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HAVE ISLAMIC BANKS BEEN MORE RESISTANT THAN CONVENTIONAL BANKS TO THE 2007-2008 FINANCIAL CRISIS?

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Abstract

The recent global financial crisis has induced a series of failures of many conventional banks and led to a renewal of Minsky's (1986) critics about the inherent instability of the fractional-reserve banking. In this context, many economists advocate for the return to narrow banking and/or for favoring the development of Islamic banking, supposedly more resilient to the financial crises. This paper attempts to answer empirically the following two questions: i) Have Islamic banks (IBs) been more resistant than their conventional peers (CBs) to the 2007-2008 financial crisis? ii) Could the presence of Islamic banks enhance the stability of conventional banks? These are the main findings. Before the financial crisis, IBs were more profitable than CBs. Then, in 2007-2008, only the large IBs remained more profitable than the large CBs. However, IBs became less profitable in 2009 when the crisis's pass-through to the real economy had sufficiently increased. Moreover, we show that CBs were more resistant to the crisis than IBs. Hence, IBs illustrated a degree of resilience and stability during the first (financial) wave of the crisis. However, they have been impacted during the second (real) wave because of their higher exposure to real estate and their limited reliance on risk sharing instruments. Nevertheless, we find a positive externality of large IBs on the soundness of large CBs, which could be justified by their asynchronous reactions to the crisis.

ملخص

أشعلت الأزمة المالية العالمية الأخيرة سلسلة من الإخفاقات في العديد من البنوك التقليدية، وأدى ذلك إلى تجديد نقد منسكي (1986) إزاء عدم الاستقرار المتأصل في النظام المصرفي و كسور الاحتياطات البنكية. في هذا السياق ، يدعو العديد من الاقتصاديين إلى العودة إلى المصرفية الضيقة لصالح تطوير العمل المصرفي الإسلامي، بفرض أن تكون أكثر صمودا في مواجهة الأزمات المالية. تحاول هذه الورقة اجابة السؤالين التاليين : الأول) هل كانت البنوك الإسلامية (IBS) كانت أكثر مقاومة من أقرانهم التقليدية (CBS) للأزمة المالية 2007-2008؟ ب) هل يعزز وجود المصارف الإسلامية استقرار البنوك التقليدية؟ وفيما يلى النتائج الرئيسية. قبل الأزمة المالية ، كانت البنوك الاسلامية أكثر ربحية من البنوك الاعتيادية. ثم، في الفترة 2007-2008، لم يبق سوى البنوك الاسلامية الكبرى والتي ظلت ربحية من البنوك التقليدية الكبرى. ومع ذلك، أصبحت البنوك الاسلامية الاصغر أقل ربحية في عام 2009 عندما كانت الأزمة في طريقها للمساس بالاقتصاد الحقيقي. وعلاوة على ذلك، وتبين لنا أن البنوك التقليدية كانت أكثر مقاومة للأزمة من البنوك الاسلامية. ومن هنا، يتضح أن البنوك الاسلامية على درجة من المرونة والاستقرار خلال الموجة (المالية) الأولى من الأزمة. ومع ذلك ، فقد تأثرت خلال الموجة (الحقيقية) الثانية بسبب تعرضها العالي لسوق العقارات واعتمادها المحدود على صكوك تبادل للخطر. ومع ذلك ، نجد أثر إيجابي من وجود البنوك الاسلامية الكبيرة على البنوك التقليدية الكبيرة ، والذي يمكن تبريره من ردود فعلهم غير المتزامن لهذه الأزمة.

1. Introduction

Some economists argue in the line of Minsky's (1986) theory, that the conventional banking system is inherently unstable. According to De Grauwe (2009) the reforms implemented since the 1930s in order to enhance the stability of the banking system and prevent large scale banking crises (central bank's lender of last resort role, deposit insurance mechanism, banks' capital regulation) have shown their limits. He argues that the solution is narrow banking where banks act as money market funds, which use the sight deposits they collect to buy riskless financial securities. Meanwhile, the traditional role of transforming deposits to loans should be assigned to financial firms (investment banks) involved in financial markets with close matching of the average maturities of their assets and liabilities. However, De Grauwe (2009) recognizes the difficulty to implementing this solution since it necessitates a co-operative international approach in order to avoid the free-rider problem: *"When only one or a few countries return to narrow banking, the banks of these countries will face a competitive disadvantage"*[1]. Moreover, Miles (2001) argues that the investment banks under a narrow banking system will suffer from high agency costs and provide a less stable supply of credit relative to deposit-insured banks.

According to Al Jarhi (2004) narrow banking bears similarities with Islamic banking when the relationship between savers and banks are considered. Indeed, Islamic banks (IBs) collect funds through two categories of deposits: demand deposits and investment deposits. While demand deposits are perfectly guaranteed and yield no return, investment deposits are similar to mutual fund shares. However, the two banking approaches are distinct relatively to their financing instruments. More precisely, Islamic banks have developed interest-free financing instruments based on two principles: Profit and Loss Sharing (PLS) and markup principle (Zahar and Hassan, 2001; Hassan et al., 2003).

Many economists (Khan, 1987; Ahmed, 2002; Cihak and Hesse, 2008) argue that the PLS mechanisms avoid the deterioration of IB's balance sheets in the case of difficult economic situations. Indeed, the PLS allows the IB to transfer the credit risk from its asset side to its liability side (the investment deposits). However, in practice, IBs all over the world rely more on debt-like financing on their assets side rather than PLS based financing instrument (Siddiqui, 2006). Therefore, it is interesting to analyze whether IBs were more resilient than their conventional banks (CBs) to the recent global financial crisis.

The 2007/2008 financial crises, which started as a credit shock, has induced a series of failure of many conventional banks, as witnessed by the collapse of Bear Stearns. According to the OCDE (2010) this crisis has shown that banks' funding structure is important to their resilience. More precisely, the report argues that banks relying mostly on wholesale funding (i.e. funding from other banks, money market funds, corporate treasuries and other non-bank investors) have been severely affected by the crisis. At the opposite end of the spectrum, banks, which relied mostly on depository funding, have been very resilient to the crisis. Could we extrapolate these stylized facts and conclude that IBs were more resilient to the recent financial crisis? According to Shamshad Akhtar[2], although IBs have illustrated a degree of resilience and stability, they have been impacted by the crisis because of their higher exposure to real estate and their limited reliance on risk sharing or equity based transactions.

Hasan and Dridi (2010) addressed the resilience of IBs relatively to CBs during the recent global financial crisis. They have analyzed the effects of the crisis on profitability, credit growth, asset growth and external ratings of 120 Islamic and conventional banks in 8 countries. They found that IBs' showed stronger resilience in the early stages of the crisis. However, as the crisis moved to the real economy in 2009, IBs' profitability has steeply declined relative to the CBs. They conclude that IBs contributed to financial and economic stability during the crisis, given that their

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1 De Grauwe (2009), page 23.

2 The Vice-president of the World Bank for MENA in his speech during the "Symposium on Islamic Finance in Roma: Developments in MENA region", Bank Italia, Rome, Italy, November, 11th, 2009.

credit and asset growth was at least twice as high as that of CBs. Although the study provides a useful analysis for the comparison of the effects of the financial crisis on IBs relatively to CBs, it didn't tell us much about changes in the financial stability of the two types of banks. To our knowledge, Cihak and Hesse (2008) is the only study that addressed the stability of IBs relatively to CBs in a cross-country analysis during the period 1993-2004. They found three main results: (i) small Islamic banks tend to be financially stronger than small conventional banks; (ii) large conventional banks tend to be financially stronger than large Islamic banks; and (iii) small Islamic banks tend to be financially stronger than large Islamic banks. These results were obtained by the application of the Z-score methodology.

This paper attempts to answer empirically the two following questions:

- Have Islamic banks been more resistant than their conventional peers to the 2007-2008 financial crisis?
- Could the presence of Islamic banks enhance the stability of conventional banks?

To answer these questions we use two approaches. The first one is a non-parametric analysis of the financial crisis's impact on a set of Financial Soundness Indicators (FSI) related to the banks' earnings and profitability, capitalization, asset quality, efficiency and liquidity. The second approach (based on an econometric model and the Z-score methodology) is similar to that of Cihak and Hesse (2008). Moreover, we consider the same sample, which is composed of 407 banks from 19 countries. However, we extend the analysis period to 2009, which enables us to assess the crisis's effects on the financial stability of IBs and CBs. Indeed, we consider three sub-periods: 1993-2006 (before the crisis), 2007-2008 (during the crisis) and 2009 (after the crisis). Furthermore, we control for the effect of the institutional environment by using six governance indicators compiled by Kaufmann et al. (2010).

