



Examining the Resilience of Islamic and Conventional Banks to Changes in Macroeconomic Conditions

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Abstract

This paper aims to examine if there is any relationship between Islamic and conventional bank resilience to changes in economic conditions. To fulfill our objectives, first we provide a descriptive approach, in which we compare the credit risk evolution of 53 Islamic and 215 conventional banks operating in 10 countries from 2005 to 2015. Then we adopted a regression analysis, to examine to what extent being Islamic does matter in determining (i) the level of a bank's credit risk, and (ii) sensitivity to changes in macroeconomic conditions. Results reveal that being Islamic seems to not matter, neither in determining a bank's credit risk level, nor a bank credit risk sensitivity. Both types of bank seem to respond similarly to changes in the macroeconomic context.

Keywords: Islamic banks, conventional banks, bank credit risk, economic conditions

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1. Introduction

The 2007/2008 global financial and economic crisis gravely and severely affected the banking industry throughout the world. In particular, we have noted many banks going into bankruptcy with significant increases in liquidity and credit risks within a large number of financial institutions. The severity of the fallout has left several economists quite sceptical regarding the development and innovations experienced by the conventional banking industry. Particularly, many economists concur with Minsky and Keynes' (1986) theory and argue that the conventional banking system is inherently unstable. Grauwe (2009) argues that reforms implemented since the 1930's in order to enhance the stability of the banking system and prevent large-scale banking crises have shown their limits.

In the face of this worrying financial distress, the Islamic banking industry seemed to be immune to the financial crisis, since we did not observe any significant difficulties or bankruptcy cases (see Ernst and Young (2009). Moreover, many studies have confirmed the sustained growth of Islamic banks during crises (Parashar and Venkatesh, (2010), Beck et al (2010), Chazi and Syed, (2010), Ahmad (2010), Nor Hayati and Noor (2011), Boumediene and Caby (2013).

According to some economists, the documented resilience of Islamic banks is not surprising. Particularly, the PLS (the profit and loss sharing principle) and the asset-backing principles, added to the prohibition of *riba*, are mechanisms that can successfully counter the failures of conventional banks in maintaining stability (Khan, (1987), Ahmed, (2002); Syed, (2007); Čihák and Hesse, (2009).

Moreover, religion, through customers' piety, may play a role in establishing Islamic banks safety. Baele et al (2014) compared default rates on conventional and Islamic loans in Pakistan. They found that in *ramadan* and in big cities where the share of votes to religious political parties is higher, the default rate of Islamic loans is less than half the default rate of conventional. So, it seems, that customers' commitment may help in enhancing Islamic banks resilience. Also Farooq and Zaheer (2015) found that Pakistanis Islamic banks are more resilient to financial panics, they suggest that greater financial inclusion of faith-based groups may enhance the stability of the banking system.

However, on the other hand, we note many other theoretical and practical factors, which are impeding

the documented resilience of Islamic banks. Particularly, the Islamic financial principles are inherently associated with many liquidity, market and credit risk level boosters. These include (1) the limited use of derivatives (risk mitigation tools), (2) the lack of diversification through the forbidding of some investing activities and (3) equity-based financing (according to the profit and loss share principal, IB's agree to share losses with their creditors), in addition to (4) absence of an effective money market. Moreover, Islamic bank gives rise to other specific risks, of which we mainly note:

- The non-conformity risk which is the risk that a bank loses its credibility by a possible non-compliance of *Shari'ah* perceived by the clients.
- The legal and documentation risk: The risk of non-compliance with the legal procedure is rather high, with an increased risk of loss of certain opportunities given the cumbersomeness and complexity of the procedure
- The displaced conventional risk: In order to preserve its competitiveness and to ensure a satisfactory return to its depositors, an Islamic bank must assume and absorb any losses on investments activities which are supposed to be borne by its depositors.
- Some of Islamic loans products are based on profit-loss sharing (PLS) contracts. So the repayment of the credit depends on the success of the project, and banks are sharing risks with their borrowers.

Thus, the Islamic financial principles that support Islamic bank's transactions are a double-edged sword. On the one hand, they are a damper on the capricious transactions often realized by the conventional banks and on the other hand they enhance the conventional risks; besides, they seem to generate some new sources of risk.

This paper attempts to investigate the impact of being Islamic on the banking industry resilience. Using a sample of 53 Islamic and 215 conventional banks operating in 10 countries from 2005 to 2015, i.e., the paper aims to identify to what extent the two types of banks are responding differently to any macro-economic conditions changes. By examining closely the impact of being Islamic on the banking industry resilience, this paper aims to contribute to the existing literature in several ways. First, the paper provides descriptive statistics about Islamic and conventional banks credit risk characteristics. Second, it adopts regression analysis to investigate whether the bank type (Islamic or conventional) determines bank credit risk level. Third, the paper contributes to the current literature, by studying new performance issues dealing with the bank response and sensitivity to changes in macroeconomic variables. This research issue helps to resolve the puzzling effect of Islamic principles, and to clarify professional and academics on the real resilience of Islamic banking industry, compared to conventional banking industry. Besides, it helps to investigate any lessons should us retain from the Islamic experience, to improve risk management in conventional banking industry.

