific and country-specific macroeconomic variables as well as regulatory variables are used to examine the risk-competition relationship.

The risk proxy used as the dependent variable in the main regression in Equation (4) is a loan-loss reserve (LLR). Loan loss reserve as a fraction of gross loan has been used as the proxy of asset risk, such as studies by (Alam, 2012; Dick, 2006; Forssback & Shehzad 2011; Shaffer, 1998). Higher loan-loss reserve indicates that banks have a greater risk in the

future. To check the robustness of the findings we also use non-performing loans (NPL) as a measure of bank risk. NPL, the ratio of nonperforming loans to gross loan is a measure of loan portfolio quality and contain information on bank risk not captured by traditional measures of risk (Berger & DeYoung, 1997).

MP_{it} is the market power of the bank calculated using the Lerner index. B is a vector of bank-specific factors which includes size of the bank measured as the natural log of total assets (TA), the ratio of equity over total assets (the capitalization ratio) (ETA), the return on average assets (ROAA), the ratio of net loans to total assets (NLTA), the ratio of cost to income (CI).

M is a vector of macro factors and is included in the main regression to take account of the broad banking system differences across the countries in the sample. The average annual growth rate of gross domestic product per capita (ΔGDP) is a variable that is used to control for each country's economic performance. Another country-specific variable is the average annual growth rate of consumer price index (CPI). Similar to GDP per capita, consumer price index is often the most frequently used statistics for identifying a country's inflation or deflation. The demands for the financial products depend on the level of economic activity in each country and thus, it is also important to control for consumer price index variable when analysing the risk-competition relationship.

The REG factor represents the level of banking regulation in the respective country. Regulatory variables such as supervisory power (SPOWER), capital requirements (CAPRQ), private monitoring (PRMONIT) and restrictions on bank activities (ACTR) taken from World Bank database as referred in (Alam, 2014; Barth, Caprio & Levine 2001, 2013; Dick, 2006; Jayaratne & Strahan, 1998; Repullo, 2004), are included in the main regression due to the reasons that these variables may impact on bank risk-taking behaviour.

SPOWER is a measure of the power of the supervisory agencies. It is calculated on the basis of the answers to 14 questions indicating the extent to which supervisors can change the internal organizational structure of the bank and/or take specific disciplinary action against bank management and directors, shareholders, and bank auditors. Higher values of this variable indicate greater power of supervisory authorities to get involved in banking decisions. CAPRQ is an index of capital requirements, accounting for both initial and overall capital stringency. The former indicates whether the sources of funds counted as regulatory capital can include assets other than cash or government securities and borrowed funds. The latter indicates whether risk elements and value losses are considered while calculating the regulatory capital. CAPRQ can take values between 0 and 10 with higher values indicating more stringent capital requirements.

PRMONIT is an indicator of private monitoring that takes values between 0 and 12 with higher values indicating higher disclosure requirements and more incentives to increase private monitoring. Barth et al., 2013 provides evidence that regulations that enhance and facilitates private monitoring can significantly boost bank efficiency and reduce risk-taking. ACTRS indicates the level of restrictions on the banks' activities. It can take values between 0 and 4 with higher values indicating higher restrictions. It is determined by considering whether securities, insurance, real estate activities and ownership of non-financial firms are unrestricted (=1), permitted (=2), restricted (=3) or prohibited (=4). We construct an overall index by calculating the average value of all four activities.

D_{IB} is a dummy variable for an Islamic bank. D_{IB} is equal to one for Islamic bank and 0 for the conventional bank. By introducing the Islamic bank dummy in the model, it allows a comparative analysis that addresses the question of whether there is a significant difference between the risk-competition relationship of Islamic banks and conventional banks. Further, to examine whether there is the differential impact of each bank internal factors on the risk-taking of Islamic banks and conventional banks, the study introduces additional specification variable by including the interaction between Islamic bank dummy with each bank-specific variables. The $D_{IB}*B_{it}$ is the interaction term between an Islamic bank dummy with each bank-specific variables that take the value of one for Islamic bank and 0 if otherwise. The interaction term gauge the difference between conventional and Islamic banks for the respective bank internal factors. By introducing the interaction term, the slope coefficients between the two banking systems can be differentiated (Gujarati & Porter, 2009). For instance, the effect of bank specific factors on risk taking in Islamic banks is measured as $\beta_2 + \beta_6$; while for conventional banks, the effect is measured as β_2. α is a bank-specific intercept, f is fixed effects controlling for unobserved heterogeneity across countries and years ε is the error term and I and t refer to bank and time respectively.