The main findings derived from the first approach are the following. Before the financial crisis, IBs were more profitable than CBs. Then, in 2007-2008, only the large IBs remain more profitable than the large CBs. However, IBs become less profitable in 2009 when the crisis pass-through to the real economy has sufficiently increased. The most important results stemmed from the second approach are the following. Firstly, CBs tend to be financially stronger than IBs. Secondly, CBs were more resistant to the crisis than IBs. Secondly, large IBs were more resilient to the crisis than small IBs. Finally, contrarily to Cihak and Hesse (2008) we found that the presence of large IBs has a positive impact on the soundness of large CBs.

The rest of the paper is organized as follows: Section II provides an overview of the strengths and weaknesses of IBs in terms of financial stability. Section III assesses the impact of the crisis using a non -parametric approach applied to a set of soundness indicators. Section IV assesses the resilience of IBs relatively to CBs during the crisis using the Z-score risk measure and panel data analysis. Finally, Section V summarizes the main conclusions and provides policy recommendations.

2. Islamic Banks and financial stability: strengths and weaknesses

Lindgren et al. (1996) define bank soundness as the ability of the bank to withstand adverse events such as bank runs, major policy changes, financial sector liberalization and natural disaster. Hence, it reflects the bank capacity to be solvent and remain so under difficult economic conditions by means of their capital and reserve accounts. In this section we will analyse the IBs' financial soundness relatively to CBs.

2.1 Islamic Banks' Strengths

According to Bryant (1980) and Diamond and Dybvig (1983), traditional banks are inherently unstable since they are deposit-taker institutions. In fact, under ordinary circumstances, banks do not expect that all depositors demand their money back at the same time. This depends on banks' individual needs of liquidity. Thereby bank can make loans over long horizons even if all

depositors have the right to withdraw at any time, by keeping a small amount of cash in hand. Unless the individual expenditures needs are largely uncorrelated, depositors attempt to withdraw their money simultaneously. In such situation, bank cannot pay all the depositors quickly because of its illiquid assets (business, mortgage loans...). It pays the first in line while the last one will be left with nothing[3]. This uncertainty about bank's ability to repay immediately can lead to a bank run situation. Therefore, due to the maturity mismatch between assets and liabilities, healthy banks are potentially vulnerable to bank panics.

However, many argue in line of Khan (1987) that the theoretical models of Islamic banks can successfully fill the failure of conventional banks in maintaining stability. In fact, Islamic banks should separate investment funds from the demand deposits and must apply 100% reserve on the latter. Banks can either sell currency or Government Investment Certificate. Hence, demand deposits cannot participate in the creation of money because depositors don't wish to share bank risks. They want to keep it intact in order to pay their expenditures. Therefore, maintaining 100% reserve removes the risk of bank panics and promotes the payment system efficiency. Khan (1987) has explained that Islamic banking model isn't unfamiliar with the economic literature; Simons (1948) and Friedman (1969) have already suggested a similar banking model to avoid bank runs.

The PLS principle plays also a critical role in keeping financial stability. As a financial intermediary institution between capital surplus and capital deficit agents, Islamic banks channel investment deposits into PLS loan (Mudharabah and Musharakah). Given that neither the principal nor the return of the investment deposits are guaranteed, any loss occurred on the asset side is totally absorbed on the liability side. Thus, if the value of assets decreased, the value of the liabilities decreased respectively. Therefore, the PLS principle allows the bank to maintain its net worth under difficult economic situations. (Khan, 1987; Ahmed, 2002; Syed, 2007; Cihak and Hesse, 2008). Finally, Ahmed (2002) argues that the prohibition of Riba and the linkage with the real economy principle could prevent the financial crises. In fact, financial assets and derivatives based on other debt financial assets cannot be traded. So, there is no place for speculative behaviour that leads to instability like what is happen in the last U.S subprime crisis.

2.2 Islamic Banks' Weaknesses

IBs may lose their comparative advantages against their conventional peers due to the deviations of the current practices from the theoretical model. In particular, the mimicking of CBs may raise multiple risks that are not assumed to be for IBs. The first deviation is in the composition of balance sheet. In a typical IB, more than 80% of total assets are fixed income and short-term maturity assets. While, only 20% are dedicated to long-term and risk sharing investments. El-Hawary (2007) and Greuning and Iqbal (2008) claim that the dominance of less risky, low return assets deprives the bank of the benefits of portfolio diversification, as Mudarabah and Mushrakah contracts are more profitable. Analysts explain this behaviour by the fact that sale-based transactions are less associated with moral hazard and adverse selection problems than PLS investments (Siddiqi, 2006). In fact, the latter need additional effort to capture good investment opportunities and to analyse projects adequately. Besides, Islamic banks cannot request for collateral to reduce credit risk. Thus, risk-sharing investments require a high level of confidence and transparency between investors, banks and depositors.

The second divergence with the Islamic banking theory is in the income distribution. In some cases, the Islamic banks distribute profits to the investment depositors even when they accrue loss, so the profits are paid out of equity. This phenomenon is the displaced commercial risk (El-Hawary, 2007; Greuning and Iqbal, 2008). Therefore, the current practices don't make a clear differentiation between shareholders and investment account holders' rights'. Finally, IBs may not fully respect Shariah principles in their activities. Such behaviour makes them vulnerable to risks

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3 Depositors may demand their deposits only because they expect that other depositors do so. Then, all depositors have the incentive to be the first in line to make withdraws.

normally born by the peers. For instance, Chong and Liu (2009) claim that Malaysian banks are not very different from traditional banks in the adoption of the PLS principle.

3. Non-parametric analysis of the financial crisis effects on IBs and CBs soundness Indicators

3.1 Methodology, variables definitions and data

In this section, we try to analyse the financial crisis effect on IBs and CBs soundness indicators belonging to the following categories (capital adequacy, earnings and profitability, asset quality, efficiency and liquidity). More precisely, we perform inter-temporal and inter-bank comparisons, using the equality of mean test (Samad, 2004; Ika, 2008). The inter-temporal comparison is useful in order to know how the IBs and CBs behave before (1993-2006), during (2007-2008) and after (2009) the recent global financial crisis[4]. As for the inter-bank comparison it enables us to compare banks' indicators between the two categories of banks during each sub-period separately. Most of the indicators we consider are part of IMF Financial Soundness Indicators[5] (FSI) and will be presented consecutively.

- Capital Adequacy: It is measured by the *Capital to asset ratio*. According to Blejer et al. (1997), banks operate most effectively when they have a reasonable level of capitalization (capital to risk-weighted assets ratio) and a satisfactory level of solvency and liquidity. Hence, higher the capital ratio, stronger is the bank. Empirically, Gaganis et al. (2006) suggest from a sample of 894 CBs from 97 countries, that capitalization, asset quality and market where banks operate are the most important criteria for identifying the bank's soundness. Capitalization in Islamic banking has been the subject of conflicting opinions. On the one hand, due to the originality of investment deposit accounts, IBs do not need to maintain a high capital ratio. On the other hand, a high level of shareholders' equity is desirable in order to reduce conflict of interest between owners and investment deposit holders. Further, Ainley (2000) considers that regulators should impose higher capital ratio for Islamic banks since assets are long term and illiquid.

- Earning and profitability: Banks cannot be permanently solvent if they are not profitable. High earnings are necessary to implement investments and make full provision for the absorption of losses. Maechler et al. (2007) show that profitability is negatively related to the probability of insolvency. From among the mostly used profitability indicators we will use the following two measures: Return On Average Assets (ROAA) and Return On Average Equity (ROAE)[6]. Using six profitability ratios, Olson and Zoubi (2008) find that Islamic banks are more profitable than conventional banks.

- Asset Quality: High levels of assets that are not generating income reduce the bank's capacity to honor its liabilities. Using PEA (provision to earnings assets) and APL (adequacy of provision for loans) as indicators of asset quality in a sample of 237 observations for banks operated in the GCC region over the period 2000-2005, Olson and Zoubi (2008) find that IBs maintain lower provisions for possible loans losses than CBs. This can be explained by two ways: either IBs concentrate their activities on less risky contracts, or they operate with greater risk. Factors that provoke high-level non-performing loans constitute the focus of the investigation of Boudriga et al. (2010). In a sample of 59 countries over the period 2002-2006, they find that higher capital adequacy ratio and prudent provisioning policy lead to lower rate of non-performing loans. Moreover, banking market concentration and the presence of foreign banks' ownership are probably associated with low level of bad loans.

- Although, Asset classification and provisioning entail much more than simply looking at amounts overdue, Loan Loss Provision and Non-performing Loans to gross loans are often used as a proxy for asset quality of an individual bank. In this paper we consider the following

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4 We distinguish between the first wave of the world financial crisis and its economic wave starting from 2009.