To fulfill our objective, we focus on credit risk as an indicator of bank resilience, since it is the main risk that threatens any banking industry. We note that credit risk is the cause of 80% of cases of bank failure, ((Khan (2003); Greuning and Iqbal (2008)). Also, it is unanimous in the literature that credit risk is the most important risk for banks (Ariffin et al (2009); Khan and Ahmad (2001); How et al (2005) and Elgari (2003). Then we proceed in two steps: we first lead a descriptive analysis where we compare the evolution of credit risk level related to Islamic and conventional banks from 2005 to 2015. Then we conduct two regression analyses to examine to what extent being Islamic does matter in (i) determining a bank's credit risk level and (ii) determining the credit risk sensitivity to some macro-economic conditions change. The study suggests that neither the difference between Islamic and conventional banks' credit risk level, nor their respective credit risk sensitivity, are significant. Especially, Islamic banks do not seem to be immune to the financial crisis, both sets of banks respond equally to the macro-economic context changes.

The rest of the paper is organized as follows: Section 2 entails review of literature that deals with the effect of the crisis on Islamic banks. We focus on the latest financial crisis, because it caused the most aggressive change in overall economies, recorded during the period of the study. Section 3 details the comparative analysis. Section 4 develops the regression analysis and section 5 provides some concluding remarks.

2. Literature Review: Impact of the Financial Crisis on Islamic Banks Stability

There is extensive literature that has investigated the reaction of Islamic and conventional banks since the last financial crisis. These studies especially focus on four banks performance issues: (i) profitability

(Almanaseer, (2014)), (ii) efficiency (Rosman et al, 2014), (iii) credit risk (Hassan and Dridi (2010), (iv) resilience through the Z score (Bourkhis and Nabi (2013), Čihák and Heiko (2008)). Nevertheless results are controversial, and we distinguish two main viewpoints: some theoretical and empirical academics assert the supremacy of Islamic banks and others seem rather skeptical.

The first group of research connects Islamic banks resilience to underlying Islamic financial principles. Hassan et al. (2009) carried out a systemic analysis of the causes of the crisis, then they outlined that these causes would not have been factors if the intrinsic principles of the Islamic financial system had been respected. Ahmed (2009) argues that following the principles of Islamic finance would have prevented the occurrence of the crisis. Chapra (2009) also shares this view. He argues especially that the main drivers of the last crisis were laxity of lending standards often adopted by conventional financial institutions – driven by greed and appetite for higher returns - and the absence of adequate and appropriate government regulatory control. These two factors are naturally banned in an Islamic financial system. Also, according to Chazi and Syed (2010), Islamic financial institutions tackled the recent global financial crisis in terms of risk management. The authors argue that Islamic banks are better able to control risk as compared to CBs, and especially that they enjoy better capital ratios. Again, the authors attribute the Islamic banks supremacy to Islamic principles, which include interest and Gharar free transactions that remove uncertainty and risk.

Empirically, Čihák and Heiko (2008), using the Z score, assessed the relative financial strength of small Islamic banks based on evidence covering individual Islamic and conventional banks in 18 banking systems with a substantial presence of Islamic banking. But, they found that large conventional banks are more stable than large Islamic banks. this finding was later confirmed by Abedifar et al (2012). Also Boumediene (2011) considered the distance to default of nine Islamic banks versus nine conventional banks from 2005 to 2009. He found that Islamic banks are significantly safer than Conventional banks. In a recent empirical work, Boumediene and Caby (2013) found that Islamic banks were immune from the financial part of the subprime crisis. Particularly, they argue that, due to the ban on securitization, Islamic banks did not participate in the mechanism, which caused the spread of the crisis in the world. Using the example of Malaysian Islamic banking, Ryu et al. (2012) assure that the Islamic banking system is more stable and sound. They argue that the Islamic finance sector has been largely immune to the ravages of the global financial crisis, due to a combination of prudent risk management and the avoidance of leverage and complex structured finance. Indeed, it focuses on the need for transactions to be supported by underlying economic activity.

Hassen and Dridi (2010) compared the impact of the crisis on Conventional and Islamic banks. They found that in terms of profitability, Islamic banks fared better than their conventional peers during crisis. However, this was reversed in 2009 as the crisis hit the real economy. But in terms of credit and asset growth, the Islamic banks continue to outperform conventional banks, except in the UAE. Also, the study affirms the supremacy of Islamic banks in terms of risk, recognizing that risk was elevated by the external rating. Furthermore, Parashar and Venkatesh, (2010) assert that, although Islamic banks have suffered in terms of leverage, capital ratio and return on equity, they exhibited better performance than CBs during 2006-2009.

Azam et al. (2012) affirm that there is lesser impact of global financial crises on Islamic banking systems, which is an integral part of Islamic finance as compared to their conventional peers. Moreover, authors argue that it is time to fully adhere to the Islamic finance system.

