Developing Inclusive and Sustainable Economic and Financial Systems

Financial Stability and Risk Management in Islamic Financial Institutions

Volume 5

SELECTED PAPERS PRESENTED TO THE 8TH AND 9TH INTERNATIONAL CONFERENCE ON ISLAMIC ECONOMICS AND FINANCE

جامعة حمد بن خليفة
HAMAD BIN KHALIFA UNIVERSITY

كلية الدراسات الإسلامية في قطر
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Developing Inclusive and Sustainable Economic and Financial Systems

Volume 5

Financial Stability and Risk Management in Islamic Financial Institutions

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Foreword

Hatem A. El-Karanshawy
Founding Dean, Qatar Faculty of Islamic Studies, Hamad bin Khalifa University, Qatar Foundation, Doha

The International Conference on Islamic Economics and Finance (ICIEF) is the leading academic conference in the discipline organized by the International Association for Islamic Economics (IAIE) in collaboration with other key stakeholders, including the Islamic Research and Training Institute, Islamic Development Bank. It is the pioneering international conference on Islamic economics organized first in Makkah Al Mukaramah, Kingdom of Saudi Arabia, in 1976 under the auspices of King Abdulaziz University and has since been held in numerous locations around the world. The conference as such has contributed immensely to the promotion of Islamic economics and finance. Since 2011, the Qatar Faculty of Islamic Studies (QFIS), of Hamad bin Khalifa University, Qatar Foundation, has also become a key partner in organizing the conference.

The global economy continues to face the perennial problems of poverty, persistent youth unemployment, excessive inequalities of income and wealth, high levels of inflation, large macroeconomic and budgetary imbalances, exorbitant debt-servicing burdens, inadequate and aging public utilities and infrastructure, skyrocketing energy prices, and growing food insecurity. The reoccurring regional and global financial crises further intensify and magnify these problems, particularly for the underprivileged segments of the world population. As a result, many countries are at the risk of failing to achieve by 2015 the Millennium Development Goals (MDGs) set by the United Nations. Hence the achievement of an inclusive and sustainable economic and financial system has remained highly illusive.

The ICIEF presents an excellent opportunity for those interested in Islamic economics and finance to present their research and contribute to the development of an inclusive and sustainable global economic and financial system. It is through such a setting that thoughts can be debated with the objective of advancing knowledge creation, facilitating policymaking and promoting genuine innovation for the industry and the markets. Disseminating research presented at ICIEF to the greatest number of researchers interested in the topic is important. It not only advances the discourse, but also grants those who did not have the privilege of attending the conference to partake in the discussion.

To this end, this series of five volumes (two in Arabic to follow) presents the proceedings of 8th and 9th conferences, which were held in Doha and Istanbul respectively in 2011 and 2013. Each volume focuses on a particular sub-theme within the broader theme of *Developing Inclusive and Sustainable Economic and Financial Systems*.

The volumes are as follows:

Volume 1: Access to Finance – Essays on Zakah, Awqaf and Microfinance
Volume 2: Islamic Economics and Social Justice – Essays on Theory and Policy
Volume 3: Islamic Banking and Finance – Essays on Corporate Finance, Efficiency, and Product Development
Volume 4: Ethics, Governance, and Regulation in Islamic Finance
Volume 5: Financial Stability and Risk Management in Islamic Financial Institutions

We hope that this academic endeavor in partnership with the Bloomsbury Qatar Foundation Publishing will benefit the Islamic economics and finance community and policy makers and that it will promote further academic study of the discipline.

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Tariqullah Khan
President, International Association for Islamic Economics

At the International Association for Islamic Economics (IAIE), we are grateful to acknowledge the unprecedented success of the 8th and 9th International Conferences on Islamic Economics and Finance, which were respectively organized in the Qatar National Convention Centre, Doha, December 19–21, 2011, and in the WoW Convention Centre Istanbul, September 9–10, 2013. We greatly appreciate the financial, academic and logistic support provided by the Qatar Faculty of Islamic Studies, Hamad bin Khalifa University at Qatar Foundation; Islamic Research and Training Institute at the Islamic Development Bank; and the Statistical, Economic and Social Research and Training Centre for Islamic Countries.

We offer our sincere thanks to the sponsors of the 8th International Conference on Islamic Economics and Finance in Doha. Without their partnership and generous contributions, the conference would not have been possible. In addition to the Qatar Foundation and the Islamic Development Bank, other sponsors included: Qatar Central Bank (QCB), Qatar Financial Centre Authority (QFCA), Qatar National Research Fund (QNRF), Qatar National Bank, Qatar Islamic Bank, Qatar International Islamic Bank, Masraf Al Rayan, and Qatar Airways.

We owe our deepest gratitude to the highly-esteemed panel of reviewers who volunteered to dedicate their time and energy in reviewing all the thousands of abstracts and papers that were submitted to the conferences. The reviewers of the English papers and abstracts included: Abdallah Zouache, Abdel Latef Anouze, Abdelaziz Chazi, Abdul Azim Islahi, Abdullah Turkistani, Abdulrahim AlSaati, Ahmet Tabakoğlu, Anowar Zahid, Asad Zaman, Asyraf Dusuki, Ercument Aksak, Evren Tok, Habib Ahmed, Hafas Furqani, Hafsa Orhan Astrom, Haider Ala Hamoudi, Hossein Askari, Humayon Dar, Ibrahim Warde, Iraj Toutounchian, Jahangir Sultan, John Presley, Kabir Hassan, Karim Ginena, Kazem Yavari, Kenan Bagci, Mabid Al-Jarhi, Maliah Sulaiman, Marwan Izzeldin, Masooda Bano, Masudul Alam Choudhury, Mehdi Sadeghi, Mehmet Asutay, Moazzam Farooq, Mohamad Akram Laldin, Mohamad Aslam Haneef, Mohamed Ariff Syed Mohamed, Mohammed Benbouziane, Mohammed El-Komi, Monzer Kahf, Muhammad Syukri Salleh, Murat Çizakça, Nabil Dabour, Nafis Alam, Nasim Shirazi, Nazim Zaman, Necdet Sensoy, Nejatullah Siddiqi, Rifki Ismal, Rodney Wilson, Ruhaya Atan, Sabur Mollah, Salman Syed Ali, Savas Alpay, Sayyid Tahir, Serap Oguz Gonulal, Shamim Siddiqui, Shinsuke Nagaoka, Simon Archer, Tariqullah Khan, Toseef Azid, Turan Erol, Usamah Ahmed Uthman, Volker Nienhaus, Wafica Ghoul, Wijdan Tariq, Zamir Iqbal, Zarinah Hamid, Zeynep Topaloglu Calkan, Zubair Hasan, and Zulkifli Hasan. The reviewers of the Arabic papers and abstracts included Abdelrahman Elzahi, Abdulazeem Abozaid, Abdullah Turkistani, Abdulrahim Alsaati, Ahmed Belouafi, Ali Al-Quradaghi, Aly Khorshid, Anas Zarqa, Bahnaz Al-Quradaghi, Layachi Feddad, Mabid Al-Jarhi, Mohammed El-Gamal, Nabil Dabour, Ridha Saadallah, Sami Al-Suwailem, Seif El-Din Taj El-Din, Shehab Marzban and Usamah A. Uthman.

The primary objective of the conferences is to further the frontiers of knowledge in the area of Islamic economics and finance. Without the hard work and creativity of the researchers who shared their work with us, the pool of knowledge generated in the form of the conference papers and presentations would not have been possible. We thank all the authors who submitted their abstracts and papers to the two conferences.

The IAIE has always endeavored to publish most of the significant research papers contributed to its conferences. Currently the selected papers of the 8th and 9th conference are being published in five volumes under the common theme of *Developing Inclusive and Sustainable Economic and Financial Systems*. On behalf of the Editorial Board we acknowledge that the partnership with the Bloomsbury Qatar Foundation Publishing in this regard will be highly beneficial in disseminating research output and in promoting the academic cause.

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Preface

Dr. Moh'd Azmi Omar
Director General, Islamic Research & Training Institute (IRTI)

The perpetual changing international economic and political landscape has undoubtedly brought about opportunities and challenges for the Islamic financial services industry. Despite the fact that, to a certain degree, Islamic financial institutions have demonstrated resilience, particularly during the 2008 global financial crisis, the true test will be the way the Islamic financial services industry responds to the continuous changes in the landscape aforementioned.

While various reports suggest slightly different figures on the size of the Islamic finance industry as a whole, it is believed that the industry witnessed consistent rises in assets over several years. The assets climbed from US$1.2 trillion in 2012 to US$1.3 trillion in 2013, i.e., 8.7% annual growth. Such data is based on disclosed assets by all Islamic finance institutions (fully Shariah compliant as well as those with Shariah windows) covering commercial banking, funds, Sukuk, Takaful, and other segments. It is also noteworthy that while the growth of the industry in 2013 slowed down from 20.7% in 2012 to 8.7 %, the compound annual growth rate since 2006 still remained a 16%.