5 See Financial Soundness Indicators Compilation Guide, IMF (2006).

6 These measures should not be interpreted separately from other bank characteristics such as capital structure.

proxies of asset quality: *Net loans to total assets* (NL/TA)*, Net loans to deposits* (NL/D)*, Non performing loans to gross loans* (NPL/GL)*, Loan loss provision to net interest revenue* (LLP/NIR)[7].

▪ Liquidity: *Liquid assets to total assets ratio, Liquid assets to deposits ratio* are the two measures of liquidity we consider in this paper. Liquid assets refer to cash and its equivalents that are easily convertible to cash at any time without significant losses.

▪ Efficiency: *Cost to income ratio* is used as a proxy of efficiency. It measures the bank's operating costs (salaries, technology, administrative expenses, etc.) as a proportion of its total income.

These 10 ratios are calculated using bank balance sheets, which were drawn from the Bankscope database, provided by Bureau Van Dijk. In this study, we focused only on fully-fledged Islamic and conventional banks and we used unconsolidated bank statements whenever consolidated statements are not available. Our sample is constituted of 64 IBs and 343 CBs from 19 countries[8] where IBs' assets account more than 1% of the total banks' assets at least in one year in the period of analyse (1993-2009).

3.2 Results

Capital Adequacy

Figure 1 illustrates the evolution of the capital to asset ratio between the three sub- periods for Islamic and conventional banks. For IBs, the capital to assets ratio decreased from 23.21% before the crisis to 18.52% during the crisis period and continued to drop down to 16.52% in 2009. As shown in Table 2 there is a significant difference between the ratio's levels before and after the crisis. However, for the CBs the capital to asset ratio seems to be constant during the three sub-periods. The t-test of equality of means provided in Table 3 shows that the 2007-2008 financial crisis did not affect the level of capitalization of CBs as a pool. However, capital to assets ratio of the large CBs increased significantly after the crisis.

Table 4 shows that during the pre-crisis and the crisis periods, the capital to assets ratio for IBs was larger than for CBs at the 1% level of risk and only at the 10% level in 2009. Thus, according to this indicator, IBs have higher level of solvency.

Earnings and Profitability

Figures 2 shows that the mean of ROAA for IBs *(CBs)* varies between 4.06 (*1.78*) and -1.15 (-*7.95*) over the period of study. The lowest points were attained in (1997-1998) which correspond to the East-Asian financial crisis. The ROAA for IBs decreased significantly after the financial crisis passing from 2.87 in 2007 to -1.06 in 2009. Concerning the ROAA for CBs, it recorded a slight decrease since 2007, but it was stable on average (Table 3). Figure 3 shows that the mean of ROAE for IBs (*CBs*) varies between 30.57 (*18.61*) and -6.14 (-*4.45*) over the period of study. The lowest points were attained simultaneously in 1999. The ROAE for IBs increased significantly in 2007 (it was in order of 14.53 against 4.53 in 2006). Since 2008, The ROAE for both IBs and CBs had decreased significantly (Tables 2 and 3).

Table 5 shows that before the crisis, IBs were more profitable (ROAA) at the 10% level of risk. This result confirms the findings of the previous researches such as Olson and Zoubi (2008). However, there is no significant difference in the profitability between the two types of banks during the crisis period. But if we focus on the bank size criteria (table 6), we note that large IBs (total assets > 1 billion $) were more profitable than large CBs during the same period. This result

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7 For Islamic banks, the net interest revenue is defined as the sum of the positive and negative income flows associated with the PLS arrangements.

8 Bahrain, Bangladesh, Brunei, Egypt, Gambia, Indonesia, Iran, Jordan, Kuwait, Malaysia, Mauritania, Pakistan, Palestinian Territory, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates and Yemen.

suggests that large IBs resisted more during the crisis but they quickly lost this advantage since IBs become less profitable in 2009.

Asset Quality

Figures 4 and 5 show that Net Loans to Total Assets ratio (NL/TA) for IBs declined from 50.33% to 48.98% in the financial crisis period, then it grew to be in order of 52.79%. Similarly, Net Loans to Deposits ratio (NL/D) slipped from 88% to 85% in the financial crisis years (2007-2008), and then it went up to 92.27%. Focusing now on the CBs, the NL/TA increased constantly from 52.74% to 53.92% and 54.77% during and after the financial crisis, respectively. In contrast, the NL/D decreased from 77% in (1993-2006) to 72% in 2009. The Nonperforming Loans to Gross Loans ratio (NPL/GL) decreased during 2007-2008 and increased in 2009 for both IBs and CBs. The Loan Loss Provision to Net interest Revenue ratio (LLP/NIR) had fallen from 26.11% to 19.19% in the (2007-2008) period, then it increased sharply in 2009 to attain 62.61%. However, for the CBs the LLP/NIR increased during the crisis and decreased in 2009. Thus we could say that that the provisioning behaviour of CBs is forward-looking whereas IBs increased their provisioning in response to the increasing of NPL/GL.

Table 7 shows that before and during the financial crisis, NL/TA is significantly larger for the CBs. Therefore, IBs are less prone to credit risk. Concerning the intermediation activity, NL/D is larger for IBs over the period of study. Indeed, the IBs of our sample convert a high proportion of their deposits (more than 80%) in loans. Concerning the CBs they look for more liquidity by investing a large amount of their deposits in liquid instruments. Before the financial crisis, NPL/GL is smaller for IBs. This can explain why IBs were more profitable in this period of time. Besides, the LLP/NIR is significantly different between the two types of banks during and after the financial crisis period.

Efficiency

Figure 8 provides a comparison of the efficiency ratio between Islamic and conventional banks. IBs had a higher efficiency ratio (more than 60%) in the three sub-periods. However, the CBs appeared more efficient (about 50%). Depending on the results reported Tables 2 and 3, the global financial crisis didn't affect significantly the efficiency level neither for Islamic nor for conventional banks. From Table 8 it is clear that before and during the financial crisis, IBs were less efficient than the CBs at the 1% and 5% level of risk respectively. This result is in line with the results of Hammim et al. (2006) and Cihak and Hesse (2008).

Liquidity

Figures 9 and 10 show that the liquid assets to total assets ratio (LA/TA) and liquid assets to deposits (LA/D) decreased during and after the financial crisis for CBs. Table 9 shows that before and during the crisis LA/TA is larger for CBs at 1% and 10% level of risk respectively. In contrast to CBs, the decreasing of liquidity of IBs occurs after the financial crisis. This result confirms the existence of a different channel of transmission of the financial crisis to IBs. It is well known that the CBs of developing countries were exposed to liquidity problems namely on the international interbank market.

4. Have IBs been more resistant than CBs to the 2007-2008 financial crisis? A Panel data analysis

4.1 Methodology and variables definitions

The second approach of our analysis focuses on calculating the Z-score ratio as a proxy for the individual bank's financial soundness. It is denoted as follows: $Z = (\mu + K)/\sigma$ where μ denotes the bank's average return on assets (ROA), K the equity capital in percent of total assets and σ *is* the standard deviation of the ROA as a proxy for return volatility. Z-score is a popular measure of bank soundness since it is inversely related to the probability of bank's insolvency. A higher Z-

score corresponds to a lower upper bond of insolvency risk. Indeed, the probability of insolvency is defined as the probability that losses π exceed equity E i.e.

$$P[\pi \leq -E] = P[ROA \leq -K] = \int_{-\infty}^{-K} f(ROA)\, d(ROA)$$

According to De Nicolo (2001),

$$P[ROA \leq -K] \leq \frac{\sigma^2}{(\mu + K)^2} = \frac{1}{z^2}$$

Under the assumption of normality of bank's return, the z-score can be interpreted as the number of standard deviations below the mean by which profits would have to fall in order to deplete equity. We construct the Z-score for each bank i at time t in country j. Based on panel data analysis, we estimate an extend version of Cihak and Hesse (2008)'s econometric model that controls for the bank specific variables, industry specific variables and macroeconomic variables:

$$Z_{i,j,t} = \alpha + \beta_1 B_{i,j,t-1} + \delta T + \beta_2 I_{j,t-1} + \sum \gamma_s T_s I_{i,j,t-1}$$
$$+ \beta_3 M_{j,t-1} + \sum \theta_j C_j + \sum \varphi_s T_s P + \varepsilon_{i,j,t}$$

Table 10 presents the variables' definition and data sources. In order to examine the first hypothesis **(H1)** *IBs are stronger than the CBs*, we include a dummy variable (T) that takes the value of 1 if the bank in question is Islamic, 0 if it is conventional. For instance, if IBs are less strong, the dummy variable should take a negative sign in the regression analysis. Second, we would like to test the second hypothesis (H2): *the presence of IBs enhances the stability of conventional banks*. For this purpose, we calculate the share of IBs in terms of total assets for each year and country and interact it with conventional and Islamic dummy variables respectively (T_1 and T_2). Then, we focus on the third hypothesis (H3): *IBs were more resistant to the 2007-2008 financial crisis than CBs*. We include a dummy variable (P) that takes value of 1 if the year in question belongs to the crisis period, and interact it with both Islamic and conventional banks dummies.