Abedifar et al (2012) investigated risk and stability features of Islamic banking between 1999 and 2009. They found that small Islamic banks have lower credit risk than their conventional peers. Beck et al (2010) assessed that at the beginning of the crisis, Islamic banks have better quality assets and a higher capitalization rate than conventional banks, which increased their ability to absorb possible losses due to bad loans, which further implies greater security for depositors and lower business risk. This finding was also documented by Johnes et al (2014) and Mat Rahim and Zakaria (2013), they argued factors affecting the stability of Islamic and conventional banks are similar, except for the diversification of income, which is exclusively a function of stability of conventional banks. Therefore, during the crisis, when a bank income was subject to change, Islamic banks proved to be more stable than conventional banks.

Almanaseer (2014) finds that the financial crisis does not have significant impact on Islamic banks profitability. In a more recent paper, Pappas et al (2017) found that Islamic banks have significantly lower risk of failure than their conventional peers. They argue that the implementation of early warning systems for bank failure should recognize the distinct risk profiles of the two bank types. Also Tabash and Dhankar (2014) documented the relative resilience and supremacy of full-fledged Islamic banks in Kingdom of Saudi Arabia,

during the financial crisis.

Nevertheless, there are some other studies which argue that the exhibited resilience of Islamic banks is temporary, such as Saddy (2009) who argues that some Islamic banks, like conventional banks, have relied on leverage and have undertaken significant risks. Islamic banks have funded occidental corporations without conducting the needed due diligence. The excess liquidity held by Islamic banks makes them eager to place the funds quickly and to maximize profits. As a result, some of the sukuk issued by entities with low ratings became junk sukuk. The securitization of these sukuk involves a process of bundling portfolios of toxic assets for sale to Islamic investors in the wholesale market.

Also, El-said and Ziemba (2009) argue that Islamic banks are not totally immunized from the crisis, and especially that they are subject to the second-round effect of the global crisis. Islamic banks were not directly affected because Islamic banks are based on a close link between financial and productive flows. However, the protracted duration of the crisis affected Islamic banks as well, simply because their contracts are based on asset-backed transactions. With the global economic downturn, property markets have seen a decline in a number of countries where Islamic banks have a significant presence. This carries negative implications for these banks, as a large number of contracts are backed by real estate and property as collateral. In such a situation, credit risk arises from the erosion in the value of collateral.

Said (2012) found that Islamic banks efficiency had increased during 2006 to 2008 but declined during 2009. Bourkhis and Nabi (2013) found that before the financial crisis, Islamic banks were more profitable than CBs. However, Islamic banks became less profitable and less resistant in 2009 when the crisis passed. They argue that Islamic banks have been impacted during the second (real) wave because of their limited reliance on risk-sharing instruments. But, Miniaoui and Gohou (2011) found that conventional banking in the UAE performed better than Islamic banking, during and after the crisis. Also, El Massah and Al-Sayed (2015) assessed that conventional banks are more solvent, liquid, profitable and less risky than Islamic banks.

Moreover, and dealing with banks' credit risk, Kabir et al (2015) argue that that the measure chosen plays a significant role in assessing the supremacy of Islamic banks. Especially they found that Islamic banks have significantly lower credit risk than conventional banks as based on distance to default. In contrast, Islamic banks display much higher credit risk using the Z-score and non-performing loans ratio.

So, facing a conflicting literature and results that are varying among samples and countries. The present paper aims to contribute to clarifying the controversies surrounding Islamic banks resilience.

To achieve our purpose, we proceed differently to the previous works. Especially we first examine the credit risk level behavior or evolution within both Islamic and conventional banks from 2005-2015. Then, which is the main contribution of this paper, we propose to see to what extent does being Islamic bank is determinant variable of the (i) credit risk level and (ii) sensitivity to any change in macro-economic conditions? We focus particularly on credit risk given its crucial importance in establishing a bank safety.

3. Islamic and Conventional Banks' Credit Risk Level and Evolution: Descriptive analysis

According to literature, we distinguish two main approaches to measure a bank' credit risk: a non-parametric and a parametric approach. According to the first approach, academics link credit risk to some observable variables, such as bank asset quality and lending strategies. So they refer to some accounting and financial variables as credit risk measures. But according to the second approach, academics construct metric measures such as the value at risk, the distance to default and the Z scores. Unlike the majority of existing studies, this paper fits into the first approach and uses asset quality indicators as measures of credit risk, rather than Z score, for two main reasons. First, we argue that, besides its simplicity and availability, asset quality can capture directly the extent to which a bank is exposed to the credit risk. Moreover almost all the international rating agencies (Standard and Poor's, KPMG, E&Y) rely heavily on this variable as credit risk indicator. Second, the Z score measure a bank distance to default. As calculated, this stability indicator does not take into account, that in Islamic banks, shareholders share default risk with depositors, investors and *mudharabah* account holders. So, Islamic and conventional banks shareholders are not equally exposed to default risk.