$$LLR_{it} = \alpha_i + \beta_1 MP_{it} + \beta_2 B_{it} + \beta_3 M_{jt} + \beta_4 REG_{it} + \beta_5 D_{IB} + \beta_6 D_{IB} * B_{it} + f_{it} + \varepsilon_{it} \quad (4)$$

$$NPL_{it} = \alpha_i + \beta_1 MP_{it} + \beta_2 B_{it} + \beta_3 M_{jt} + \beta_4 REG_{it} + \beta_5 D_{IB} + \beta_6 D_{IB} * B_{it} + f_{it} + \varepsilon_{it} \quad (5)$$

As shown in Table 1, the comparison of total numbers of both Islamic and conventional banks tells that Islamic banks

Table 1
The distribution of Islamic and conventional banks by country.

Country	All Banks	Conventional banks	Islamic banks
Bahrain	19	8	11
Bangladesh	28	25	3
Indonesia	37	34	3
KSA	12	9	3
Kuwait	9	6	3
Malaysia	28	13	15
Pakistan	21	16	5
Qatar	9	6	3
Turkey	24	20	4
UAE	21	12	9
All	208	149	59

dominate the banking systems in countries like Bahrain and Malaysia. The banking systems of other countries, however, can be seen as a developing one.

The significance of the Islamic banking in the banking sector can be shown in Table 2 which represent the allocation of total assets of both banking concepts. The table shows there is a significant increase in the size of the Islamic banking industry between 2006 and 2016. Conventional banking industry, however, has been decreased in size over the period, from 90.21 percent in 2006 to 84.48 percent in 2016. The growth rate of total assets of Islamic banking has increased significantly from 9.79 percent in 2006 to 15.52 percent in 2016.

Table 3 displays the descriptive statistics of banks by country. It is noted that in terms of total assets, conventional banks express an overall total asset of USD 13635.943 million, while Islamic banks, in general, show total assets of USD 5483.304 million. Islamic banks in KSA have the largest size in total assets (USD 20574.24 million), followed by Kuwait (USD 17375 million) and Qatar (USD 9399.81 million). On the other hand, conventional banks in KSA also has the largest share of total assets (USD 33439.4 million), followed by Malaysia (USD 28393.45 million) and UAE (USD 22956.1 million).

In terms of profitability ROAA, conventional banks made larger profits than Islamic banks in total (1.508 against 0.736) which show a contrasting result found by Olson and Zoubi (2008). Islamic banks in Qatar have a higher profitability (3.938), whereas Islamic banks in KSA, Kuwait and Turkey have a similar economic efficiency to conventional banks. Conventional banks are more profitable than Islamic banks might due to the reasons that conventional banks have higher net financing and better asset quality. Islamic banks express equity to total assets (ETA) significantly higher than conventional banks (16.398 against 14.948 for conventional banks). This is in line with the various conducts practised by both types of banks where Islamic banks engage more in equity dealings. Also, in terms of cost to income ratio, Islamic banks show a higher cost to income ratio than conventional banks (53.028 versus 49.706 for conventional banks), indicating Islamic banks are less efficient in controlling cost and increasing profits compared to conventional banks. However, the study conducted by El-Gamal & Inanoglu (2005) proves otherwise, where the authors discovered insignificant difference in efficiency between the two types of banks. In terms of net loans to total assets, conventional banks have a higher ratio for net loans to total assets than Islamic banks in total (56.496 against 49.401 for Islamic banks).