Apart from offering significant economic prospects, such staggering growth and development nonetheless has posed new challenges to global supervisory authorities and to Islamic banks that encountered new challenges in managing risks, particularly related to maintaining operational soundness of IFIs. Two very crucial areas yet to be thoroughly developed in an integrated manner are financial stability and risk management.

In this respect, the volume entitled *Financial Stability and Risk Management in Islamic Finance*, has been gathered and edited with a main objective to fill the intellectual gap in such areas, particularly from the perspective of theoretical, empirical and policy oriented focus. Selected papers in this volume are from the 8th International Conference on Islamic Economics and Finance held in Doha, Qatar, 19–21 December, 2011, and from the 9th International Conference on Islamic Economics and Finance held in Istanbul, Turkey, 9–11 September, 2013. They are presented here in their original form, with changes limited to copyediting and correcting typographical errors. The conferences were organized by the Center for Islamic Economics and Finance, Qatar Faculty of Islamic Studies (QFIS), Hamad bin Khalifa University; Islamic Research and Training Institute (IRTI), Islamic Development Bank (IDB); International Association for Islamic Economics and Finance (IAIE); and Statistical, Economic, and Social Research and Training Centre for Islamic Countries (SESRIC).

We expect that the papers presented in this volume will provide further insights and focus, ultimately contributing to further research on some unresolved technical issues in the subject matter.

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Financial stability and risk management in Islamic finance:

An introduction to the issues and papers

Salman Syed Ali[1], Hylmun Izhar[2]
[1]Senior Research Economist, Islamic Research and Training Institute, Jeddah, KSA
[2]Economist, Islamic Development Bank, Islamic Research and Training Institute, Jeddah, KSA

1. What and why of financial instability?

Financial stability refers to the stability of the overall financial sector as well as stability of individual financial institutions. The subject is important because finance affects the economy and its participants in multiple ways. A disruption in finance can result in disruption of payments system, that is despite having the resources/money the agents are unable to settle the payments due to non-availability of a method to make or record the payments. The financial disruption can also affect the valuation of assets and currencies, so payment obligations that were feasible earlier become impossible to honor due to fluctuations in the price of currency or of the other assets in the payer's asset portfolio. Similarly, a large mismatch between cash in-flows and out-flows can affect the normal flow of economic transactions of individuals, private businesses, and governments, thus initiating a crisis. The list of possible scenarios can be large, and all these examples highlight the fact that stability of the overall financial sector as well as stability of its individual component institutions is important for the health of the economy, and by implication also for the preservation of social harmony. The high importance of financial stability is not a recent phenomenon; even in the distant past, several cases of financial instability can be highlighted. For example, the *fulus* currency crisis during the Mamluk era of early fifteenth-century Egypt analyzed by the scholars of that time al-Maqrizi and al-Asadi (see Islahi, 2013) originated from economic mismanagement and governance failures. Reinhart and Rogoff (2011) have also documented a large number of financial crises from over sixty-six countries over a period of eight centuries.

It is interesting to note that the majority of the financial crises in the world had been the result of excessive debt, whether it was the debt of the governments, kings, banks, corporations, traders or consumers. We think it was interest rate that compounded the problem of excessive borrowing. Many of the extractive institutions (to use the term from Acemoglu and Robinson, 2012) also were either the result of interest bearing excessive debt or they were strengthened due to interest bearing debt obligations. Such extractive institutions, as opposed to inclusive institutions, themselves were, and are, a source of low economic growth and development. In the olden ages the high and unsustainable levels of sovereign debts usually resulted from spendthrift nature of kings or because of their war campaigns or economic mismanagement. The burden of debt eventually falls on the private individuals and businesses through the extractive taxes and poor governance by the governments already caught in debt trap. One can only have some sense of the high cost of these crises from the large social and economic turmoil they generated in the past. The most recent global financial crisis was no different from the ancient ones in its basic source – excessive debt – but its costs have been more actively documented. The cost of this crisis for USA only has been estimated to be 14 trillion USD by the Federal Reserve Bank and it is still growing.[1] The global costs when the contagion effects on the other countries are taken into consideration can be much higher. Another recent, and still ongoing crisis is the EU debt crisis, which also highlights the political, economic and social costs of such events and hence the importance of financial stability and risk management.

Among the many sources of financial crises two important factors that heighten the crisis are (i) institutionalization of interest on loans and debts (*riba*) and (ii) contractual ambiguities and opaqueness (*gharar*). Both were glaringly at play as sources of the recent global financial crisis in terms of intra-financial sector debt accumulation, the incentives for it within the system, and the ambiguity enhancing financial product offerings in the period preceding the crisis (CDS, CDO, and a whole family of synthetic financial derivatives). Two other important factors behind financial crises are economic mismanagement and governance failures. These two also played their roles in the form of lax regulatory framework of financial sector and poor governance within financial firms by incentivizing extension of credit and its sale.

2. What Islamic finance can contribute?

Studies on financial stability and risk management from Islamic perspective can usefully contribute not only in the global debate on the issue but also to improve the functioning of Islamic financial sector and the institutions operating therein. In this regard two strands of studies are

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important and needed: First, the studies that explore the implications of the nature of Islamic finance for the stability of a financial system as a whole and the risk management of individual Islamic financial institutions. For this, both the stand-alone and the comparative theoretical studies are useful. Second, the studies that explore the practical realities as well as empirical evaluation of the existing operations and policies of Islamic financial institutions and the sector as a whole. This strand of studies is needed so as to improve the situation on the ground and also to provide guidance in correcting the course of action.

Though the global debate on causes of and remedies for financial crises is not over yet, in the sphere of policy making and regulation, the voices and ideas that called for re-thinking about the financial system and its over-haul have been sidelined by the incumbent guards of the conventional financial system. Unfortunately, the focus has now shifted to minor changes and small re-adjustments here and there within the existing system on the assumption that this kind of thinking will solve the fundamental problems. Among some of interesting ideas and proposals forwarded during the crises were a movement towards more risk-sharing, devising aggregate debt to capital ratios for the economy and the financial system, curbing the trading of debt and un-insurable interest, and linking finance with the real economy. These were expressed in numerous papers, writings and reports just after the crisis.[2] Among these, the Turner Review (2009), Morris and Shin (2008), Buiter writing in the Financial Times (2009a, 2009b), The IMF Report to G-20 (2010), Usmani (2010) in World Economic Forum and the IFSB-IDB-IRTI Islamic Finance and Global Financial Stability Taskforce Report (2010) are particularly noteworthy. The last mentioned report explains that "the solution to the fragility of financial system lies not in small regulatory changes but in building a new financial architecture that will promote greater efficiency in the financial intermediation process. The inherent features of Islamic finance have the potential to serve as a basis to address several of the issues and challenges that have surfaced in the conventional financial system during the current crisis. As the role and relevance of Islamic finance in the global financial system gains significance, it has potential to contribute to greater global financial stability and towards strengthening global growth."

However, what we actually observe happening on the global platform is only small tinkering of rules and regulations. The new Basel III added three new regulatory ratios for banks and made minor adjustment to the capital ratio[3] but remained silent on the reformation of the financial architecture and on the macro-prudential measures and ratios. Even on the capital market front, no fundamental change has taken place to curb the derivative products and trade in promises despite the existence of various alternative proposals from within the system. Instead, the solution sought is only to move the derivative trade to a central clearing house in the expectation that availability of trading information will solve all the problems.

At the same time the Islamic finance movement itself has not done much to devoid itself of many anomalies in the practice of Islamic finance. A combination of genuine difficulties of running Islamic financial institutions within the existing moral and regulatory environment, competition with conventional finance, the goal of showing profitability and the desire of gaining acceptance in the mainstream international financial system have led to products and practices that are Islamic only in form but not necessarily in spirit. Hence, Islamic finance is also rendering it open to the sort of problems and risks faced by the conventional finance.

In this situation, it is important that a debate should remain alive among the academics, practitioners of finance, and the financial regulating bodies on the merits of Islamic finance, its stability, the risk management practices adopted by Islamic financial institutions, and their evaluation. It is necessary that the continuous supply of suggestions should be supplemented with bold experimentations with various concepts and ideas. We expect that these deliberations along with experimentations will keep Islamic financial sector growing fast on a correct course, and the virtues of its stability and inclusiveness will be realized for the entire humanity.

3. The current issues in the stability and risk management of Islamic finance

Let us now turn to briefly present the situation on ground in the practice of Islamic finance and comment on some steps that are waiting to be. This is useful taken before we provide a summary introduction of the articles collected in this volume. We discuss the matters in two stages: first, at the financial sector level where the focus is on overall stability; second, at the financial institutions level where the focus is on risk management.