Accordingly, equity and reserves are less vulnerable to losses in Islamic banks than Conventional banks. As a result, the Z score would not be a credible bank stability indicator, when we deal with Islamic and Conventional banks. Especially, we refer to three ratios among those that the literature had asserted as indicators of credit risk level:

- The ratio of total loans to total assets (GL/TA): this ratio is an indicator of the bank loan expansion. The

higher the proportion of total loans to total assets is, the higher the potential increase in non-performing loans and credit risk.

- The ratio of loan loss provisions to total loans (LLP/GL): other studies found that loan quality measured by this ratio, has a significant and negative relationship with credit risk (Eng and Nabar, (2007)). More loans are provisioned, better the bank will prepare to face possible non-recovery.
- The ratio of non-performing loans to gross loans (NPL/GL): This ratio is the main direct indicator of the quality of bank loans and the amount of credit risk to bear (Ahmad and Nizam, 2004; Bourkhis and Nabi, 2013; Al-Wesabi and Nor Hayati, 2013).

Additionally, we use unconsolidated annual bank level variables of Islamic and conventional banks operating in 10 countries¹ (alphabetically ordered): Bahrain, Egypt, Jordan, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates, covering the period 2005-2015. We choose to use unconsolidated bank statements, because we argue that considering each bank once and according to its nationality, may bias results and hide the bank subsidiary response to any macro-economic condition change, and so may hide the country financial system resilience. Also, to be able to analyze the real Islamic banks' impact on systemic stability we have extend the usual literature GCC sample and have included other non GCC countries as Turkey, Malaysia and Pakistan, where the Islamic asset share is not negligible. Additionally, we exclude from the considered conventional banks any information belonging to Islamic activity, since almost all the conventional banks in the GCC region offer some Islamic financial products through their Islamic windows. Since it was not possible to distinguish the financial performance (and importance) of these windows or branches and analyze their separate impact on financial stability. We therefore focus only on the comparison of fully-fledged Islamic banks and conventional banks.

In total, we have up to 583 observations for 53 Islamic banks and 2365 observations for 215 conventional banks. The sample coverage is detailed in table 1. The period study is particularly interesting since it covers three particular sub-periods: before, during and after the world financial crisis of 2008-2009, so it gives enough perspectives to analyze the real response of Islamic banks to crisis which is illustrating the heaviest economic conditions changes. In addition to the bank-by-bank data, we also use a number of macroeconomic and other system-wide indicators. Those are described in more detail in the regression analysis.

Table 1: Overview of sample distribution

	Bah	Egypt	Jordan	Kuwait	Malay	Paki	Qatar	KSA	Turk	UAE	Total
I	6	3	3	6	10	6	4	5	4	6	53
C	16	10	23	14	12	29	16	18	42	35	215

I: Islamic banks

C: Conventional banks

3.2 Credit Risk Evolution from 2005 to 2015: Comparative Analysis

As a preliminary step in the analysis, we perform basic statistical tests for the credit risk. In order to compare credit risk in Islamic and conventional banks, and as explained above, we refer to three financial and accounting ratios to evaluate the credit risk level evolution among all banks selected in the sample from 2005 to 2015. Table 2 reports the inherent descriptive statistics of the three selected ratios, belonging to Islamic and conventional banks. The table 2 compares three measures of credit risk of both Islamic and Conventional Banks. The value of each ratio represents the average in the period 2005-2015. The standard deviation of each indicator is given in parenthesis.

¹ The constitution of the sample is heavily dependent on the availability of data. All data are gathered from the annual reports available on banks' website.

Table 2: Credit risk pairwise comparisons

Credit risk indicator	Basic sample		
	Islamic	Conventional	Paired Difference (I-C)
Loans loss provision/gross loans	1.15	1.18	(-0.03)*
LLP/GL	(0.062)	(0.069)	
Gross loans/total assets	0.61	0.78	(-0.17)*
GL/TA	(0.009)	(0.008)	
Nonperforming loans/gross loans	4.7	5.1	(0.14)
NPL/GL	(0.081)	(0.071)	

Source: calculated by author

* Significant at 10%

The basic data² analysis suggests that conventional banks seem to be more cautious with a higher LLP/GL ratio, and more exposed to credit risk with a higher GL/TA, reflecting the fact that the difficult refunding of Islamic banks seem to let them more restrictive in distributing loans, and let them relying on other non-financing activities such as treasury and investment activity. Besides, the conventional banks seem to be effectively more exposed to credit risk than their Islamic peers, since their NPL/GL is higher, but the difference is not enough significant. So results indicate, that on average, conventional banks seem to distribute more loans, but they seem to be more cautious, and more efficient in recovering loans. Also results point out some relative high standard deviation of the loan loss provision and the non-performing loans, indicating their high variability amongst both types of banks. We argue that the high variability of these two variables is related to outliers recorded in the crisis period, where the non-performing loans and loans loss provisions have reached peak levels. Nevertheless, results seem to be not enough conclusive about the better stability of Islamic banks.