Table 4 presents the descriptive statistics of loan-loss reserve over the gross loan for the sample countries. The statistics show that average loan-loss reserve over the gross loan for overall Islamic banks is comparatively smaller than conventional banks, except two countries - Bangladesh and Malaysia. One possible explanation for why the average ratios of loan-loss reserve for Islamic banks are smaller than conventional banks in overall could be Islamic banks in worldwide are smaller in size compared to conventional banks (Chong & Liu, 2009; Alam 2012, 2014). The average loan-loss reserve over gross loan ratio of Islamic banks for Bangladesh is 0.082 compared to 0.037 for conventional banks and for Malaysia; the average ratio of Islamic banks is 0.031 against 0.029 for conventional banks.

The cost function in Equation (1) is calculated for each bank in each year in order to allow the coefficients of the translog cost function to change over time. Table 5 presents the evolution of both HHI and Lerner index between 2006 and 2016 for both Islamic and conventional banks.

As illustrated in Table 5, the Lerner index for Islamic banks did not show a clear-cut trend over the period. During the period 2006–2008, the Lerner index for Islamic banks decreased from 0.32255 to 0.12992, indicating an increase in competition. The result makes sense since the competition for conventional banks decreased during this period because of the financial crisis and Islamic banks were preferred as an alternative financial service at that time. Islamic banks did not suffer major losses during financial crisis mainly due to their financing methods in which interest and all forms of speculation are prohibited and thus, boosting the competition for Islamic banks during this period (Perry & Rehman 2011). During the period 2006–2008, the Lerner index for conventional banks increased, indicating a minor reduction in competition in the conventional banking industry. This occurrence was followed by a reduction in the Lerner index during 2009–2010, indicating an increase in competition. During 2011–2016, the value of the Lerner index for conventional banks increased again showing a decline in competitive conditions. HHI score for both conventional and Islamic banks show that HHI in the Islamic banking is five times higher than the conventional banks.

Table 6, panel A present effect of competition on LLR of both Islamic and conventional banks. The results indicate that a large variation in risk-taking the behaviour of banks can be explained by market power and bank-specific factors namely; size, bank capitalization and profitability. All these factors account for 82.3% of the variability in the riskiness. The results show a positive relationship between the Lerner index

Table 2
Distribution of total assets between conventional and Islamic banks.

	2006		2009		2011		2013		2016	
	Million (USD)	%	Million (USD)	%	Million (USD)	%	Million (USD)	%	Million (USD)	%
Conventional banks	1,197,910	90.21	1,855,779	86.25	2,356,262	85.90	2,784,361	85.04	3,245,259	84.48
Islamic banks	130,061	9.79	295,866	13.75	386,738	14.10	489,765	14.96	578,676	15.52
Total	1,327,972		2,151,646		2,742,999		3,274,126		3,823,935	

Source: Bankscope database and author's own calculations.

Table 3
Descriptive statistics of individual variables of banks by country.

		Islamic banks					Conventional banks				
		TA	ETA	ROAA	CI	NLTA	TA	ETA	ROAA	CI	NLTA
Bahrain	Mean	1532.929	30.000	0.573	63.131	28.618	11195.293	12.656	0.807	45.487	44.002
	Std. dev	1228.343	25.407	7.381	94.652	24.500	11030.713	5.397	1.411	19.712	14.940
Bangladesh	Mean	713.756	−12.136	−2.126	55.385	73.423	1759.323	7.563	1.131	48.318	65.004
	Std. dev	577.037	30.702	6.375	39.291	7.543	1678.796	3.937	1.904	35.352	10.604
Indonesia	Mean	3998.317	6.260	0.886	56.312	63.646	6346.023	24.152	1.085	56.969	55.605
	Std. dev	9593.824	2.673	0.569	24.236	25.557	12274.020	170.398	4.664	27.731	19.512
KSA	Mean	20574.238	26.006	2.090	46.203	54.442	33439.393	13.313	2.273	35.624	57.162
	Std. dev	24168.306	24.918	1.777	28.688	26.046	20292.632	2.950	1.636	11.181	6.946
Kuwait	Mean	17375.027	14.952	0.945	49.897	58.859	18699.792	12.206	1.424	29.788	60.691
	Std. dev	19331.536	2.681	1.846	13.019	8.520	14081.600	3.053	1.655	7.197	7.009
Malaysia	Mean	3725.584	11.099	0.169	43.877	47.829	28393.452	7.530	1.105	42.520	56.848
	Std. dev	3574.046	16.455	2.757	25.232	22.055	25127.364	1.969	0.488	10.084	12.738
Pakistan	Mean	725.488	21.025	−0.746	105.007	40.781	4400.811	9.947	0.652	69.908	46.640
	Std. dev	733.780	21.806	2.735	77.772	12.968	3780.212	6.654	1.994	59.423	10.430
Qatar	Mean	9399.808	25.522	3.938	21.303	56.725	17830.320	17.296	2.127	32.597	51.673
	Std. dev	6061.767	16.796	1.859	7.568	14.526	25605.468	13.963	0.981	17.264	19.635
Turkey	Mean	6953.892	11.433	2.099	46.302	66.399	22365.469	18.954	2.948	55.814	54.422
	Std. dev	3474.056	3.006	0.900	9.482	17.001	30228.716	19.169	4.886	24.845	20.593
UAE	Mean	7376.446	15.256	1.310	43.524	55.349	22956.070	15.238	2.294	34.579	65.660
	Std. dev	8341.061	14.557	4.394	49.190	26.884	24818.632	4.692	1.255	11.548	12.347
Total	Mean	5483.304	16.398	0.736	53.028	49.401	13635.943	14.948	1.508	49.706	56.496
	Std. dev	9647.801	21.214	4.423	56.234	24.86	20825.459	81.942	3.208	32.077	16.48