When examining the banks' financial soundness, it is imperative to control for macroeconomic variables (GDP growth rate, inflation rate, and exchange rate depreciation). We also have to control for the institutional environment. To this end we construct index (per year and country) by averaging the 6 following governance indicators compiled by Kaufmann et al. (2010): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. To take into account the impact of market concentration on the financial stability, we use the Herfindahl-Hirschman Index (HHI)[9]. The model includes also the country dummies variables (C_j) in order to reveal the potential role of country-specific unobserved factors in maintaining banking stability.

The above linear model is conducted using the Random-Effect Generalized Least Squares estimation to test our three hypotheses. Based on unbalanced panel data, three models are analysed: none effect model, fixed effect model and random effect model. The best model is selected based on the Hausman test. To overcome the problem of heteroscedasticity in the data, we perform a robust regression technique. In order to capture possible past effect, we lag by one year all the bank specific and macroeconomic variables, the Herfindahl-Hirschman Index and the interaction of Islamic banks' share with Islamic and conventional banks dummies. We test the lagged effect by comparing estimation using lagged variables with estimation using contemporaneous variables.

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9 Defined as the sum of squared market share in terms of total assets of all banks in the country.

4.2 Results

Pairwise Comparisons

Table 11 indicates, firstly, that the Z-score displays a high variation for both IBs and CBs across countries and over time. It is from -11,75 *(-8,13)* to 1014,93 *(300, 87)* for the conventional *(Islamic)* banks. Further, the means of the Z-score are equals for the two groups of banks. They are of the order of 23. Moreover, Tables 12 (a) and 12 (b) show that there is no significant difference in the bank's financial soundness between Islamic and conventional banks.

According to Cihak and Hesse (2008), the high variability of the Z-score reflects the presence of outliers, which have an important effect on the results. So, we opt to exclude the 1st and 99th percentile from the z-score's distribution and repeat the pairwise comparisons. The data analysis suggests, therefore, that IBs are less strong than CBs during the three sub-periods (before, during and after the 2007-2008 financial crisis). In fact Table 12 shows that for the distribution excluding the 1st and 99th percentile, Z-scores of CBs are higher on average than those of IBs.

Figure 11 illustrates the trend for the Z-score for the IBs and CBs. In (1993- 2000) period, there is a decrease in the mean of Z-score index for the two groups of banks; and IBs tend to be financially stronger than CBs. After 2000, the mean of Z-score for CBs improves and become larger than for IBs. Apparently, the 2007-2008 financial crisis has not had an important effect on the banks' financial stability, since there is a slight decrease in our focal variable for the two categories of banks. Furthermore, small IBs tend to be financially stronger than large IBs over the period of financial stability (1993-2006) (Table 12 (a) and fig 12). We obtain similar results as Cihak and Hesse (2008). Yet, this relationship is reversed during and after the financial crisis period. Small IBs become less strong than large IBs (Table 12 (b) and fig 12).

Regression Results

The regressions analyses (table 13) confirm the results of the pairwise comparison of Z-score that bank stability decreases with size. The sign of Islamic dummy variable is always negative and significant at the 10 percent level in the regressions (2), (6) and (8). As a result, the first hypothesis is rejected. IBs are less financially stable than CBs. Concerning the bank specific variables, the net loans to total assets ratio does not appear significant in all regressions, except (8). The slop coefficient of the cost to income ratio is consistently negative. The more efficient banks are more financially stable (significant at the 1 percent level). Additionally, the higher diversification from traditional lending activities to other activities damages the small banks' financial stability (see (10) and (12) specifications). For the second hypothesis, the presence of large IBs in a banking system has a positive impact on the z-score of large CBs (specification (7)), whereas the entrance of small IBs lowers the financial stability of small CBs (specification (11)).

Governance has a positive impact on large banks' financial stability (see estimation (5)). In all the estimations where HHI is entered show that HHI is negatively correlated with the z-score. Hence, concentrated markets seem to be more prone to financial fragility. Focusing now on the effect of the macroeconomic variables on banking risk, we note that GDP growth is positively related with Z-score (specifications (4) and (12)). Exchange rate depreciation and inflation have not a clear linear dependence with banks' financial stability. Concerning the country's role in achieving financial stability, the results show that bank stability is better in Tunisia, Qatar, Malaysia and Brunei (see table (14)).

Finally, the regression analysis confirms the findings of the pairwise comparisons of the Z-score during the crisis period. Firstly, CBs were more resistant to the 2007-2008 financial crisis than IBs (H3) (see the specification (1) and (4)). Then, small IBs were negatively affected by the financial crisis comparing to the large IBs (estimation (9), (10), (11) and (12)).

5. Conclusion

The recent global financial crisis has induced a series of failures of many conventional banks and led to a renewal of Minsky (1986)'s critics about the inherent instability of the fractional-reserve banking. In this context, many economists advocate for the return to narrow banking and/or for favoring the development of Islamic banking supposed to be more resilient to the financial crises.

This paper attempted to answer empirically the two following questions:

- Have Islamic banks (IBs) been more resistant than their conventional peers (CBs) to the 2007-2008 financial crisis?
- Could the presence of Islamic banks enhance the stability of conventional banks?

To answer these questions we used two approaches. The first one is a non-parametric analysis of the financial crisis's impact on a set of Financial Soundness Indicators (FSI) related to the banks' earnings and profitability, capitalization, asset quality, efficiency and liquidity. The second approach (based on an econometric model and the Z-score methodology) is similar to that of Cihak and Hesse (2008). Moreover, we considered the same sample, which is composed of 407 banks from 19 countries. However, we extend the analysis period to 2009, which enables us to assess the crisis's effects on the financial stability of IBs and CBs. Indeed, we considered three sub-periods: 1993-2006 (before the crisis), 2007-2008 (during the crisis) and 2009 (after the crisis). Furthermore, we controlled for the effect of the institutional environment by using six governance indicators compiled by Kaufmann et al. (2010).

The main findings derived from the first approach are the following. Before the financial crisis, IBs were more profitable than CBs. Then, in 2007-2008, only the large IBs remain more profitable than the large CBs. However, IBs become less profitable in 2009 when the crisis pass-through to the real economy has sufficiently increased. The most important results stemmed from the second approach are the following. Firstly, CBs tend to be financially stronger than IBs. Secondly, CBs were more resistant to the crisis than IBs. These results confirm that in practice, IBs all over the world rely more on debt like financing on their assets side rather than PLS based financing instrument (Siddiqui, 2006). Indeed, the PLS mechanisms would have enabled the IBs' to avoid the deterioration of their balance sheets in 2009. Thus, IBs should decrease their exposure to the real estate and rely more on risk sharing instruments.

Additionally, our results showed that large IBs were more resilient to the crisis than small IBs. Therefore, this result suggests that small Islamic banks should increase their size (by mergers and acquisitions for example) to enhance their resistance to the financial crisis.

Finally, contrarily to Cihak and Hesse (2008) we found that the presence of large IBs has a positive impact on the soundness of large CBs. This result could be justified by the asynchronous reactions to the crisis of IBs and CBs, which certainly enhances the overall stability of a banking system.