Current issues in financial stability of Islamic finance

As far as the overall financial stability of Islamic financial sector is concerned, the theoretical model based on risk-sharing at multiple levels points towards greater stability and resilience. However, in practice, the predominance of fixed obligation type contracts such as *murabaha* and *ijarah* somewhat reduce the element of risk-sharing but do not eliminate it. The concern for stability of the Islamic financial sector has increased not because of this as such, but because of the fact that even within the fixed obligation type of contracts the industry is increasingly resorting to *tawarruq*, two sided *murabaha*, and commodity *murabaha*. These arrangements eliminate any trace of risk sharing and bring the Islamic financial sector at par with the conventional finance even more prone to instability due to the non-existence of the support infrastructure that is available to conventional finance. The Islamic banking sector has become heavily tilted to very short-term financing, even more than its conventional counterpart, adding an element of vulnerability to shocks. The only lines of defense the industry so far has are its higher liquidity and avoidance of large-scale use of derivatives in its portfolio. These two elements helped the Islamic financial sector ride out relatively safely through the global financial crisis in the past but the changing liquidity situation does not guarantee the protection of this capability in future.

Given the small size of the Islamic financial sector, it is also prone to the repercussions caused by problems in the conventional financial sector. For example, the tapering off of the quantitative easing monetary policy by the US Federal Reserve resulted in withdrawal of funds from emerging

markets in anticipation of higher interest rates in the US. As a large proportion of investors in sukuk are conventional financial institutions, they may withdraw from sukuk investments in favor of higher yielding conventional bonds. Thus any disposal of large size sukuk can affect stability of the Islamic financial sector. This reflects the stability issue arising from the asymmetric sizes of Islamic and conventional financial sectors.[4] This also shows that for the sake of the stability of Islamic financial sector it is important to increase its inclusiveness and the diversity of its investor base. This would help in making the system more resilient and less prone to quick shifting of funds by the behavior of a single type of investors who are indifferent to investing between Islamic and conventional instruments.

Growth in Islamic finance and the possibility of spillover effects from the conventional finance system highlights the importance of assessing the stability and developmental needs of the Islamic financial sectors at the level of countries and the regions. It is needed in the way that FSAP (Financial Sector Assessment Program) is carried out by IMF and the World Bank but addressing the specificities and requirements of Islamic financial sector. Given the large physical infrastructure requirements of the regions such as MENA Africa and Asia in energy, water, transport, and housing; and given the increasing population with higher proportion of youth, the role of sukuk in the capital markets and the role of Islamic banks in the provision of financial services is likely to become more important. A framework for the consistent and sound development of Islamic finance at the global level is provided in the Ten-Year Framework and Strategies (IRTI-IFSB, 2007) and its Mid-Term Review (IRTI-IFSB, 2014).

Current issues in risk management of Islamic financial institutions

Risk management at the level of Islamic banks and financial institutions is in-itself a developing area. Despite the issuance of many regulatory standards by the IFSB covering the capital adequacy, liquidity risk management, and market risk, etc. The missing part remains the guidelines on how to operationalize those standards. This can form an area of research and guidance. Though many of the risks faced by the Islamic banks and financial institutions are similar in nature as faced by the conventional banks and financial institutions, but modification may be needed in identification and measurement of those risks. This is due to the fact that a contract as simple as *murabaha* passes through various stages of promise, purchase on behalf of the bank, and the final sale on credit. During the transition of each stage risk transformation and transition also takes place. Moreover, notwithstanding the commonalities, the risk mitigation techniques can be quite different between conventional and Islamic financial institutions. A survey of risk perception and risk management of Islamic financial institutions conducted jointly by IRTI and GARP during 2012 revealed that bankers and regulators perceive credit risk management as a more important aspect, on which guidance and techniques are urgently needed. This was followed by importance of operational risk and liquidity risk management respectively.

Several important issues in risk management for Islamic banks and financial institutions deserve immediate attention both by the academics and practitioners. One issue among them pertains to quantification of the risk-taking behavior of Islamic banks that are mobilizing a high proportion of profit sharing investment accounts compared to those banks that are relying more on current accounts. These will have different implications for risk taking and term of investments by the Islamic banks. Another area pertains to developing methodologies and techniques of stress testing for Islamic banks such that the methods are useful for internal risk management and acceptable for regulatory purposes. Yet another area is to develop new instruments and techniques for risk management that are Shariah compliant and cost effective.

4. Introduction to the papers

In the context of the above discussion, the present volume brings together nine papers that have tried to address various aspects of stability of the overall Islamic financial sector (Part I of the book) and risk management methods for individual Islamic financial institutions (Part II of the book). These papers cover ideas on: Islamic Financial Sector Assessment Program (iFSAP), review of literature on stability of Islamic finance, transmission of liquidity shocks through Islamic banks, stress testing methodology for Islamic banks, assessment of Islamic banks' distress to currency shocks, risk taking and capital decisions of Islamic banks mobilizing profit sharing investment deposits, stability comparison of Islamic and conventional banks in Indonesia, devising new "credit default sharing" instrument to hedge against default, and introducing the concept of performance-at-risk as opposed to value-at-risk as an appropriate tool for risk management in Islamic banks.

Part I: Financial stability

The first paper in in Part I is "Financial Sector Assessment Program for Islamic Financial System (iFSAP)" contributed by Dadang Muljawan. It is essentially based on a template for the Islamic Financial Sector Assessment Program (iFSAP) that has been created by a team at Islamic Research and Training Institute (IRTI) – Islamic Development Bank. The background to this effort is that many countries, including the OIC countries, have been through the financial sector assessment program (FSAP) jointly conducted by IMF and the World Bank. However, the current FASP does not provide the right methods to assess the development needs and stability of Islamic financial sector. While the rapid growth of Islamic finance internationally poses new challenges to the supervisory authorities, particularly those in countries with the significant growth of this newly developing industry, operationally, the development of the Islamic financial industry should fulfill certain criteria in promoting operational soundness, stability and efficiency. However, it needs to be measured, monitored and rightly channeled. The initiative on iFSAP is deemed important for providing appropriate understanding on how the Islamic financial system can deliver benefits and contribute to financial stability within the country and internationally. Moreover, the implementation of iFSAP will highlight the developmental needs of this sector to the financial authorities in those countries and help in formulation of appropriate facilitation policies. In this sense the contents of the iFSAP would be a beneficial complement to the FSAP initiative. It will provide the assessors of the FSAP

a standard guidance to carry out the initiative. The paper provides the methodology and the areas of the assessment in the Islamic Financial Sector Assessment Program.

The second paper, "Islamic Finance and Financial Stability: A Review of the Literature" by Ahmed Belouafi, Chaouki Bourakba and Karima Saci provides a review of thirty-four selected papers from Islamic economics and finance literature (from the period 1983–2013) that have examined the stability of the Islamic financial system and its institutions vis-à-vis the conventional interest-based system. This literature survey can serve a useful starting point for anyone doing research in this area. To manage the task of surveying a large number of papers, the reviewing authors adopted a systematic method by which they have provided the main findings and conclusions of the literature, discuss the robustness and comprehensiveness of these findings, and highlighted some venues for future exploration. The survey found that the pre-crisis era was dominated by theoretical studies, while the post-crisis era has resulted in more empirical studies. It also shows that there is a big divergence between the theory and practice of Islamic finance. Theoretical studies generally claim superiority of an Islamic financial system based on pure equity and participatory modes of financing, while empirical studies provide mixed results. By bringing out the issues of financial stability and the complexities involved in its measurement, the paper also contributes to the ongoing discussion on financial stability taking place in the conventional literature.

The third paper, "The Role of Islamic Banks Subsidiaries in the Transmission of Liquidity Shocks across Countries" by Mehdi Mili, Jean-Michel Sahut and Eryj Trimechec addresses a different dimension. The paper empirically studies the international transmission of bank liquidity shocks from multinational Islamic bank-holding companies to their subsidiaries. Using a sample of 120 Islamic and conventional bank subsidiaries, the paper tests whether foreign bank lending is determined by different factors for Islamic and conventional banks. The estimation method controls for subsidiary and parent bank characteristics as well as host and home country variables. It finds that while the conventional parent bank fragility due to liquidity shock negatively affects lending by their subsidiaries, it is not the case between parent and subsidiaries of Islamic banks. Why this is the case is still an open question. Presumably, it is due to the fact that Islamic banks differ from conventional banks in terms of profit sharing and funding methods. These characteristics may alter the nature of the risks incurred by Islamic banks and affect their strategies of lending and deposit collection.

Further, the paper examined the existence of market discipline exerted by depositors on Islamic and conventional subsidiaries and its relation to transmission of liquidity shocks. It finds that the depositors react to a deterioration of Islamic bank performance and punish their institutions by withdrawing money. Whereas liquidity needs determine the change in lending by conventional banks, reduction in lending is stronger for those banks that are dependent on the interbank market. Market discipline does not substitute regulation and supervision. Rather, a standardized accounting framework and appropriate policies for the dissemination of information regarding both the assets and liabilities of Islamic subsidiaries also become necessary.