Table 4
Loan-loss reserve over gross loan of banks by country.

	Average loan-loss reserve over gross loan by country	
	Islamic banks	Conventional banks
Bahrain	0.055	0.074
Bangladesh	0.082	0.037
Indonesia	0.021	0.022
KSA	0.022	0.029
Kuwait	0.047	0.053
Malaysia	0.031	0.029
Pakistan	0.031	0.087
Qatar	0.015	0.016
Turkey	0.022	0.069
UAE	0.030	0.036

Source: Bankscope database and author's own calculations.

Table 5
Year wise Market Power of Banks (HHI and Learner Index).

	HHI Deposit		HHI Loans		Lerner Index	
	IB	CB	IB	CB	IB	CB
2006	0.2244	0.0378	0.2264	0.0374	0.3225	0.3116
2007	0.1039	0.0367	0.1089	0.0378	0.0847	0.3688
2008	0.0937	0.0314	0.0875	0.0320	0.1299	0.4944
2009	0.0825	0.0276	0.0845	0.0276	0.2930	0.4058
2010	0.1015	0.0260	0.1075	0.0268	0.1457	0.2068
2011	0.1125	0.0231	0.1201	0.0248	0.1125	0.2289
2012	0.1278	0.0254	0.1447	0.0279	0.0301	0.2138
2013	0.1345	0.0348	0.1505	0.0379	0.2446	0.2383
2014	0.1512	0.0414	0.1632	0.0402	0.2652	0.2528
2015	0.1627	0.0479	0.1674	0.0425	0.2521	0.2751
2016	0.1685	0.0519	0.1681	0.0465	0.2413	0.2862

Source: Bankscope database and author's own calculations. IB = Islamic banks; CB = Conventional banks.

and LLR. The results are in line with the "competition-fragility" view (Hellmann et al., 2000; Repullo, 2004; Forssback & Shehzad 2011) which implies that highly competitive environment induces banks to take on the riskier loan portfolio. In order to derive a high return and maintain their high market power banks tends to take on riskier projects. For country-specific variables (regression 2), it can be seen that the ΔGDP has a negative effect on banks' risk-taking behaviour but found to be insignificant. CPI however, is positively associated to the overall banking sector risks. This finding indicates that the banking system will engage in more risks if there is an increase in the price level of consumer goods and services in the economy which can be due to the tight monetary situation in the country. Using the specification in regression 2 as the basic model, dummy for Islamic banks is added in regression 3. While controlling for bank-specific factors and macro factors, the coefficient of Islamic bank dummy measures whether there is any significant difference between risk-taking the behaviour of Islamic banks and conventional banks. The finding indicates that there is an evidence of the difference between riskiness in Islamic and conventional banks. The relationship between Lerner index as a measure of bank competition and bank risk-taking is negative for Islamic banks (regression 4). This can be due to the fact that Islamic banks play safe when it comes to the highly competitive environment. As suggested by "competition-stability view" by (Boyd & De Nicolo, 2005; Boyd et al., 2009). Islamic banks do not have many avenues to diversify their risk as they don't have access to the interbank markets and cannot obtain wholesale funding by paying interest rates, they tend to use their cash flows to build large buffers which reduces their risk-taking activity. In the case of TA, there is a positive and