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Appendix

Figure 1: Comparison of Capital to Assets ratio
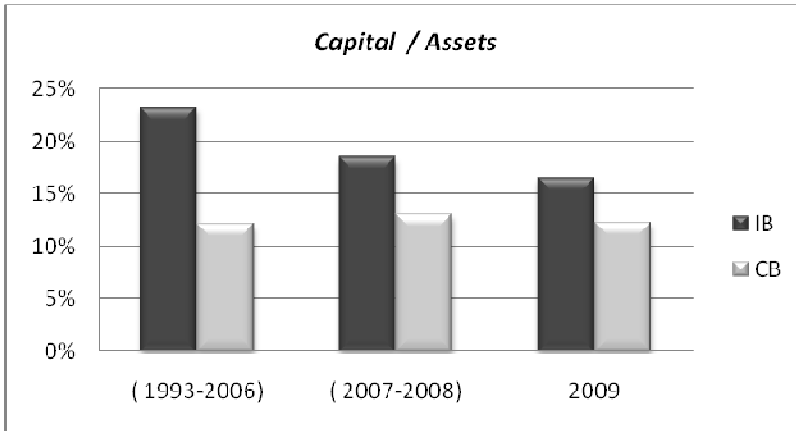
Figure 2: Trend of ROAA
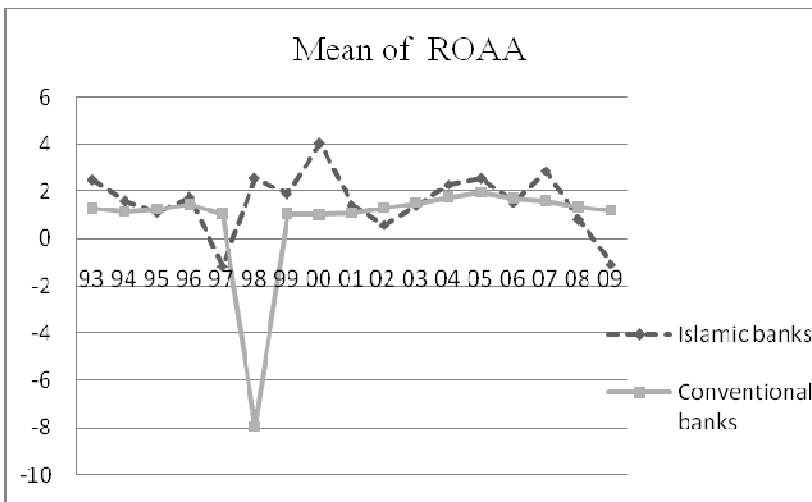
Figure 3: Trend of ROAE
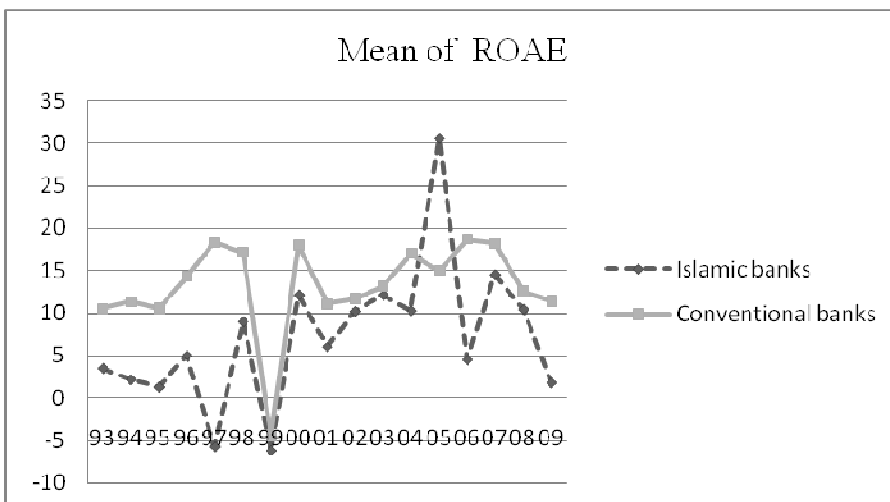
Figure 4: Comparison of Net loans to Total Assets ratio
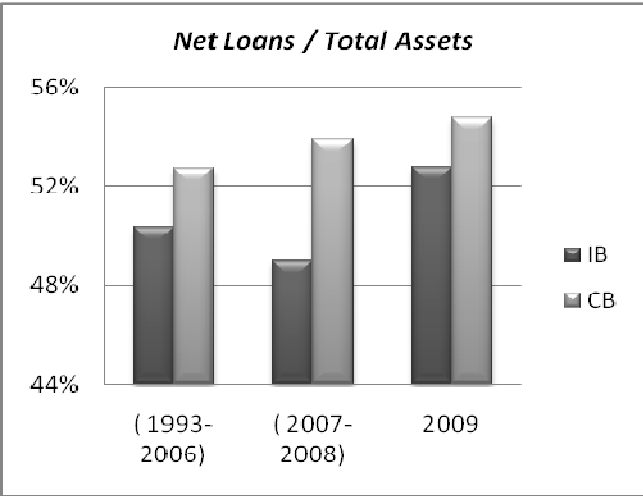
Figure 5: Comparison of Net loans to Deposits ratio
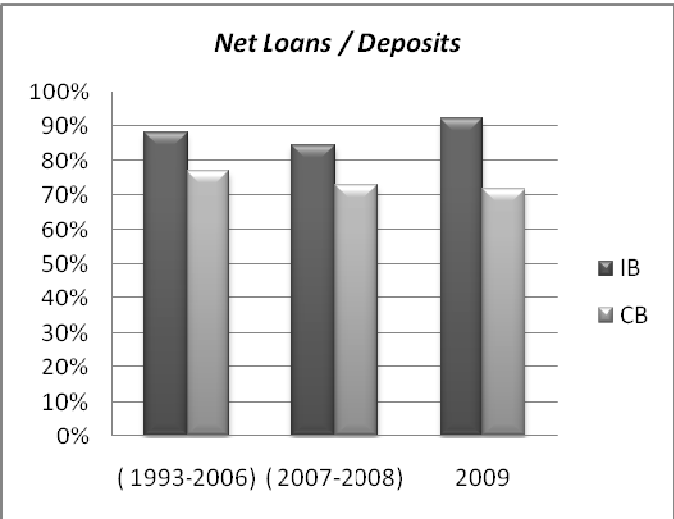
Figure 6: Comparison of Nonperforming Loans to Gross Loans Ratio

Figure 7: Comparison of Loan Loss Provision to Net Interest Revenue

Figure 8: Comparison of Cost to Income Ratio

Figure 9: Comparison of Liquid Assets to Total Assets Ratio

Figure 10: Comparison of Liquid Assets to Deposits Ratio

Figure 11: Trend of Z-score
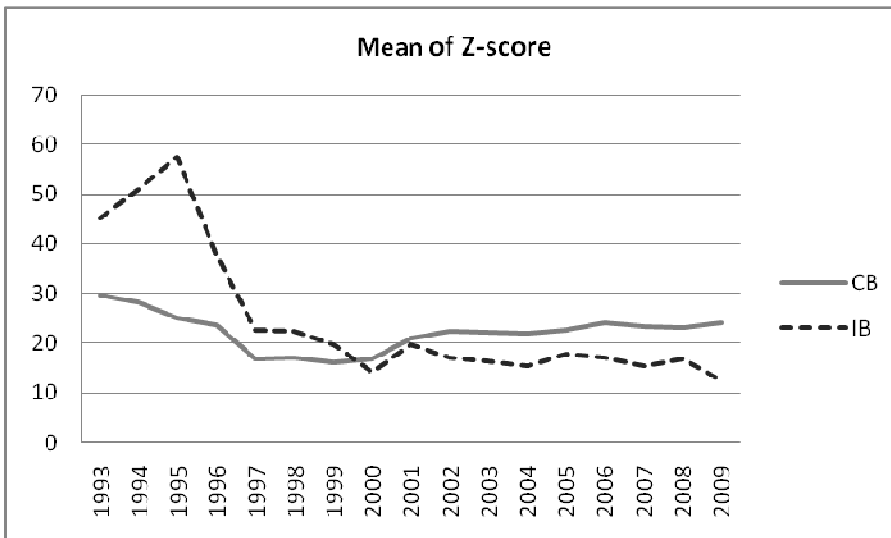
Figure 12: Comparison of Average Z-score
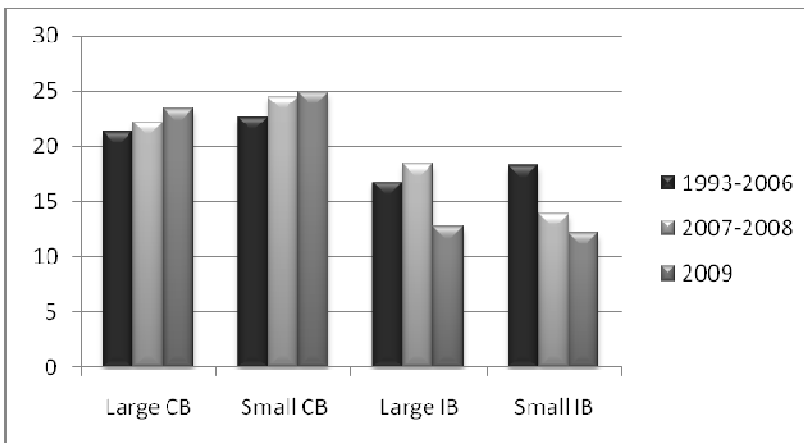
Table 1: Descriptive Statistics of the Soundness Indicators for Islamic and Conventional Banks