The fourth paper, "Assessing the Stability and Resilience of Islamic Banks through Stress Testing under Standardized Approach of the IFSB Capital Adequacy Framework" by Jamshaid Anwar Chattha takes up the elaboration of an important risk management tool, i.e., stress testing. The paper complements the principles based IFSB standards on the subject by providing a systematic example of how to apply stress testing methods in the evaluation of risk and stability of Islamic banks. Though, Islamic banks operate within the similar financial environment facing the conventional banks, but the difference in their balance sheet composition and adherence to Islamic principles calls for different treatment in stress testing. While there is a large literature on stress testing for conventional banking institutions, there exists significant gap in the literature to address the specificities of Islamic banks and the stress testing implications. This paper is a welcome addition both for filling this gap and in providing a step-by-step method and analysis capable of guiding the practitioners in applying the method to other Islamic banks. Specifically, it creates a stress-testing matrix, which is used as a benchmark for simulating solvency stress tests for Islamic bank, followed by a stylized numerical example. The paper is thus a step towards developing a comprehensive toolkit for the evaluation of risk and stability of Islamic banks, which can be utilized in iFSAP.

The fifth paper, "Currency-Banking Crises and Economic Downturns: A Comparison between Islamic and Conventional Banks" by Meriem Djennas, Mohamed Benbouziane, and Mustapha Djennas creates a synthetic measure: Financial Stress Index (FSI) which is based on exchange rate, banking and stock market variables. It then examines the effects of currency and banking crises on economic downturns in North Africa and GCC countries. It proposes an analytical framework to assess the impact of financial stress – in particular the effect of Islamic banks distress and conventional banks distress – on the economic downturn. It shows that banking crises are more important than securities and exchange rate crises in the countries studied. Furthermore, it shows that during the past global financial crises the contribution of Islamic banks in the Financial Stress Indicator was no less important than the conventional banks in the financial systems of the countries. Thus the paper provides a technique to evaluate the likelihood of financial stress at the level of countries and regions and decomposes it into Islamic and conventional parts of the financial sector. It adds to the literature on creating early warning signs for macro-economic and financial stability.

The sixth paper, "The Stability Comparison between Islamic Banks and Conventional Banks: Evidence in Indonesia," co-written by Gamaginta and Rofikoh Rokhim aims to determine the stability of Islamic banking and its comparison with conventional banking in Indonesia. In this case, the level of bank stability is measured individually using one of accounting-based bank soundness measures called the Z-score indicator. Using the parametric statistical t-test, the study shows that the level of stability between Islamic banks and conventional banks are significantly different. This research uses the sample data of 12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004–2009. The results show that the Islamic banks in general have a lower degree of stability compared

to the conventional ones. However, in some instances small Islamic banks relatively have the same degree of stability as small conventional banks. During the crisis period of 2008–2009, Islamic banks and conventional banks tended to have the same relative degree of stability. Interestingly, the stability of full-fledged Islamic banks (BUS) is lower than Islamic business units (UUS).

Part II: Risk management

The seventh paper, "Investment Deposits, Risk-Taking and Capital Decisions in Islamic Banks," co-authored by Hichem Hamza and Zied Saadaoui, examines the relationship between the volume of investment deposits (profit sharing investment accounts – PSIA) and capitalization of Islamic commercial banks in a context of asymmetric information. The authors argue that investment accounts holders may support part or all of the losses on assets value, which could be a source of moral hazard among bank managers and shareholders. To test these assumptions, Hamza and Saadaoui deploy the system-generalized method of moments (System GMM) on a dynamic panel of 59 Islamic banks observed during the period 2005–2009. After controlling for a set of variables that may influence capital level, it was found out that the empirical results show a significant negative relationship between PSIA and a regulatory capital ratio. This indicates that the specific nature of PSIA can be a source of excessive risk-taking and higher leverage in order to maximize shareholders value. This behavior is likely to threaten the solvency of Islamic banks and shows that there may exist some deficiencies in their risk management and governance system. In this regard, the authors suggest some recommendations to better implement the principle of profit and loss sharing and to curb excessive risk-taking in Islamic banks.

The eighth paper ""Credit Default Sharing:" New Islamic Financial Instruments for Hedging Default Risk," by Nader Naifar, attempts to examine the principles of risk-sharing promoted by Islamic finance as a possible reform of or complement to the current financial system. The secondary objective of this paper is to explain how and why the famous credit default swap (CDS) markets expanded and why they contributed to the recent financial crisis. In addition Naifar proposes a new financial instrument to hedge default risk (credit default sharing) based on the principles of risk-sharing and Islamic insurance "Takaful" (sharing responsibility and mutual cooperation) as a substitute for CDS. He also argues that "credit default sharing" can reduce counterparty risk, improve banks' monitoring incentives, reduce systemic risk and contagion in financial systems and eliminate "empty creditors."

In the ninth paper, "Performance at Risk: Another Approach to Value at Risk for Islamic Finance," Alioune Diagne attempts to capture the volatility of earnings so as to estimate the expected performance using a Value at Risk type framework. The difference of this approach (termed as PaR) from VaR is in its focus on earnings and economic capital as opposed to the regulatory capital. The author adapted the framework for the specificities of Islamic banks, which maintain investment risk reserves and profit equalization reserves as risk management tools. This technique of performance at risk needs to be validated by experimentation and back-testing to determine whether it fully captures and factorizes the risks related to the market.

Notes

1. For the USA alone the Federal Reserve Bank of Dallas calculated the cost to be in the range of 6 to 14 trillion USD. "Our bottom-line estimate of the cost of the crisis, assuming output eventually returns to its precrisis trend path, is an output loss of $6 trillion to $14 trillion. This amounts to $50,000 to $120,000 for every U.S. household, or the equivalent of 40 to 90 percent of one year's economic output." Luttrell, David; Tyler Atkinson and Harvey Rosenblum (2013). Adding the other costs such as lost consumption, trauma etc. a more comprehensive evaluation of factors suggests that cost of the crisis likely exceeded the value of one year's output.
   Another report by United States Government Accountability Office (2013) puts the losses in the USA to exceed 13 trillion USD. This does not include other economic losses associated with the increased mortgage foreclosures and higher unemployment which would be additional costs.
2. For example, the Financial Services Authority (2009, Turner Review), the Wall Street Journal, The IMF Report to G-20 (2010), Usmani (2010), Morris and Shin (2008), the Islamic Financial Stability Report, publications and seminars of IRTI and IDB Group etc.
3. The changes introduced by Basel III are: some changes in the previous Capital Ratio, introduction of a Minimum Leverage Ratio, and two new Liquidity Ratios: the "Liquidity Coverage Ratio" (LCR) requiring a bank to hold sufficient high-quality liquid assets to cover its total net cash outflows over 30 days; and the Net Stable Funding Ratio (NSFR) requiring that the available amount of stable funding to exceed the required amount of stable funding over a one-year period of extended stress.
4. The IFSB Islamic Finance Stability Report 2014 discusses this aspect in more detail.

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Financial sector assessment program for Islamic financial system (iFSAP)

Dadang Muljawan
Senior Economic Researcher, Research Division, IRTI-IDB

Abstract - The FSAP, initiated by the IMF and the World Bank, has been implemented internationally including the IDB and IFSB member countries. The initiative is beneficial to further improve the quality of the financial industry as well as to contribute to global financial stability. The rapid growth of Islamic finance internationally poses new challenges to the supervisory authority particularly with the growing significance of the newly developed industry. Operationally, the development of the Islamic financial industry should fulfill certain criteria in promoting operational soundness and efficiency. The initiative on iFSAP is deemed very crucial for providing appropriate understanding on how the Islamic financial system can deliver benefits and how it is compatible with the international financial stability initiatives. The implementation of iFSAP in further instances may provide a developmental view to the financial authorities in particular countries operating by the Islamic financial system. To address this issue, the IRTI-IDB has been trying to formalize the contents of the iFSAP that are beneficial to complement the FSAP initiative so that the assessors of the FSAP would have a standard set of guidelines to carry out the initiative. This paper provides the methodology and the areas of the assessment in the iFSAP.

Keywords: Financial assessment, regulation and stability

JEL: G15, G18, G28 and H12

1. Introduction

The Islamic financial industry has developed rapidly in the last two decades. This has been taking place not only in the Muslim predominated countries, but also in the non-predominated Muslim countries (Mersch, 2010). The presence of the Islamic financial industry can be seen in African countries, Middle Eastern countries, South Asian, Southeast Asian countries, and some European countries. The Islamic financial industry has become more significant than its predecessors and starts to play a significant role in economic development. The development has been taking place in terms of business volume, the variety of products offered, institutional development, and a regulatory framework. In most instances, Islamic financial institutions have started to complement the conventional products, i.e. banking products, capital markets, insurance (takaful), pawnshop, microfinance, and areas of the Islamic social sector (zakat, infaq, sadaqah and waqaf). The Islamic banking industry has even been offering technology intensive products to entertain the customers with the equally friendly and sophisticated products resembling those offered by its conventional counterpart. Despite a relatively smaller market share, in some countries, the Islamic financial industry provokes a relatively higher rate of growth, showing a potential of the industry to further develop in years to come. Some countries have put the development of the newly established industry within its national agenda, which could potentially complement the existing financial system, including the issuance of dedicated acts for Islamic banking, takaful and capital markets. Besides accommodating the demand of the local markets, some countries also look forward to benefiting from the growth of the industry internationally.