Table 6
Competition and Bank Risk-taking. Competition and bank risk-taking. Based upon an unbalanced panel of 59 Islamic banks and 149 conventional banks in 10 markets during the years 2006–2015 (1664 observations). In Panel A, the dependent variable is Loan Loss Reserve (LLR), and the regressions are run using bank fixed effects with time dummies. In Panel B, the dependent is Non-Performing Loans (NPL). Competition measures include the Lerner index. A larger value for Lerner index indicates a higher degree of market power. The equations are regressed by the fixed effect estimator using the Least Square Dummy Variable (LSDV) regression model. The LSDV is a pooled OLS with additional parameters for the country or/and year dummy variables (constant), and thus identical to the fixed effect estimator. The study uses LSDV with country and time fixed effect to absorb the unobserved heterogeneity across countries and years. There are basically five regression models. Regression (1) includes only bank-specific variables and regression (2) includes both bank-specific and macroeconomic variables. The base model is expanded by including additionally: (3) dummy Islamic bank; (4) interactive dummy Islamic bank*bank-specific factor; and (5) level of bank regulation.

	1	2	3	4	5
Panel A: Dependent is LLR					
Market Power (MP)	0.272***	0.272***	0.268***	0.203***	0.162***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
TA	0.025**	0.025**	0.024**	0.008	0.004
	(0.03)	(0.02)	(0.02)	(0.67)	(0.33)
ETA	0.013	0.013	0.013	0.011	0.014
	(0.24)	(0.20)	(0.20)	(0.25)	(0.25)
ROAA	−0.030	−0.030	−0.031	−0.027	−0.029
	(0.15)	(0.15)	(0.15)	(0.15)	(0.14)
NLTA	0.028*	0.028*	0.028*	0.029	0.007
	(0.09)	(0.09)	(0.10)	(0.11)	(0.12)
CI	0.013	0.013	0.013	0.009	0.028*
	(0.21)	(0.21)	(0.21)	(0.25)	(0.08)
CPI		0.008*	0.008*	0.008*	0.002*
		(0.07)	(0.07)	(0.06)	(0.06)
ΔGDP		−0.005	−0.002	−0.003	0.002
		(0.36)	(0.24)	(0.30)	(0.55)
Dummy Islamic bank			0.014**	0.345*	0.452**
			(0.04)	(0.06)	(0.04)
IB*MP				−0.141***	−0.230***
				(0.00)	(0.00)
IB*TA				0.006**	0.007**
				(0.04)	(0.03)
IB*ETA				−0.003**	−0.001*
				(0.02)	(0.06)
IB*ROAA				0.008	0.065
				(0.35)	(0.19)
IB*NLTA				0.019*	0.019*
				(0.07)	(0.07)
IB*CI				−0.006*	−0.008*
				(0.06)	(0.08)
SPOWER					0.032**
					(0.04)
CAPRQ					0.011
					(0.25)
PRIMON					0.012
					(0.40)
ACTR					−0.025*
					(0.07)
Constant	1.243***	2.169***	2.154***	1.948***	1.862***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.823	0.826	0.826	0.842	0.841
Observations	1164	1164	1164	1164	1164
Panel B: Dependent is NPL					
Market Power (MP)	0.326***	0.326***	0.302**	0.254**	0.201***
	(0.00)	(0.00)	(0.03)	(0.02)	(0.00)
TA	0.016**	0.015**	0.018**	0.012	0.008
	(0.02)	(0.02)	(0.02)	(0.50)	(0.30)
ETA	0.045	0.028	0.020*	0.015	0.017
	(0.15)	(0.17)	(0.08)	(0.20)	(0.20)
ROAA	−0.018**	−0.020**	−0.048*	0.027	0.029
	(0.05)	(0.05)	(0.08)	(0.15)	(0.14)
NLTA	−0.015*	−0.012*	0.021*	0.024	0.021
	(0.06)	(0.06)	(0.10)	(0.15)	(0.15)
CI	−0.026**	−0.026**	−0.025	−0.03	−0.017*
	(0.02)	(0.03)	(0.03)	(0.15)	(0.08)
CPI		0.015	0.021	0.027	0.023
		(0.50)	(0.48)	(0.16)	(0.21)
ΔGDP		−0.025**	−0.015*	−0.027*	−0.012*
		(0.04)	(0.08)	(0.08)	(0.07)
Dummy Islamic bank			0.027**	0.28**	0.32**
			(0.02)	(0.03)	(0.03)
IB*MP				−0.251***	−0.260***
				(0.00)	(0.00)
IB*TA				0.028**	0.014**
				(0.03)	(0.03)
IB*ETA				−0.022**	−0.005*
				(0.02)	(0.07)
IB*ROAA				−0.005	−0.025
				(0.24)	(0.15)
IB*NLTA				0.045	0.021
				(0.14)	(0.13)
IB*CI				−0.014*	−0.018*
				(0.06)	(0.06)
SPOWER					0.043**
					(0.01)
CAPRQ					0.127
					(0.17)
PRIMON					0.031
					(0.12)
ACTR					−0.011**
					(0.04)
Constant	1.482***	2.252***	2.231***	1.821***	1.782***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.852	0.858	0.863	0.865	0.891
Observations	1164	1164	1164	1164	1164