To refine analysis, we focus henceforth on the non-performing loans ratio as main indicator of credit risk and propose to compare its evolution from 2005 to 2015 among Islamic versus conventional banks. Figure 1 plots the evolution of the average NPL ratios within sample data of Islamic and conventional banks, and highlights three revealing periods. From 2005 to 2008, we note a higher credit risk among conventional banks, but the credit risk seems to evolve at opposite trends: an increase among the Islamic banks and a decrease among conventional banks. We argue, that at this period the Islamic banks offer loans through mainly the relative safe product, which is *murabaha* financing, but with the loans volume growth recorded and the more Islamic products diversification, the credit risk of Islamic banks has showed some growing trend.

Concerning, the conventional banks, they seem to take advantage from the economic expansion and they assist accordingly to some improvement of their asset quality. In 2008, the two types of banks seem to be equally exposed to the credit risk, and since, we point out some parallel credit risk evolution, with shifted peaks. Islamic banks' exposure to credit risk has reached its peak to 7.9% in 2009, but the highest conventional banks' credit risk, was recorded at 2010. Also, Figure 1 indicates that the credit risk evolution among conventional banks is smoother and less aggressive. Then, and since 2009, the two types of banks show very close credit risk evolution.

² To circumvent the problem of outliers, we proposed to exclude the first and the last percentile. But the results and conclusions have not changed, and we had notified the same trends, so we had prefer to continue working with the basic data and to not display the other results.

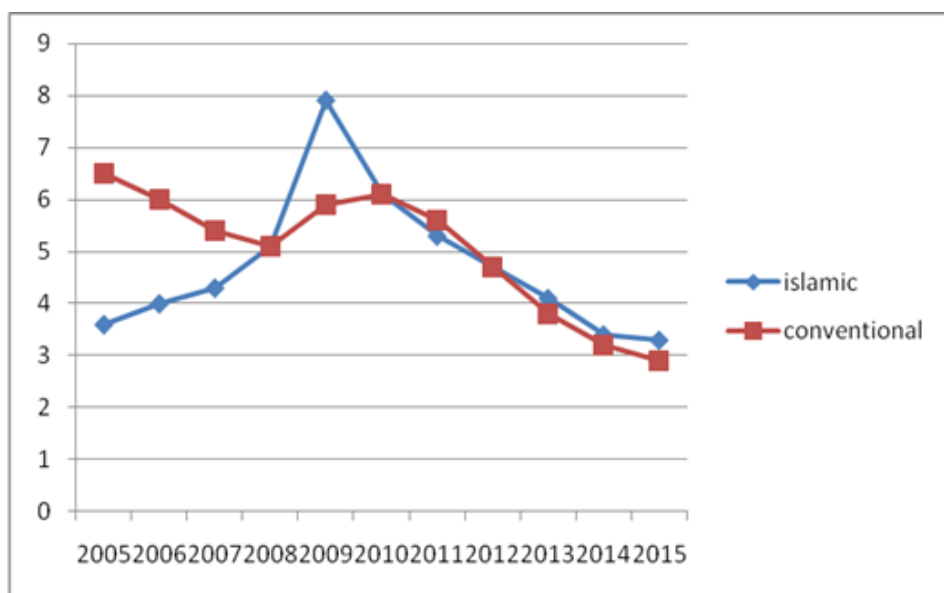


Figure 1: Non-performing loans to gross loans evolution: Islamic versus conventional banks

Source: calculated by author

Accordingly, we argue that as their conventional peers, Islamic banks were also impacted by the crisis, with an important increase in their credit risk. Besides, since 2010, the two types of banks show some sustained improvement in their respective asset quality. Concerning, the aggressive increase of Islamic banks' credit risk, we argue that it is related to some Islamic banks outliers present in the sample. Particularly, there are four Islamic banks in the sample (two from UAE and two from Kuwait) that knew serious difficulties during crisis. The results are not consistent with Hassen and Dridi (2010), Basu et al (2015), who assessed that Islamic banks were impacted by crisis with delay, and they precise that Islamic banks were impacted during the crisis second road. We think that the different sample considered in each study may be the reason of these divergent results.

Therefore, the religion feature and the specific Islamic financial principals seem to be not effective in protecting Islamic banks from the financial and economic crisis and from the creditor default risk. Moreover, the forbidden use of derivative, and the limited use of guarantees and other Sharia compliant risk management tools, let Islamic banks more fragile to some general macro-economic conditions deterioration. These comparisons of NPL ratios are useful, but may overlook some additional factors that explain bank-to-bank variation in NPL ratios. We will therefore, examine this issue more formally using regression analysis.