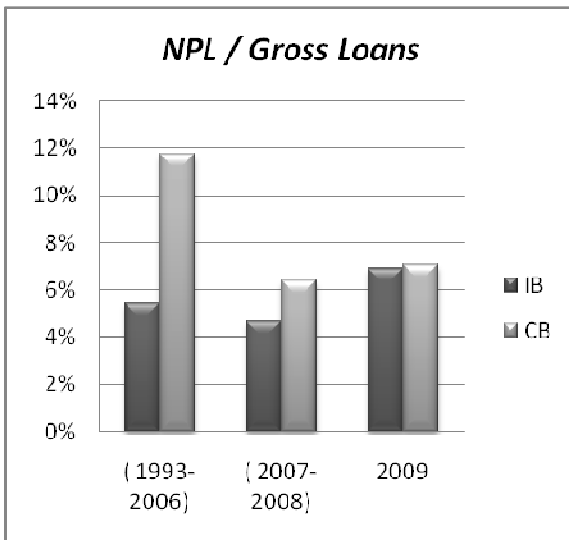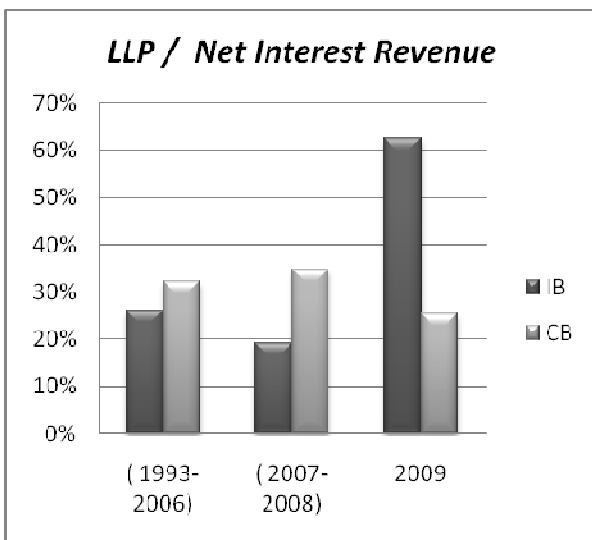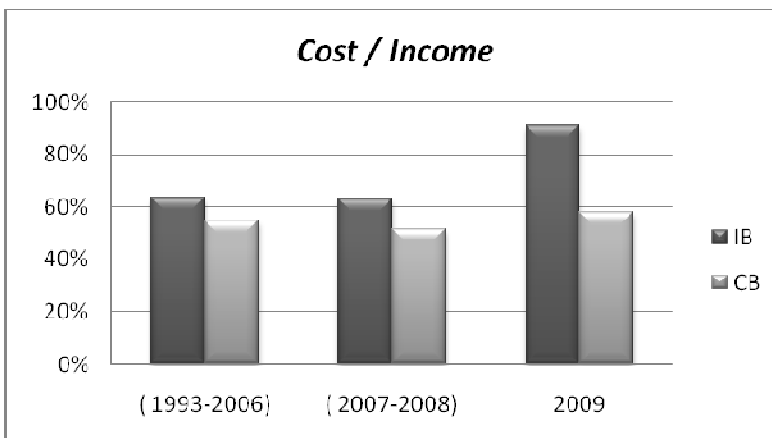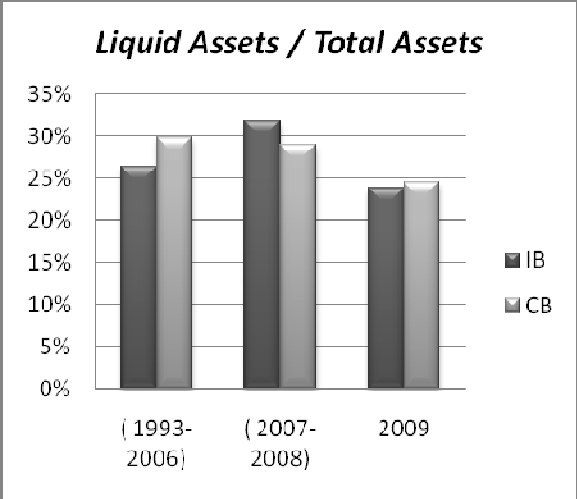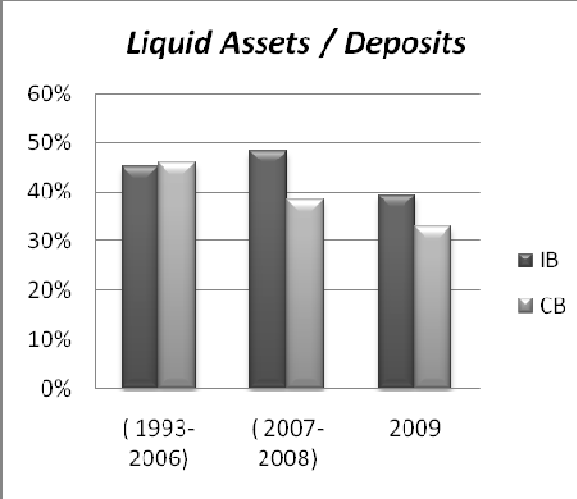|	Pre-crisis period (1993-2006)					Financial Crisis period (2007-2008)					Post-crisis period (2009)			
	N	Mean	Std	Min	Max	N	Mean	Std	Min	Max	N	Mean	Std	Min	Max
Capital Adequacy															
Capital / Assets															
IBs	311	**23.21**	27.28	-42.91	100	109	**18.52**	20.91	-47.4	99.64	35	**16.52**	14.96	4.49	90.04
CBs	1817	**12.10**	11.9	-76.39	123.5	462	**13.05**	11.85	-12.04	99.78	157	**12.3**	8.46	-6.37	64.22
Earnings and Profitability															
ROAA															
IBs	307	**1.781**	6.632	-69.72	53.09	109	**1.865**	5.526	-30.07	30.84	35	**-1.06**	6.76	-28.41	4.96
CBs	1803	**1.172**	5.611	-113.2	71.32	462	**1.492**	2.371	-15.47	20.47	157	**1.21**	1.8	-7.53	7.36
ROAE															
IBs	307	**12.01**	56.97	-573.3	736.67	109	**12.51**	14.35	-48.85	63.15	35	**1.842**	24.7	-104	43.17
CBs	1793	**13.9**	53.3	-975.3	698.14	459	**15.33**	45.97	-250.2	850.2	157	**11.36**	6.22	-94.33	42.85
Asset Quality															
NPL / Gross loans															
IBs	57	**5.427**	6.71	0.29	39.47	46	**4.675**	4.7	0.04	22.25	18	**6.88**	3.96	1.29	13.62
CBs	973	**11.76**	15.78	0	216	306	**6.38**	10.07	0.13	80.15	108	**7.05**	8.74	0.55	59.4
LLP / Net Interest Revenue															
IBs	202	**26.11**	63.54	-550	313.8	83	**19.19**	26.85	-41.08	146.4	30	**62.61**	122.1	-7.38	615
CBs	1638	**32.14**	98.68	-158.6	1111.9	430	**34.76**	93.28	-158.6	925.8	148	**25.35**	55.78	-397.3	303.53
Net Loans / Total Assets															
IBs	304	**50.33**	22.66	0	97.4	109	**48.98**	20.31	1.99	98.92	34	**52.79**	17.61	1.77	83.44
CBs	1799	**52.74**	19	0	144.04	458	**53.92**	17.59	0.5	93.31	157	**54.77**	14.56	4.48	78.46
Net Loans / Deposits															
IBs	283	**88.12**	110.01	0	936.94	105	**84.7**	97.82	3.28	743.1	34	**92.27**	88.36	2.62	435.68
CBs	1788	**76.95**	64.88	0	906.63	455	**72.94**	45.86	0.96	626.1	157	**71.76**	37.7	9.29	470.07
Efficiency															
Cost / Income															
IBs	289	**63.63**	51.11	7.69	560	104	**62.89**	55.55	11.39	456.32	33	**91.27**	160.7	4.15	950
CBs	1755	**54.81**	42.84	0.59	873.58	456	**51.37**	39.96	0	425.84	156	**58.14**	83.68	4.43	826.17

	Pre-crisis period (1993-2006)					Financial Crisis period (2007-2008)					Post-crisis period (2009)			
	N	Mean	Std	Min	Max	N	Mean	Std	Min	Max	N	Mean	Std	Min	Max
Liquidity															
Liquid Assets / Total Assets															
IBs	320	**26.38**	17.08	0.086	85.64	109	**31.72**	80.91	0.68	859.32	35	**23.77**	12.79	0.8	62.19
CBs	1818	**29.75**	20.56	0.015	360.75	462	**28.87**	37.68	0.694	727.7	156	**24.45**	20.64	3.62	220.58
Liquid Assets / Deposits															
IBs	281	**45.2**	48.6	1.48	551.39	105	**48.35**	63.59	1.42	569.57	35	**39.37**	37.74	4.75	194.22
CBs	1807	**45.82**	63.42	0.02	898.6	459	**38.33**	41.13	0.86	470.15	157	**32.92**	45.16	4.8	469.6

Table 2: Bank Soundness Indicators of IBs before and after 2007-2008 Financial Crisis