Note: p-values in parentheses, ***, **, * indicate significant sign at 1%, 5% and 10% respectively.

significant result on both Islamic and conventional banks. The results show that large banks of both types seem to take on more risks and have a higher loan-loss reserve since large banks are harder to control and thus, engage in riskier activities. This finding is supported by the "too-big-to-fail" view from (Boyd & Runkle, 1993; Mishkin, 1999) where bigger banks dare to take on more risks since they will not fail easily. ETA, however, shows a negative and significant result for Islamic banks, but a positive and insignificant result for conventional banks. Banks with higher equity on hand tends to have more prudent risk-taking behaviour and thus have a lower loan-loss reserve as stated by (Berger et al., 2009; Saurina et al., 2007). This is true for Islamic banks where the banks hold more equity due to the practice of profit and loss sharing contracts and high risks can be offset by higher equity capital.

For the regulatory variables, it can be stated that SPOWER has a positive association with risk-taking. These results are supported by studies conducted by Allen & Gale (2000) and Levine (2003). With respect to CAPRQ and PRIMON, the results are positive and statistically insignificant. The insignificant results for both CAPRQ and PRIMON are not in line with the findings by Repullo (2004) and Konishi and Yasuda (2004) which suggested that capital requirements and private monitoring take on as a hugely significant role in banks' risk-taking behaviour. In the case of last regulatory variable, ACTR shows a negative and significant relationship between loan-loss reserves for banks which imply that if restrictions are imposed by regulators on bank activities; banks will tend to undertake less risky undertakings since higher activity restrictions result in lower loan-loss reserve which is in line with the findings of Claessens and Laeven (2004).

Table 6, panel B shows our results using nonperforming loans to total loans as our proxy for loan portfolio risk. The results in the panel B validates the findings of the panel A and also increases the explanatory power of the model which can be seen from increased adjusted R square. The findings imply a positive relationship between proxy of market power and NPLs. This suggests that more market power is associated with significantly higher overall risk-taking behaviour. The results lend support to the "competition fragility" view that an increase in competition in banking is likely to erode the franchise value of firms and encourage banks to increase their overall risk exposure. With respect to ROAA, it is observed that a negative and significant result which indicate that higher margin and profits earned by banks can lower the non-performing loans of banks, ultimately, reducing banks' risk-taking behaviours (Olson & Zoubi, 2008). Panel B shows that CI has a statistically significant and negative impact on both Islamic and conventional banks. This is in contrast with the results estimated in Panel A. For country-specific variables, it can be seen that the ΔGDP has a statically significant negative impact highlighting that banks take on more risks when the growth rate of GDP per capita within an economy slows down.