4. Regression Analysis: Does It Really Make the Difference to be Islamic?

The main finding of the previous exploratory study is the parallel evolution of Islamic and conventional credit risk from 2009 to 2015, i.e, the descriptive analysis suggests that the two groups of banks are equally sensitive to macro-economic conditions changes, and being Islamic bank seem to not immune the bank from their creditor default risk, which is the main risk faced by the banking industry. To test this finding we adopt a regression analysis, where we try to see to what extent these two variables (i) bank credit risk level and (ii) credit risk sensitivity to changes in the economic context, are sensitive to the bank type (Islamic or not), measured by a dummy variable that indicates 1 when the bank is Islamic, and 0 when it is not. As control variables, we include two common sets of exogenous variables (1) some related to bank characteristics (2) others related to economic indicators, which are common to both sets of banks that operate in the same country.

4.1 Methodology and variables measurement

Regarding exogenous variables that are suspected to determine the bank credit risk level (CR), the empirical evidence is relatively unanimous. Specifically, the literature specifies two sets of variables. The first set regroups variables belonging to bank characteristics or the microeconomic factors, while the second set includes variables belonging to the overall macroeconomic and financial environment.

- Microeconomic factors
The empirical evidence asserts that bank characteristics, particularly size, are determinant in the scope of credit risk. Moreover, the strategies employed regarding loan growth and capital adequacy are widely important in determining credit risk level. Almarzoqi *et al* (2015).
- Macroeconomic factors
Macroeconomic factors are considered to play an important role in this matter (Demirgüç-Kunt and Detragiache (1998), Liewellyn (2002)). More specifically, adverse economic condition, high interest, high inflation rates and competitive pressure are favorable to increase credit risk level.
- Does being an Islamic bank matter in determining the bank credit risk (i) level, and then (ii) sensitivity to macro-economic conditions changes?

We should recall that our purpose is to examine the effect of being an Islamic bank first, on the credit risk level, then on its evolution in response to changes in economic conditions. To fulfill our objective, we carry out two separate regressions, where the endogenous variables are respectively the credit risk level then the credit risk variation. Besides the micro and macro exogenous variables, we include in the two models a dummy variable which takes 1 when the bank is Islamic and 0 when the bank is conventional. We argue that, via this binary variable, we can examine whether the effect of being an Islamic bank is pertinent in affecting the credit risk level of banks³. For example, if Islamic banks are less risky than conventional banks, the dummy variable would have a significantly negative sign in the regression explaining credit risk level. The credit risk level is measured again by the bank loans quality measured by the ratio of nonperforming loans to gross loans (NPL/GL). Table 3 summarizes the exogenous variables considered in this study.

Table 3: Explanatory variables of credit risk level

Variable	Theoretical effect	Measure
Variables belonging to bank characteristics		
Size (Hassan and Dridi (2010), Bourkhis and Nabi (2013), Čihák and Heiko (2008), Trad <i>et al</i> (2017))	Negative effect. Small banks tend to have lower capacity to absorb losses	Log Total assets (LNTA)
Leverage volume (Hassan and Dridi (2010), Bourkhis and Nabi (2013), Čihák and Heiko (2008))	Positive effect	Total financing/total assets (LEV)
Asset quality (Hassan and Dridi (2010), Bourkhis and Nabi (2013), Čihák and Heiko (2008), Trad <i>et al</i> (2017))	Negative effect. Larger proportion of risk-weighted assets indicates a better quality of assets. It tends to reduce probability of credit risk.	Risk-weighted assets/total assets (RWA)

³ It should be noted that we borrowed the Čihák and Heiko (2008) methodology to examine the impact of being Islamic on bank stability. Specifically, they led a regression of the Z score on a pack of variables including a dummy variable that takes 1 when the bank is Islamic and 0 when it is not.

Variables belonging to overall financial environment.

Economic growth Salas and Saurina (2006), Jiménez and Saurina (2006), Das and Ghosh (2007), (Gunsel 2012), Thiagarajan, Auuapan et al. (2011), (Zribi and Boujelbene 2011) and (Castro 2012)	Negative effect ⁴ When growth slows or even turns negative, Firms and households reduce their cash inflows (sales, wages), which, in turn, renders it difficult for them to repay the loans.	GDP growth (GDPg)
Inflation (Thiagarajan, Auuapan et al. (2011), Gunsel (2012) and Rinaldi and Sanchis-Arellano (2006)	Positive effect ⁵ High inflation rates are generally associated with a high loan interest rate. Thus, a high interest rate increases cost of borrowing, which leads to an increase in the obligation of borrowers, resulting in an increase in credit risk.	Inflation rate (INF)
Competitive pressure (Garr (2013), Abhiman and Ghosh (2007), Almarzoqi et al (2015))	Positive effect Strong competition between banks means bank managers might sacrifice objectivity in credit evaluation and increase loan growth indiscriminately at the expense of their loan portfolio quality.	Three bank asset concentration. Total assets of the three largest banks/total assets of all the banks. (BCr)

The main part of our objective is to test, using regressions of credit risk as a function of a number of variables, whether Islamic banks are really more immune and resilient than conventional banks. Especially, we estimate these following two panel form models. The first model estimates the impact of a bank nature (Islamic or not) on its credit risk level, and the second model estimates the impact of a bank nature (Islamic or not) on its credit risk sensitivity to macroeconomic and micro conditions changes.