Besides offering benefits, the development of Islamic financial systems poses more challenges to the financial authority that is in the position to maintain stability in the financial system including the Islamic financial system stability. Islamic financial industry as a part of the global financial system requires a standardized and internationally recognized set of regulations. Many countries have tried to develop their own regulatory framework applied to the Islamic banking operation along side the conventional counterpart. The development may vary from one country to others since they have to accommodate its operational characteristics resulting from

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different interpretations of Shariah issues. One country may have a set of permissible products, which may not be acceptable to other countries. The operational differences will then lead to different permissible Shariah financial products (Jobst, 2007).[1] That has been the main reason for having a number of international initiatives seeking for a higher level of compatibility of the Islamic financial operation and eventually the international regulatory framework. An international initiative has established a number of international institutions to help the industry achieve a higher level of regulatory convergence. There are AAOIFI, IFSB, IIFM and IILM, all dealing with accounting standard, prudential regulations, financial product development and liquidity market development, respectively. Internationally, the development of the regulatory framework should also be convergent with the international initiatives aimed at achieving a required level of financial soundness like the Financial Sector Assessment Program (FSAP).

The paper proceeds as follows. Section 2 reviews the existing FSAP initiative by the IMF and the World Bank. Section 3 reviews the relevance of the FSAP to the Islamic finance and the initiatives for the Islamic financial industry. Section 4 discusses the areas of the assessments. Section 5 discusses the implementation of iFSAP. Section 6 concludes the paper.

2. A brief about the FSAP

The FSAP initiative is a joint program developed by the IMF and the World Bank to help strengthen the financial system. The pilot program was launched in 1999 and has gone through reviews and updates until the formal document was launched in 2005. The objective of the FSAP program is to achieve an integrated analysis of stability and development issues in the financial system at the country level that will contribute to global financial stability by using a variety of assessment tools and methodologies.[2] The implementation of FSAP offers benefits in some areas (World Bank and IMF, 2005). First, it allows the government to analyze issues relating to the stability and development of the financial system by using a standardized method of assessment. Second, as the result of assessment process, the government can identify the points of vulnerability of the financial system. Third, the government can also detect the weakness of the financial system. Lastly, based on the identification and analysis conducted, the result of the assessment process serves as the basis for policy formulation aiming at strengthening the infrastructure needed for improving the financial stability in the long run including its capability to withstand any adverse effect resulting from external shocks that could possibly happen in the future. The FSAP states that a sound and well functioning financial system is supported by three pillars to sustain orderly financial development and stability, which relate to the macroeconomic factors, regulatory and supervisory frameworks, and the infrastructures.

Pilar I : Macroprudential Surveillance and Financial Stability
Pillar II : Regulatory and Supervisory Framework of the Financial System
Pilar III : Financial System Infrastructure

The three assessment pillars are consolidated into the final assessment reflecting the overall stability of the financial system, and current financial structure and stage of development.

Based on the assessment process, the document will also offer the recommendation and follow-up actions (see **Exhibit 1**). As illustrated in the **Exhibit 2**, the FSAP is conducted by the IMF and the bank to compliment the reports put forward for the board presentation under the ROSCs binder. As the follow-up, the assessment committee will suggest programs, which generally cover continuous country dialogue, technical assistance and lending operations, as well as capacity building and policy reforms. The technical assistance program would accommodate country specifics that are unique. With the growing significance, the assessment of the soundness of the Islamic financial system becomes more important than the previous since the new system provides benefits to sustain the economic

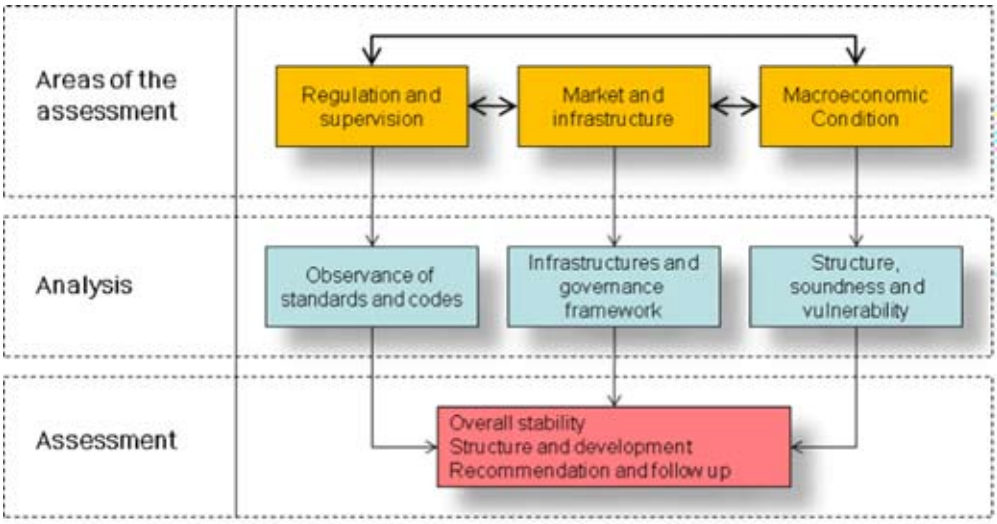
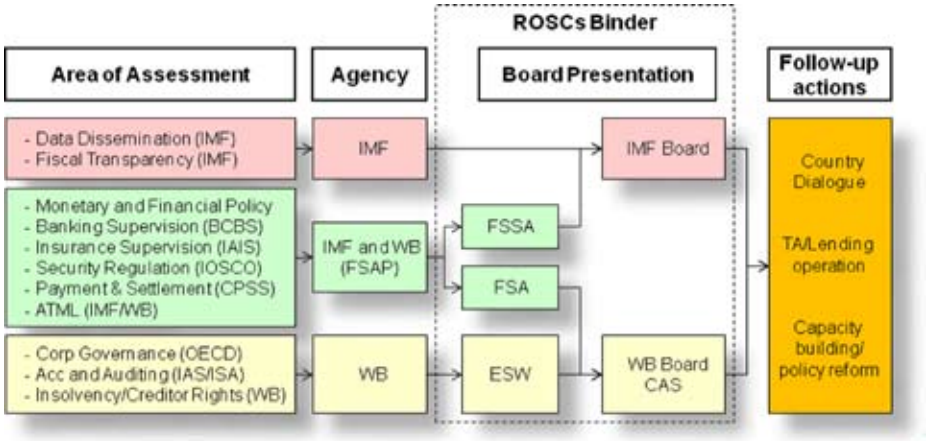


Exhibit 1. The assessment framework.



Notes: ROSCs: Reports on the Observance of Standards and Code
FSSA: Financial Sector Stability Assessment
FSA: Financial Sector Assessment
ESW: Economic and Sector Work
CAS: Country Assistance Strategy

Exhibit 2. FSAP and ROSCs.

development and potential risk in the case of operational failures. The inclusion of the assessment of the Islamic financial system within the 3 pillars of the assessments could help the financial authority assure that the Islamic financial system fulfills the essential requirements to contribute to financial stability in general. Those requirements for the Islamic financial system are supposed to be compatible with the existing financial assessment framework in order to arrive at an accurate consolidated picture.

This assessment process can also be considered as the step to integrate the Islamic financial system into the global financial system by assuring the compliance with international prudential measures and the Shariah principles at the same time.

3. The iFSAP studies

The prudential regulatory framework has been one of the central themes after the recent financial crises. Most of the countries have participated in the Bank-Fund Financial Sector Assessment Program (FSAP) in order to create a comprehensive assessment process considerate of financial stability and development needs of the within financial systems around the world. The governments allowing the Islamic financial institutions to operate need to assure this new system operates within the prudential corridor. Senior representatives from the IFSB, IMF and IIFM have taken an initial step to discuss the assessment methodology and to see the possible level of formality of the assessment process in country-level agenda.[3] The initial discussion is followed-up by the IRTI-IDB study to review the methodology and procedures used in the Bank-Fund FSAP in order to identify the areas where additional guidance and benchmarking would be helpful to FSAP assessors in order to assess the development and stability of the Islamic Financial Services Industry (IFSI).[4]

The last studies regarding the possible implementation of iFSAP has provided a birds-eye view of gaps occuring between the existing FSAP assessment methodology and the existing measures in the Islamic financial industry (see **Exhibit 3**). There are three main areas discussed in the studies comprising general standards applied, macroeconomic and microeconomic analysis. The first issue discusses the standards applicable to accounting systems, financial reporting and tax treatments so that the industry can achieve its optimal operational efficiency, and, eventually, a level playing field. The accounting standard applied to Islamic finance should show itself to be reliable and to promote transparency and good governance besides being capable of accommodating its operational peculiarities. There is a need to translate those characteristics into clear financial profiles properly so that the financial authority can provide appropriate treatments. One of the important examples is the relationship between financial properties and solvency regimes that relate the Shariah properties into financial claims that link public funds to the bank capital and financial safety net programs. The studies found the need to have adequate guidelines set in place around tax treatment and accounting standards. This would foster product innovation beneficial to all financial players, such as banking, capital market or even the government and central banks, when it comes to sukuk issuance.