Regulatory variables show similar relationships as found in panel A, thus validating the outcome and the relationships proposed earlier. All regressions present consistent results for almost all variables indicating that our specifications models are robust. Findings validated structural differences in the risk-taking the behaviour of conventional and Islamic banks under different competitive environment. While conventional banks are found to be the supporter of "competition-fragility view", Islamic banks tend to incline more towards "competition-stability view".

According to Arellano and Bond (1991), fixed effects LSDV might be inefficient, which necessitates the exploitation of orthogonality conditions that exist between the lagged values of the dependent variable and the disturbance term through the use of an additional instrument in the model. Thus to overcome the endogeneity issue, we conducted a robustness check of our findings by using a two-step system GMM method. The results are reported in Table 7. The results are to a great degree consistent with the earlier findings. All bank-specific variables have the same signs as in the previous results. There are, however, slight differences in the statistical significance of these variables.

4. Conclusion and implications

Our results regarding the risk-competition relationship suggest that bank competition have a negative association for Islamic banks risk-taking behaviour in contrast with the positive association for conventional banks. Under the traditional "competition-fragility" view, more bank competition erodes market power, decreases profit margins, and results in reduced franchise value. This encourages banks to take on more risk to increase returns. The findings also confirm the reasoning that

Table 7
Robustness test using two step.

Robustness Check- Two-Step GMM		
	LLR	NPL
Market Power (MP)	0.460***	0.375**
	(.1563)	(.1652)
TA	0.102	0.674
	(.189)	(.523)
ETA	0.486	0.482
	(.468)	(.465)
ROAA	−0.168	−1.235
	(.101)	(.375)
NLTA	0.012	.102
	(.118)	(.187)
CI	0.287	−0.173*
	(.528)	(.078)
CPI	0.004	0.302
	(0.010)	(.237)
ΔGDP	0.146	−0.179*
	(.139)	(.184)
Dummy Islamic bank	0.003**	0.014**
	(.001)	(0.006)
IB*MP	−0.027**	−0.018**
	(.013)	(0.009)
IB*TA	0.104	0.055**
	(.041)	(.021)
IB*ETA	−0.069*	−0.177*
	(.043)	(.112)
IB*ROAA	0.309	−0.124
	(.2354)	(.301)
IB*NLTA	0.212*	−0.170
	(.116)	(.103)
IB*CI	−0.521*	−0.805*
	(.187)	(0.327)
SPOWER		
CAPRQ		
PRIMON		
ACTR		
Constant	2.891***	3.001***
	(0.598)	(0.158)
Time fixed effects	Yes	Yes
Country fixed effects	Yes	Yes
AR (1) P-value	0.008	0.031
AR (2) P-value	0.537	0.402
Hansen J- P-value	0.827	0.729

The ***, **, and * represent p-values of 0.01, 0.05, and 0.10. Robust standard errors are reported in the parentheses.

Islamic banks have a strong incentive to engage in market segments where the degree of competition is low in order to achieve higher rates of return.

The study found that Islamic banks have lower market power compared to conventional banks as supported by Weill (2011) and different from the findings by (Kuran, 2004; Sahut et al., 2011). It is also clear that both Islamic and conventional banks with larger size tend to take on more risks since the total assets have a significant positive relationship between loan-loss reserves for both bank types. Islamic banking, however, with their religious based system allow them to hold more equity and more profitable than conventional banks and thus, have a lower loan-loss reserve. Conventional banks, on the other hand, are more efficient in controlling costs than Islamic banks and hence, have a lower loan-loss reserve.

This paper has significant implications for policymakers including central banks and other international agencies operating in countries where dual-banking systems coexist. This study will enable researchers and relevant organizations to understand the market power of each type of banks and how the varying degrees of market power could impact banks' risk-taking behaviour of the two types of banks. The findings from this research will be of high use for government policy for countries with the highly dual-banking environment in implementing a policy such as licensing of new Islamic and conventional banks as the results provide particular implications that the policymakers could employ for the management and regulation of the banks.

Conflicts of interest

None declared.

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