$$\text{Model 1: } CR_{i,t} = \alpha_i + a_i \text{ GDP}_{j,t-1} + b_i \text{ INF}_{j,t-1} + c_i \text{ BCr}_{j,t-1} + d_i \text{ LNNTA}_{i,t} + e_i \text{ LEV}_{i,t} + f_i \text{ RWA}_{i,t} + g_i \text{ Dummy}_i + \varepsilon_{i,t} \quad (1)$$

$$\text{Model 2: } \Delta CR_{i,t} = \alpha_i + a_i \Delta \text{GDP}_{j,t} + b_i \Delta \text{INF}_{j,t} + c_i \Delta \text{BCr}_{j,t} + d_i \Delta \text{LNNTA}_{i,t} + e_i \Delta \text{LEV}_{i,t} + f_i \Delta \text{RWA}_{i,t} + g_i \text{ Dummy}_i + h_i \Delta \text{GDP}_{j,t} + i_i \Delta \text{INF}_{j,t} + j_i \text{ Dummy}_i + \varepsilon_{i,t} \quad (2)$$

Where the credit risk is measured by the non-performing loans to gross loans $(\text{NPL/GL})_{it}$ and credit risk variation $\Delta CR_{i,t}$ is : $[(\text{NPL/GL})_{it} - (\text{NPL/GL})_{i,t-1}] / (\text{NPL/GL})_{i,t-1}$. The i index refers to the bank i ; and the j index refers to the country j . Also, we should note that we estimate credit risk level (i) and (ii) sensitivity on lagged macroeconomic variables. Some academic research papers have been built to analyze the dependent variable in relation to the independent variables for the same year. Other studies relate the dependent variable in year (t) with the independent variables of (t-1). In this paper, we adopt this second option, because it is more consistent with the real-life situation.

Furthermore, we incorporate a panel model with individual fixed effects, to rule out the sample

⁴ However, Fofack (2005), Kalirai and Scheicher (2002) and Aver (2008) found no relationship between gross domestic product and credit risk.

⁵ We note that there is empirical evidence asserting a negative relation between inflation and credit risk, (Shu, 2002; Zribi and Boujelbene, 2011; and Vogiazas and Nikolaidou, 2011). However, other studies by Aver (2008), Bofondi and Ropele (2011) and Castro (2012) did not find any influence of inflation on credit risk.

heterogeneity bias, i.e. the possibility that the individual banks characteristic and relationship with borrowers may be potential explanation of the credit risk level or sensitivity to economic context changes. We adopt regression by using the ordinary last square technique, and then we lead a robust estimation relying on Turkey bisquare weight function, to address the problem of outliers. Robust regression uses a weighting scheme that causes outliers to have less impact on the estimates of regression coefficients.

4.2 Results and discussion

The results for the OLS and the robust estimations are shown in Table 4. The regression (1) explains the credit risk level, and the regression (2) explains the credit risk sensitivity. In table 4, we may observe an increase in the R-squared value when we used the robust regression, and a significant decrease in the standard deviation, which point out again the presence of variables outliers that may bias results, so we decide to rely exclusively on robust regression results for discussions.

Table 4: Regression Results

Estimation n°	OLS regressions		Robust estimations Bisquare Weight function	
	(1.a)	(2.a)	(1.b)	(2.b)
Islamic dummy variable	1.836 (0.085)*	2.125 (0.205)	0.963 (0.103)	2.27 (0.148)
GDP growth (-1)	-0.895 (0.012)**	-	-0.495 (0.062)*	-
Inflation (-1)	0.013 (0.066)*	-	0.003 (0.126)	-
Competitive pressure (-1)	0.805 (0.012)**	-	0.415 (0.009)***	-
Size	-0.354 (0.006)***	-	-0.245 (0.002)***	-
Leverage volume	2.845 (0.000)***	-	1.445 (0.000)***	-
RWA	-0.954 (0.225)	-	-0.534 (0.134)	-
Δ GDP growth	-	-1.27 (0.018)**	-	-0.881 (0.031)*
Δ INF	-	0.881 (0.141)	-	0.609 (0.115)
Δ BCr	-	0.792 (0.025)**	-	0.192 (0.011)**
Δ LNTA	-	-0.792 (0.040)**	-	-0.305 (0.021)**
Δ LEV	-	0.505 (0.018)**	-	0.905 (0.001)***
Δ RWA	-	0.205 (0.151)	-	0.105 (0.120)
Dummyi * Δ GDP	-	-1.105 (0.161)	-	-1.021 (0.151)
Dummyi* Δ INF	-	-0.254 (0.181)	-	-0.125 (0.111)
Δ BCrit * Dummyi	-	-0.042 (0.354)	-	-0.012 (0.245)
Fixed effect α_i	31.371 (0.004)***	23.087 (0.002)***	25.617 (0.000)***	26.595 (0.001)***
Observations	2 574	2 574	2574	2574
R-squared	0.173	0.208	0.222	0.217

P values in parenthesis

* significant at 10%; ** at 5% ; ***at 1%.