At the micro level, an international initiative, led by IFSB, has been trying to fill the gaps in the field of prudential standards, in terms of promoting modifications on capital adequacy standards applicable to Islamic banks, risk management, good governance, codes of business conducts, etc. However, the implementation is not on a compulsory basis. It allows some modifications based on national discretion around what was considered to best fit its condition. Despite its efforts to keep on achieving its target to better equip the market, much still remains to be done. The standards issued require more technical notes so that they can achieve their practical benefit. The technical notes should serve to explain how the prudential measures describe financial conditions precisely in terms of liquidity figures and potential risk faced by the financial institutions.

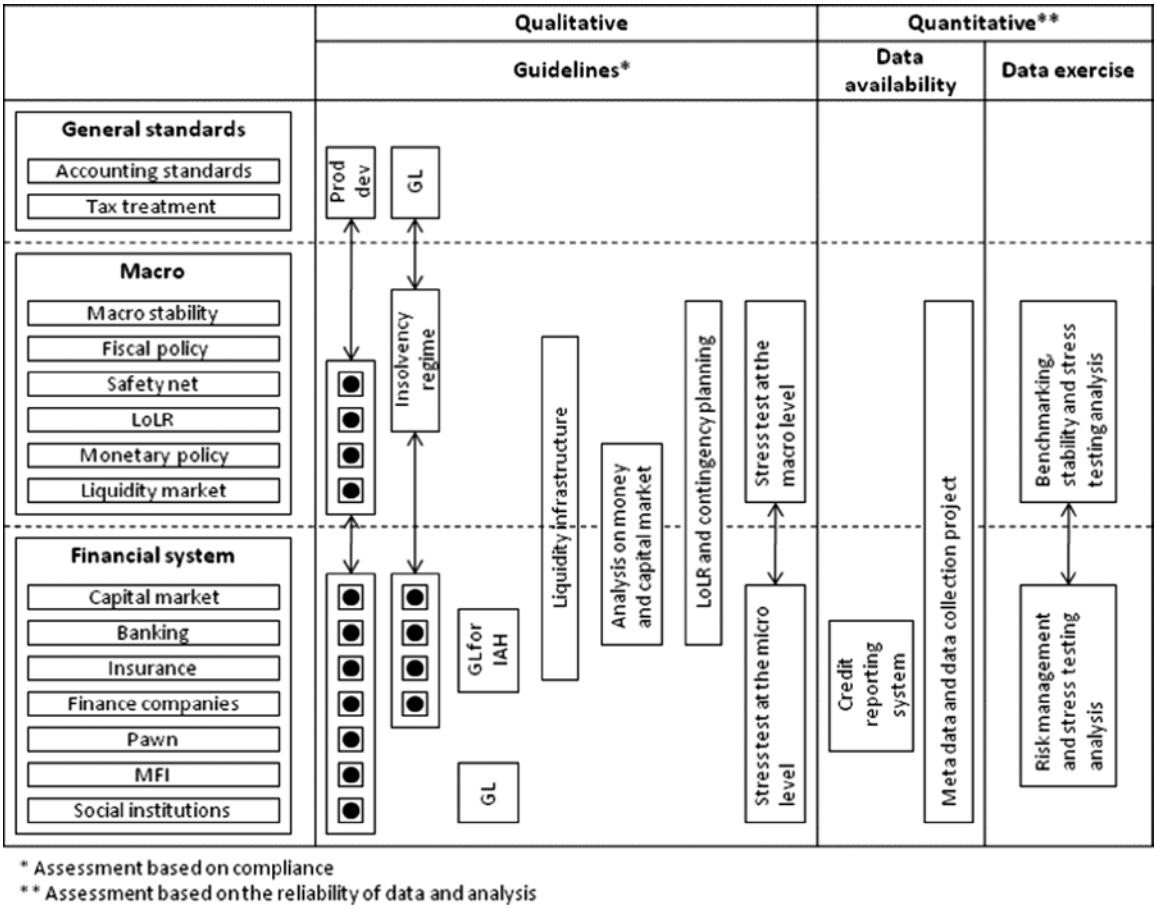


Exhibit 3. Gaps identified in the FSAP initiatives for Islamic finance.

Since the Islamic financial institutions face different frontiers of transactional modes, there is a need to develop suitable methodologies applicable for risk identification, measurement, mitigation techniques, and monitoring. At the macro level, the challenges are largely based on the capability to interpret the financial figures resultant from the risk assessment process and to consolidate the financial figures of the Islamic financial sector into that which would be interpretable by the mainstream. The analysis would cover the areas of liquidity markets, lender of the last resort facility, stress-testing analysis and financial robustness against any possible shocks.

Having the initial iFSAP study in hand, the phase II study explores 2 major areas: potential absorbance of international best practices set in the regulatory standards and the prudential measures allowing the supervisors to always maintain financial soundness (see **Exhibit 4**). In the area of regulatory standards, the study focuses on the compilation process of the main documents according to the international regulatory standards issued by the conventional bodies and the international standards set for Islamic finance. This compilation process is aimed at identifying the existing gaps that should be filled by the Islamic regulatory setting bodies so that it could offer reference points when any financial supervisor refers to it. The regulatory framework covers the banking industry, capital market, insurance, social sector, accounting standards and other aspects relating to infrastructural development.

The compilation of prudential measures involves the analysis of the financial indicators at the micro level as well as at the macro level. The financial indicators at the micro level concern the operational sustainability of the financial institutions. The indicators at the macro level concern the financial stability and systemic costs, particularly when encountering an adverse condition. In addition to the stability issues that are the main focus of the FSAP, the study also presents developmental issues, since most of the Islamic financial system is still in the developing stage. In this follow-up stage, the initiative also elaborates on the assessment methodology that combines the issues of the absorbance of the regulatory framework and the issues of financial stability, which involve the quantitative aspects.

The study serves as a continuation of the previous one, seeking possible steps to fill up the gaps. The steps will cover the followings:

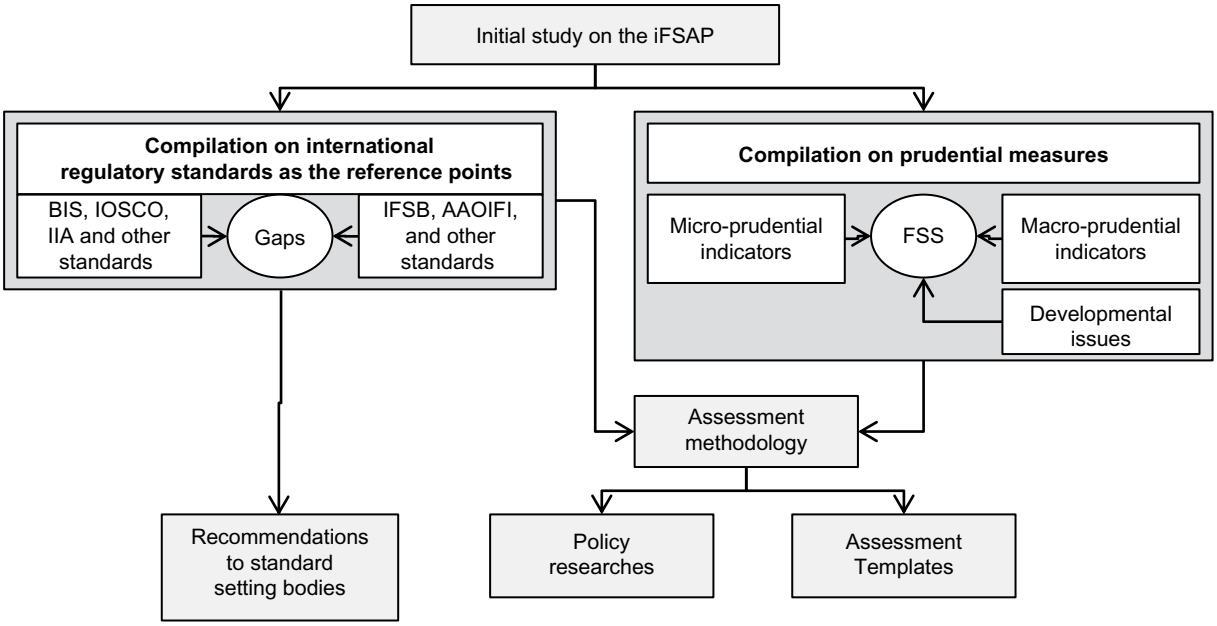


Exhibit 4. Flow of the analysis.

1. The compilation of the international regulatory standards as the reference points for regulatory absorbance – this includes conventional and Islamic regulatory standards
2. Identification of possible indicators applicable for Islamic finance prudential measures, at both micro and macro levels

The study aims at providing a comprehensive picture of Islamic finance architecture, adding value on several fronts as follows:

1. It provides a bird-eye view of the Islamic financial system within the global financial market – this describes the potential differences as well as the common ground between the regulatory framework of the two systems
2. It provides a converged view on how Islamic finance could contribute to financial robustness on whole, particularly when it comes to the assessment process
3. It provides some analytical grounds for the governments that wish to develop Islamic finance within their jurisdictions, while maintaining their financial soundness and operational efficiency

4. The areas of the assessment

Financial stability assessment

Financial stability assessment involves the analysis on macroeconomic and financial market development, macro prudential framework, macro financial linkage and key policy issues supporting financial stability. The involvement of the Islamic financial system in macroeconomic analysis depends upon the level of significance of the Islamic finance in one particular country. Other issues specific to the country may also be folded into the analysis to arrive at wider perspectives and understanding of various stages and dynamics of national development.