Indicators	Before the 2007-2008 financial crisis			After the 2007-2008 financial crisis			t-test for equality of means	
	N	Mean	Std	N	Mean	Std	t-value	p-value
capital / assets	311	23.21	27.28	35	16.52	14.96	2.25	**0.013**
capital / assets (large banks)	101	17.14	19.78	22	15.66	8.75	0.547	0.292
capital / assets (small banks)	210	26.13	29.84	13	17.98	22.29	1.250	0.115
Total assets (Mill $)	316	1478.659	3448.699	35	6122.269	10646.81	-2.55	**0.007**
ROAA	307	1.781	6.632	35	-1.062	6.7602	2.363	**0.008**
ROAE	307	12.01	56.97	35	1.842	24.76	1.918	**0.029**
NPL/GL	57	5.42	6.71	18	6.88	3.96	-1.133	0.131
LLP/ NIR	202	26.11	63.54	30	62.61	122.1	-1.605	**0.059**
NL/TA	304	50.33	22.66	34	52.79	17.61	-0.749	0.228
NL/D	283	88.12	110.01	34	92.27	88.36	-0.251	0.401
Cost/Income	289	63.63	51.11	33	91.27	160.69	-0.982	0.166
Liquid Assets / Total Assets	320	26.38	17.08	35	23.77	12.79	1.101	0.138
Liquid Assets / Deposits	281	45.2	48.6	35	39.37	37.74	0.831	0.205

Notes: The t-test of equality of means is based on the mean in the pre-crisis period minus that in the post-crisis period The test is calculated assuming unequal variances.

Table 3: Bank Soundness Indicators of CBs before and after 2007-2008 Financial Crisis

Indicators	Before the 2007-2008 financial crisis			After the 2007-2008 financial crisis			t-test for equality of means	
	N	Mean	Std	N	Mean	Std	t-value	p-value
capital / assets	1817	12.10	11.9	157	12.3	8.46	-0.276	0.608
capital / assets (large banks)	614	10.15	7.387	103	11.45	6.74	-1.782	**0.038**
capital / assets (small banks)	1203	13.09	13.53	54	13.92	10.92	-0.537	0.296
Total assets (Mill $)	1807	2707.024	7031.958	156	8881.973	15658.74	-4.883	**0.000**
ROAA	1803	1.172	5.611	157	1.21	1.8	-0.194	0.577
ROAE	1793	13.9	53.3	157	11.368	16.22	1.402	**0.08**
NPL/GL	973	11.76	15.78	108	7.05	8.74	4.791	**0.000**
LLP/ NIR	1638	32.14	98.68	148	25.35	55.78	1.307	**0.096**
NL/TA	1799	52.74	19	157	54.77	14.56	-1.628	**0.052**
NL/D	1788	76.95	64.88	157	71.76	37.7	1.536	**0.062**
Cost / Income	1755	54.81	42.84	156	58.14	83.68	-0.492	0.311
Liquid Assets / Total Assets	1818	29.75	20.56	156	24.45	20.64	3.07	**0.001**
Liquid Assets / Deposits	1807	45.82	63.42	157	32.92	45.16	3.306	**0.000**

Notes: The t-test of equality of means is based on the mean in the pre-crisis period minus that in the post-crisis period. The test is calculated assuming unequal variances.

Table 4: t-tests of the Equality of Means of the Capital to Asset Ratio

Period	N		Mean		Std		t-test for equality of means	
	CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	1817	311	12.10	23.21	11.90	27.28	-7.067	**0.000**
(2007-2008)	462	109	13.05	18.52	11.85	20.91	-2.632	**0.004**
2009	157	35	12.3	16.52	8.46	14.96	-1.611	**0.057**

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 5: t-tests of the Equality of Means of the Profitability Ratios

Period	Indicators	N		Mean		Std		t-test for equality of means	
		CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	ROAA	1803	307	1.17	1.78	5.61	6.63	-1.52	**0.064**
	ROAE	1793	307	13.9	12.01	53.3	56.97	0.54	0.294
(2007-2008)	ROAA	462	109	1.49	1.86	2.37	5.52	-0.69	0.245
	ROAE	459	109	15.33	12.51	45.97	14.35	1.10	0.134
2009	ROAA	157	35	1.21	-1.06	1.8	6.76	1.97	**0.028**
	ROAE	157	35	11.36	1.84	16.22	24.76	2.17	**0.017**

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 6: t-tests of the Equality of Means of the ROAA for Large Banks

Period	Indicators	N		Mean		Std		t-test for equality of means	
		CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	ROAA	605	101	1.56	1.65	2.48	4.63	-0.177	0.429
(2007-2008)	ROAA	249	53	1.45	2.89	2.16	3.18	-3.149	**0.001**
2009	ROAA	103	22	1.38	-0.47	1.05	6.61	1.318	0.1007

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 7: t-tests of the Equality of Means of the Asset Quality Ratios

Period	Indicators	N		Mean		Std		t-test for equality of means	
		CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	NL/TA	1799	304	52.74	50.33	19	22.66	1.754	**0.04**
	NL/D	1788	283	76.95	88.12	64.88	110.01	-1.663	**0.048**
	NPL/GL	973	57	11.76	5.42	15.78	6.71	6.193	**0.000**
	LLP/ NIR	1638	202	32.14	26.11	98.68	63.54	1.183	0.118
(2007-2008)	NL/TA	458	109	53.92	48.98	17.59	20.31	2.341	**0.01**
	NL	455	105	72.94	84.7	45.86	97.82	-1.201	0.116
	NPL/GL	306	46	6.385	4.675	10.07	4.7	1.896	**0.03**
	LLP/ NIR	430	83	34.76	19.19	93.28	26.85	2.895	**0.002**
2009	NL/TA	157	34	54.77	52.79	14.56	17.61	0.611	0.272
	NL/D	157	34	71.76	92.27	37.7	88.36	-1.327	**0.096**
	NPL/GL	108	18	7.05	6.88	8.74	3.96	0.135	0.446
	LLP/ NIR	148	30	25.35	62.61	55.78	122.1	-1.637	**0.055**

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 8: t-tests of the Equality of Means of the Cost to Income Ratio

Period	N		Mean		Std		t-test for equality of means	
	CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	1755	289	54.81	63.63	42.84	51.11	-2.779	**0.002**
(2007-2008)	456	104	51.37	62.89	39.96	55.55	-2	**0.023**
2009	156	33	58.14	91.27	83.68	160.69	-1.15	0.128

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 9: t-tests of the Equality of Means of the Liquidity Ratios

Period	Indicators	N		Mean		Std		t-test for equality of means	
		CB	IB	CB	IB	CB	IB	t-value	p-value
(1993-2006)	LA / TA	1818	320	29.75	26.38	20.56	17.08	3.148	**0.000**
	LA / D	1807	281	45.82	45.2	63.42	48.6	0.191	0.424
(2007-2008)	LA / TA	462	109	28.87	31.72	37.68	80.91	-0.358	0.360
	LA / D	459	105	38.33	48.35	41.13	63.59	-1.54	**0.062**
2009	LA / TA	156	35	24.45	23.77	20.64	12.79	0.247	0.402
	LA / D	157	35	32.92	39.37	45.16	37.74	-0.88	0.191

Notes: The t-test of equality of means is based on the mean for CBs minus that of IBs at 95% confidence level. The test is calculated assuming unequal variances.

Table 10: Description of the Used Variables

Variable Name		Definition	Source
$Z_{i,j,t}$		Z-score for bank i at time t in country j	Authors' calculations based on Bankscope data
$B_{i,j,t-1}$	Vector of bank specific variables	Total Assets of a bank (in U.S billion dollars)	Bankscope
		Loan / Assets	
		Cost / Income	
		Income Diversity $$1 - \left| \frac{\text{net interest income} - \text{other operating income}}{\text{total operating income}} \right|$$	Authors' calculations based on Bankscope data and Laeven and Levine (2005)
$I_{j,t-1}$	Vector of industry specific variables	Herfindahl Hirschman Index	Authors' calculations based on Bankscope data
		Market share of Islamic banks	
		Governance	Kaufmann et al. (2010)
T	Islamic bank dummy variable	Equals 1 for Islamic bank, 0 otherwise	Bankscope
$T_1 I_{i,j,t-1}$		Islamic bank dummy variable * Share of Islamic banks	
$T_2 I_{i,j,t-1}$		Conventional bank dummy variable * Share of Islamic banks	
$M_{j,t-1}$	Vector of macroeconomic variables	GDP Growth(Growth rate of nominal GDP, adjusted for inflation(in local currency))	World Bank Development Indicators
		Inflation (year-on-year change of the CPI index(percent)	
		Exchange depreciation (year-on-year change in the nominal exchange rate, U.S dollars per local currency (percent))	
C_j		Country dummies variables	
P	Period dummies variables	Equals 1 for the crisis-period, 0 otherwise	