Dealing with model 1, which estimates de credit risk level drivers, we find that GDP growth and competitive pressure affect significantly the banks credit risk level. An increase in GDP growth seems to improve the banks' asset quality, and a more competitive environment seems to deteriorate the banks' asset quality. Accordingly, and as expected by previous studies, a positive GDP growth, decreases the creditor default risk, and so improves a bank assets' quality. Also, more the environment is competitive, more the banks will be less cautious in according financing, so they will be exposed to some higher credit risk. Nevertheless, results are not conclusive for the inflation rate impact. Concerning the microeconomic variables, results indicate as previous studies, that the bank size, impacts negatively and significantly the bank assets' quality, reflecting the fact, that more the bank is big, more it develops more expertise in managing non-performing loans. Also, for the loans volume, which seems to impact positively and significantly the bank asset quality, reflecting the positive relation documented by previous literature between the loans volume and the bank exposure to credit risk. The more the bank commits its assets to financing, the more it is exposed to credit risk. In particular, the financing volume indicates to what extent the bank is selective in distributing financing. More leverage indicates that the bank is less selective, and it is facing higher the credit risk.

Looking at the dummy variable, which differentiates between conventional and Islamic banks' credit risk level, robust estimation results indicate that the dummy variable is not a significant exogenous variable in explaining a bank credit risk. That is, and according both regressions' results, the type of the bank doesn't explain its credit risk level, and Islamic banks seem to be neither more resilient nor riskier than their conventional peers.

The Model 2 regression, estimates the bank credit risk reactions to (i) changes in both microeconomic and macroeconomic conditions, and (ii) to the interaction between the bank type and the recorded macroeconomic changes. We point out that again, the robust estimation tends to smooth credit risk sensitivities to exogenous variables and to improve their P values. Results indicate that credit risk level is significantly sensitive to GDP growth rate variation, to competitive pressure variation, to gross loans growth. That is, a deterioration in macroeconomic conditions, will negatively and heavily affect asset quality, through an increase in the non-performing loans. We should also note, that a bank credit risk responds particularly aggressively to change in GDP and to change in loans volume, which seem the main drivers of a bank asset quality. But looking at the interaction between the bank type and the macroeconomic conditions, results are no longer significant. That is, the credit risk response to changes in macroeconomic conditions seems to not depend on the bank type, in other words, the bank credit risk response, does not depend on its type.

These results refute the hypothesis that Islamic banks are more resilient and support a lower credit risk level than do their conventional peers. The characteristic of being Islamic doesn't seem to influence a bank's credit risk level nor its sensitivity to macroeconomic changes. The OLS and robust regressions suggest that the bank credit risk sensitivity is independent from its type Islamic or conventional. Both groups of banks seem to response equally to any macroeconomic change. All dummies variables coefficients are not significant (See regression 2.a and 2.b), these results are consistent with (Beck et al 2013) and Abedifar *et al* (2012) findings, who documented any significant difference between Islamic and Conventional Banks' efficiency.

Accordingly, the most important result of this paper is that to be Islamic or not, is a feature that is not decisive in determining credit risk level, nor sensitivity of the banking industry to changes in macroeconomic conditions. Moreover, the paper suggests that both Islamic and conventional banks are similarly operating within their environment in terms of underlying market and regulatory constraints. Islamic banks have developed lending structures that, while being referred to as *Shari'ah*-compliant, are in fact largely mimicking the characteristics of conventional lending products.

5. Conclusion

A large amount of research has connected the resilience of Islamic banks to the last financial and economic crisis, mainly to the underlying risk-preventive principles of Islamic finance. They argue that the Islamic

banking industry has enough mechanisms and is built on financial principles that are sufficient to ensure safety and to immunize financial institutions from common bank risks. Nevertheless, there is another set of empirical researches, which is assessing that Islamic banks are also affected by the crisis, and their relative resilience was temporary and illusory. This paper tries to examine to what extent being Islamic does matter in predicting the credit risk level, since these Islamic financial principles are simultaneously dampening and boosting risks, particularly credit risk.

To fulfill our objective we first conducted a comparison between Islamic and conventional banks credit risk evolution. The results of the study hint that during crisis both sets of banks have seen a sustained increase in credit risk level. That is, the Islamic banks did not seem to be particularly more resilient than their conventional peers. Then, through a regression approach, we examined to what extent being Islamic matters in determining a bank's credit risk (i) level, (ii) sensitivity to macroeconomic changes. The results did not show any significant role of the Islamic bank characteristic in determining credit risk level. As a conclusion, we argue that both Islamic and conventional banks are both vulnerable to their overall financial and economic context.

Such findings that disprove the expectations of many academics and practitioners, who argue that establishing an Islamic financial system would improve safety and stability, may motivate further researchers to explain the gap between the theoretical expected Islamic banks stability and the conflicting empirical findings.

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