Macroeconomic and financial development

A dedicated analysis of the vulnerability of the Islamic financial system would be important to complement the overall analysis, assuming that the Islamic financial system would manifest different dynamics in particular response to the financial disturbance at hand. A dedicated reporting system compiling Islamic financial data and information would be important for the analysis since it enables the authority to look into the Islamic financial system independently before it is integrated into the national financial analysis. The dedicated reporting system is expected to have the same level of operational reliability in terms of data accuracy and time lag.

Macro-prudential surveillance framework

Financial stability indicators

The IFSB has initiated the establishment of internationally compatible Islamic financial indicators (IFSB, 2007)[5]. The financial data and information complements the IMF Financial Stability Indicators (FSI) (IMF, 2006) arriving at better understanding of the dynamics of the Islamic financial system. The financial authority identified the Islamic financial data, which was compiled from the market through a dedicated reporting system. The prudential data set represents the potential financial disturbance directly caused by the lack of operational soundness, as produced by the financial institutions. Some of the data set is totally the same as its conventional counterpart, whilst some of those represent necessary adjustments, like capital adequacy standard and prudential reserves allocated

to the profit sharing investment account holders. Like the IMF-FSI data set, the IFSB financial data set focused more attention on the three major financial industries: Islamic banking, takaful industry and Islamic capital market (particularly sukuk). The analysis should also include the role of sukuk in supporting debt sustainability of the government as another pillar providing financial resources for development. The Islamic financial industry should be able to set a proper methodology for stress testing representing the level of the system robustness to withstand any possible and unexpected financial shock in the future. The result of the stress testing should also be compatible and complimentary to the stress testing process of the financial system as a whole. Complementing the existing dominating institutions, there is also one segment of the Islamic financial industry that is supposed to play a significant role in the development of the Islamic financial industry, i.e. the Zakat-Infaq-Sadaqah and Waqaf (ZISW) systems. As mentioned earlier, the ZISW system could enhance the outreach of the system by providing low-cost funds and infrastructure so that the system can serve the low-income society more effectively. An efficient informational system allowing cross-sector information exchange could even leverage the benefit of the ZISW funds when the facilities are combined with other facilities provided by other Islamic financial sectors.

5. System-focused stress testing

The implementation of stress testing may adopt two different approaches: top-down and bottom-up. The stress test at the aggregate level may also involve variety techniques and toolboxes (Blaschke et al., 2001). Top-down approach estimates the effect by using aggregate data, whilst bottom-up approach estimates the effect by using individual institutions' portfolios. Having proposed by its member countries, the IFSB has also come up with a set of principles outlining the essential components in conducting stress testing at both the institution level and systemic level. This helps the supervisory authority assure the Islamic financial industry operates within the acceptable prudential corridor, which involves variables having different intensity from those of the conventional. Bottom-up stress testing would allow financial authority to capture specificities in Islamic finance.

6. Analysis of macro-financial linkages

Effect of FS on macroeconomic development

An analysis on specific sector where Islamic banking starts to show its significance may be done to see the potential effect of the Islamic banking problems on those particular economic sectors. A second linkage can be found in trade finance, which showed a dramatic fall during the period of financial crisis, which eventually affected the pace of economic development. The magnitude of the impact linked to the lack of insurance when it was needed, to herd behavior (among banks, official export credit agencies, and private insurers), and to weaknesses in domestic banking systems. This encourages the analysis of takaful industry when its presence becomes financially significant. Another linkage comes from the function of banking institutions as monetary transmission channels by the central bank. If there is any significant problem occurs in the banking industry, it could disrupt its capacity of the central bank to perform its function effectively. The analysis would have to take account of financial structure, including the relative importance of market and bank financing, the role of foreign banks in financial intermediation, and the central bank operating procedures. As a part of the banking industry, Islamic banking may also be used as a channel of monetary transmission. The analysis involves the innovation of Islamic monetary instruments and its effectiveness in supporting efficient monetary policy.

7. Effect of FS on debt sustainability

Debt servicing problem in Islamic finance might take a different shape since there exist share-based instruments besides fixed-income instruments. If the share-based instruments are more dominant, debt-servicing problems will be less intensive. However, the choice is up to the market players depending upon the level of transparency and market discipline in the market. Debt servicing problems in the government are caused by deterioration of the government's balance sheet and unsustainable debt ratio, which could create a severe impact on the whole financial system since government securities play a key role as risk-free assets, as stores of collateral and as liquid assets.

Macroeconomic variables such as interest rate and exchange rate may also be significant factors causing problems in debt sustainability. Therefore, the government and the monetary authorities should make concerted and credible efforts to assure these since debt sustainability and macroeconomic sustainability are mutually reinforcing. The assessment of debt sustainability and monitoring the two-way linkages between financial system soundness and financial soundness of nonfinancial sectors are keys to fostering financial stability. In a separate analysis, debt sustainability is analyzed on the sukuk market for countries that have used sukuk as one of the fiscal instruments globally as well as domestically. Assuming that the level of demand could be different, the government should have sufficient knowledge about the market to come up with the planning for an efficient composition of issuance government sukuk and bonds.

8. Effect of FS on growth and financial development

Financial soundness gives positive effect to the economic growth. The soundness of financial systems involves stability and the development of the market to facilitate the real economic activities. To that extent, Islamic finance assures that all the financial transactions have direct links to the economy. In many countries, the development involves the size of the banking system and the liquidity of stock markets, which each positively linked with economic growth which lower external financing constraints impeding corporate and industrial expansion. The last financial crises proves that although financial development can foster general development, the financial authorities should assure the prudential part of this development since fast growth of the financial market can make it vulnerable to shocks and putting constraints on the economic output. Specifically, the financial regulatory authorities need to distinguish

to what extent a rapid financial sector growth reflects improvements in access to finance and to what extent the growth reflects a loosening in risk management practices and supervision. Islamic finance may have a greater chance to reduce the market volatility since it does not involve the speculative transactions that do not have direct link to the economy.

9. Other topics relevant to the financial stability analysis

International financial centers (IFC) and offshore financial centers (OFC).

Islamic banking and finance may also be a part of financial services offered in the IFC and OFC. The objective of offering Islamic finance is similar to the conventional, i.e. providing more flexibility to the global players. The presence of the IFC and OFC may offer economic benefits, but it may be an additional source of instability for the host economy. The hosting countries should have a financial surveillance that is capable of conducting analysis covering the complex structure of the key financial institutions operating in an IFC and the operations in which those institutions are engaged so people can understand the sources of the risks and the transfers of risks within and from the IFC.

10. Capital account liberalization

The choice of capital control regime has a significant effect on the way that external shocks are transmitted to the domestic financial system (including the Islamic financial industry) and to the macro-economy. Some evidences show how capital account liberalization can provide the economy with natural adjustment and minimize the potential of having speculative attacks. However, the liberalization process requires a thorough consideration and process on the capital account on domestic financial stability.

11. Key policy issues and policy priorities to support financial stability

The policy actions cover four key areas: macroeconomic, institutional, regulatory or supervisory, and structural. The financial authorities of related jurisdictions are in a position to formulize policy tools with appropriate mix and timing to address the vulnerability, which combines the analysis of risks and vulnerabilities with the assessment of various financial policy responses and policy frameworks. Priorities in financial policy development need to be put to the Islamic financial industry. The rapid growth of Islamic financial institutions in several countries needs to be facilitated by proper regulatory and supervisory frameworks. The new financial industry also needs to be supported by infrastructure, including efficient settlement systems and safety nets.

12. Financial structure and development assessment

The Islamic financial system is also expected to deliver efficient financial services to all market segments and sectors of the economy. Technically, the scale and the scope of activities affect the level of operational efficiency. Since the Islamic financial industry is relatively new, different paces of development may occur in different subsectors. In most cases, Islamic banking is usually the most developed followed by the Islamic capital market, takaful industry and other subsectors.

13. Quantitative benchmarking

Quantitative benchmarking for the Islamic financial industry may use the structure of IFSB prudential data for financial data comparison. Some of them already use the GDP for unit of comparison. Quantitative benchmarking normally takes three main areas for comparison, i.e. business volume as the measure of efficiency as a function of economic of scale, operational sustainability and efficiency in terms of profitability, and net-worth level (solvability) in terms of capital. This quantitative benchmarking analysis may also be used to measure of the level of significance of the Islamic banking operations in one particular financial jurisdiction.