Table 11: Summery Statistics for Islamic and Conventional Banks

Panel 1: Conventional Banks

	N	Mean	Std	Min	Max
Z-score	2422	23,67	33,58	-11,75	1014,93
Total Assets (Mill$)	2423	3832,54	9463,31	0,0009166	88165,37
Net Loans / Total Assets	2414	53,102	18,48	0,01	144,04
Cost / Income	2367	54,36	46,15	0,59	873,58
Income Diversity	2395	0,42	3,23	0	0,99

Panel 2: Islamic Banks

	N	Mean	Std	Min	Max
Z-score	445	23,13	39,33	-8,13	300,87
Total Assets (Mill$)	458	2349,754	5712,19	0,20	45527,92
Net Loans / Total Assets	447	50,19	21,74	0,02	98,92
Cost / Income	426	65,59	67,21	4,15	950
Income Diversity	450	0,52	0,29	0	1

Table 12: Average across the Banks in the Respective Category

Table 12 (a): The 1993-2006 Period

	All Banks		Large Banks		Small Banks	
	CB	**IB**	**CB**	**IB**	**CB**	**IB**
Z-score	23.50	24.75	22.61	24.02	23.95	25.12
Z-score (excluding outliers)	22.15	17.73***	21.32	16.73***	22.57	18.22***
Cost/income	54.10	63.99***	46.33	56.49**	58.14	67.78**
Loan/assets	52.87	49.23***	54.30	53.81	52.15	47.01***
Income diversity	0.47	0.40	0.57	0.31*	0.41	0.44

Table 12 (b): The 2007-2008 Period

	All Banks		Large Banks		Small Banks	
	CB	**IB**	**CB**	**IB**	**CB**	**IB**
Z-score	23.87	22.08	23.36	20.80	24.47	23.29
Z-score (excluding outliers)	23.27	16.12***	22.23	18.37*	24.47	13.91***
Cost/income	50.43	63.19**	44.07	51.3	57.82	75.58**
Loan/assets	53.98	48.65***	53.64	52.11	54.38	45.26***
Income diversity	0.25	0.42	0.001	0.4	0.55	0.44*

Table 12 (c): In 2009

	All Banks		Large Banks		Small Banks	
	CB	**IB**	**CB**	**IB**	**CB**	**IB**
Z-score	25.05	12.48***	25.15	12.66***	24.87	12.19***
Z-score (excluding outliers)	23.91	12.48***	23.41	12.66***	24.87	12.19***
Cost/income	58.1	91.27	42.58	56.64	87.96	144.54
Loan/assets	54.93	52.79	55.62	50.7	53.62	56.63
Income diversity	0.56	0.12**	0.61	0.18	0.48	0.63**

Note: The difference between value of CBs and IBs at 95% confidence level is significant at 10% (*); at 5% (**), at 1% (***).

Table 13: Random - Effects (GLS regression)

	All Banks (1)	All Banks (2)	All Banks (3)	All Banks (4)	Large Banks (5)	Large Banks (6)	Large Banks (7)	Large Banks (8)	Small Banks (9)	Small Banks (10)	Small Banks (11)	Small Banks (12)
log(Total Assets) (-1)	-1,664	-1,602	-1,42	-1,99	0,007	-1,324	-1,539	-0,47	-2,743	-1,94	-2,27	-2,522
	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,992)	(0,004)***	(0,02)**	(0,517)	(0,000)***	(0,000)***	(0,000)***	(0,000)***
NL/A(-1)	-0,007	0,015	-0,017	0,034	0.018	0,019	-0,009	0,072	-0,015	0,0007	-0,002	0,004
	(0,724)	(0,480)	(0,387)	(0,168)	(0,552)	(0,430)	(0,746)	(0,014)**	(0,626)	(0,977)	(0,918)	(0,887)
Cost/Income(-1)	-0,014	-0,013	-0,016	-0,012	-0,033	-0,031	-0,032	-0,031	-0,013	-0,011	-0,012	-0,014
	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,001)***	(0,000)***	(0,000)***	(0,000)***
Income Diversity(-1)	-0,186	-0,239	-0,225	-0,312	-0,188	-0,107	-0,158	-0,060	-1,363	-0,914	-0,943	-0,997
	(0,506)	(0,349)	(0,422)	(0,332)	(0,307)	(0,614)	(0,508)	(0,724)	(0,104)	(0,09)*	(0,263)	(0,082)*
Islamic dummy	-4,905	-4,9	-3,281	-4,181	-3,505	-4,694	-3,791	-4,837	-3,853	-2,401	-3,545	-1,470
	(0,123)	(0,051)*	(0,223)	(0,121)	(0,305)	(0,093)*	(0,202)	(0,100)*	(0,405)	(0,473)	(0,374)	(0,694)
HHI(-1)	-0,001		-0,0004		-0,001		-0,0001		-0,002		-0,001	
	(0,000)***		(0,204)		(0,021)**		(0,648)		(0,001)***		(0,006)***	
Governance	2,363		2,46		8,21		1,153		0,836		0,316	
	(0,334)		(0,206)		(0,058)*		(0,693)		(0,774)		(0,898)	
CB dummy *Share of IB(-1)	-14,34		4,721		2,159		7,438		-46,2		-28,68	
	(0,005)***		(0,036)**		(0,733)		(0,003)***		(0,000)***		(0,000)***	
IB dummy *Share of IB(-1)	-12,04		-1,731		-6,514		2,351		-9,95		-3,613	
	(0,027)**		(0,667)		(0,451)		(0,647)		(0,158)		(0,520)	
Exchange Rate Depreciation (-1)	0,009			0,009	-0,011			-0,014	0,023			0,013
	(0,384)			(0,268)	(0,109)			(0,022)**	(0,084)*			(0,163)
Inflation(-1)	0,174			0,028	0,249			0,204	0,195			0,039
	(0,006)***			(0,463)	(0,002)***			(0,007)***	(0,03)**			(0,406)
Real GDP growth (-1)	-0,077			0,130	-0,106			0,047	-0,047			0,197
	(0,419)			(0,018)**	(0,253)			(0,423)	(0,805)			(0,027)**
IB dummy *crisis period dummy	-1,185	-0,071	-0,707	-1,199	-1,133	0,901	0,438	-0,549	-3,089	-1,472	-2,302	-2,796
	(0,124)	(0,899)	(0,285)	(0,109)	(0,891)	(0,158)	(0,592)	(0,538)	(0,008)***	(0127)	(0,029)**	(0,022)**
CB dummy *crisis period dummy	1,357	0,477	0,701	1,162	-0,267	-0,994	-0,302	-0,924	2,900	2,395	2,834	2,853
	(0,018)**	(0,269)	(0,125)	(0,030)**	(0,745)	(0,032)**	(0,602)	(0,195)	(0,001)***	(0,001)***	(0,000)***	(0,001)***
Constant	31,37	25,03	24,83	25,31	26,27	25,98	27,44	11,75	44,93	27,25	37,59	28,54
	(0,000)***	(0,001)***	(0,000)***	(0,001)***	(0,092)*	(0,014)**	(0,062)*	(0,437)	(0,000)***	(0,000)	(0,000)	(0,000)***
Observations	1472	2641	2641	2233	603	1076	751	806	869	1565	930	1427
R-squared (between)	0,193	0,128	0,128	0,126	0,266	0,182	0,230	0,2	0,222	0,115	0,218	0,117

Table 14: Country Dummies Variables

Country	
Bahrain	4.598
	(0.444)
Banghladesh	1.38
	(4.89)
Brunei	32.54
	(0.009)***
Egypt	3.8
	(0.516)
Gambia	-8.091
	(0.085)*
Indonesia	-0.402
	(0.944)
Iran	0.950
	(0.883)
Jordan	11.56
	(0.085)*
Kuwait	4.39
	(0.461)
Malaysia	17.19
	(0.007)***
Mauritania	12.15
	(0.311)
Pakistan	-0.125
	(0.979)
Qatar	32.07
	(0.000)***
Saudia Arabia	9.79
	(0.071)*
Sudan	6.21
	(0.328)
Tunisia	27.099
	(0.000)***
UAE	9.299
	(0.196)

Table 15: Regression Results of the Aggregate Z-Scores

z	
Share of IB (-1)	-5.84
	(0.502)
HHI (-1)	0.001
	(0.111)
Governance (-1)	-8.97
	(0.059)*
Real GDP Growth (-1)	0.245
	(0.174)
Inflation (-1)	0.012
	(0.943)
Exchange Rate Depreciation (-1)	-0.004
	(0.73)
Constant	17
	(0.000)***
R-squared (within)	0.1764