14. Review of legal, informational, and transactional technology infrastructures for assessment and development

The Islamic financial industry needs to translate its internationally accepted standards within its operations so that the integration into the global financial markets contribute to global financial stability. Islamic finance embraces sharing in some of the financial transactions that may be considered less appropriate in the conventional system. The supervisory authority needs to define those transactions in the operating regulations at micro and macro level effectively. This adoption would bring legal consequences to other legal aspects like bankruptcy law. The recognition of Islamic financial operations needs to take place in some relevant legal structures like company law, trade law besides directly related laws like banking act, capital market acts and insurance acts.

The existence of informational infrastructures is aimed at reducing asymmetric information between borrowers and lenders. The information required covers transparency in borrowers' financial statements and enables lenders to assess borrowers' creditworthiness on present and past financial and operational performance, and readily available credit information on borrowers enables lenders to assess borrowers' creditworthiness according to their past performance within the financial system.

The effectiveness of financial reporting should also be supported by sufficient accounting and auditing rules and practice, as well as the legal and organizational requirements for public or private credit registries and property registries. In addition to that, the presence of rating agency may be relevant in more-advanced, middle-income countries. The Islamic financial system is even in a deeper need for this informational infrastructure to minimize potential moral hazards in the shared based financial contracts. In some countries, the Islamic financial system uses the same credit information exchange facility with some slight modifications in the financial data structure to make the transparency and market discipline work. Development assessment includes evaluating the effectiveness of the check and money transfer system in terms of time and cost, and access to the financial systems. The payment system should be flexible to facilitate

the transaction within the whole financial system including the Islamic financial system. A reliable payment system is also critical to sustain the function of central bank in conducting monetary policy and performing its function as Lender of the Last Resort (LOLR) for both the conventional and the Islamic banks by using appropriate instruments.

15. Sectoral development review

Banking

The banking industry plays a significant role in economic development, particularly in most developing countries through an intermediation process. An effective banking system is normally characterized by considerable depth and breadth in terms both of customer base and of product range and and efficiency. Similarly, the development of the Islamic financial industry is normally led by a significant development of Islamic banking industry. Some financial indicators like overhead costs, income spreads, and profit margins may also indicate the level of operational efficiency.

Quantitative benchmarking

Comparison is made between Islamic banks and conventional banks, and cross-country analysis. It should be able to explain not only the level of operational efficiency but also the decomposing factors pointing out on the roots of the deficiencies in the system. One indicator must be able to be decomposed into other factors, such as profit margin is decomposed by overhead cost, loan-loss provision, reserve requirements, taxes and the profits. The level of access to banking services may be assessed by physical presence (geographical spread of branch offices and ATM) and virtual presence (level of internet access and the availability of mobile banking services to the community).

Scope of activities

An assessment of the scope of activities is aimed at assuring the synchronization between risk-taking activities and the regulatory framework applied (a level of playing field). Each country may adopt different operational segmentation of Islamic banking operation e.g. whether adopting a universal banking framework or segmenting the investment banking and commercial banking criteria. This assessment also identifies the existence of near-banking activities, which potentially magnify the financial disturbance within the system. Different financial institutions may converge to provide similar financial products as the result of stiff business competition. The assessment should also consider the competition between conventional and Islamic banking.

Competition and market segmentation

The level of competition may be indicated by the number of the players operating within the market. However, relating to the analysis of scope of activities, the level of competition may also come not only from the banking institutions but also from other financial companies offering almost the same financial products like insurance companies or other institutions that used to be the outsiders before the financial innovation become advanced. The level of competition, in turn, would determine the behavior of the banking institution particularly in composing its investment portfolio. High competition would lead the players to become more aggressive in approaching the market.

Taxation issue

The taxation issue covers direct and indirect taxation impacts on the operational efficiency. The direct taxation issue is relating to the deduction of taxable income by the provision of earning asset losses and possible double taxation problems to the trade-based assets. This requires sufficient understanding on the Islamic financial transactions when it is implemented in the tax law. Indirect taxation issue is relating to reserve requirement determined by the central bank.

Near banking institutions

There are financial institutions operating in the society to provide alternative financing. These financial institutions can take the form of finance companies that can be seen as an annex to the commercial banking system, and some smaller scale near-banks may have sufficient development importance to call for special treatment. Some smaller near-bank institutions consist of specialized microfinance firms, cooperative credit unions, specialized mortgage banks, and government sponsored specialized development intermediaries. This calls for a special regulatory framework due to its financial characteristics particularly when the activities involve the deposit taking activities. Some of the institutions are operating for non-profit motif and some of them operate in very small business activities.

16. Takaful and collective funds

Takaful companies provide risk-reduction instruments on the liabilities side and conduct long-term funds management. Some investments of the takaful industry are placed in terms of bank deposits or in terms of unit trust; therefore, it is necessary to have a cross-sector review to assess inter-relation among the possible connected sectors. Takaful and collective investment funds operations often overlap in the area of pension fund management. Takaful companies may sell pension policy or manage pension funds and so do the fund managers. The assessment process may also cover the available range of products and its pricings, and its relation to the regulatory framework, level of competition, organizational capacity, and existing skills in the industry.

17. Securities market

The assessment of the Islamic capital market needs to look at the quantitative measures describing the depth and liquidity of the market. The depth and liquidity are fundamentally affected by the variety of Islamic financial instruments available in the market (i.e., fixed income and equity types of instruments, including any possible Shariah compatible derivative products) and transaction cost. In most countries, the domestic sukuk market is often less developed than the Islamic equity market due to some weaknesses. Active issuance of government sukuk can have a significant influence on the functioning of the sukuk market by helping provide the benchmark needed to price more risky securities and can be beneficial to the monetary policy management. An efficient capital market requires a cost-effective infrastructure including proper design of the trading platform and the regulatory burden. The ultimate goal of the capital market

should be providing an optimal way of giving local firms and investor access to liquid securities markets.

18. The demand-side reviews and the effect of finance on the real sector

The demand-side review is conducted to assess the demand for, and access to, financial and credit services by listed companies, including corporate and micro entrepreneurs – ideally from different economic sectors and business lines. An analysis on the demand side may be conducted for Islamic financial system to indicate the development trend and its sustainability. The financial authority may need to assess the awareness level of the public towards the Islamic financial system.

Evaluating financial sector supervision: Banking, insurance and securities market

The soundness of the financial system depends upon the effectiveness of the financial sector supervision. The FSAP framework emphasizes legal, institutional and policy frameworks of the three sectors, i.e. banking, securities markets and insurance. Besides the implementation of the relevant regulatory framework, effective supervision requires some preconditions covering the provision and consistent enforcement of business laws, good corporate governance (including adoption of sound accounting), auditing, and transparency procedures that carry wide international acceptance and that promote market discipline, appropriate systemic liquidity arrangements, and adequate ways to minimize systemic risk. As part of the overall financial system, the analysis of the Islamic financial system has also come into view covering the same aspects of the assessment.

Legal and institutional framework for financial supervision

Financial sector supervision is one of the center points of the assessment process of financial soundness. The supervisory framework should be able to maintain systemic stability by providing a safe mechanism of exit for the Islamic financial institutions that do not meet the soundness criteria. Effective supervisory activities for Islamic financial institutions require proper legal frameworks that empower supervisors to ensure that rules and regulation are effectively implemented by the market players. The key laws governing the central bank, banking and financial institutions, capital market laws, and insurance laws are backed by adequate provisions on the efficient and reliable payment system infrastructure. Those key laws should clearly recognize Islamic financial operations. The legal and institutional framework should cover: the identity of the supervisor; the authority and the process behind the issuance of regulations and guidance (including the governance around Shariah fatwa issuance); the authority and tools to monitor and verify compliance with the regulations and principles of safe and sound operations; the authority and actions to remedy, enforce, take control, and restructure the procedures to de-license and liquidate problem institutions that cannot be restructured. It should define the roles and responsibilities of institutions involved in supervision activities. They are regulatory governance, regulatory practices, prudential, and financial integrity and safety net arrangements.

In order to maintain the soundness and robustness systematically, the Islamic financial system needs proper designed safety nets that cover efficient liquidity support, deposit insurance schemes, investor protection schemes and crisis management protocols. The Islamic financial industry faces almost the same challenges when entertaining its customers. There are risk-averse customers and risk-neutral customers. At the customer side, the implementation of deposit insurance schemes and investor protection could reduce the potential liquidity crunch resulted from deposit runs. Although, in concept, Islamic banking depositors are supposed to share the profit as well as the loss, in reality they still wish to have sufficient financial assurance. Some countries have included deposit protection schemes with both systems: the conventional and the Islamic. However, some further development should take place to improve the mechanism that confirms Shariah principles. There are two distinctive features that should appear in the Islamic deposit insurance scheme. First, the protection does not directly link to the deposit but is in place more to relieve potential loss of the Islamic banking business activities. Secondly, the investment activities by the deposit insurance corporation should be on the Shariah-compliant financial instruments in order to justify the income. The financial authorities for Islamic banking system have to prepare the required infrastructure required, particularly where the Islamic banking operations is still far below the critical mass to achieve its operational sustainability. The legal interpretation can also be an issue – to interpret the liabilities around the customers when the guarantee is given to the instrument that is supposed share contracts according to Shariah principles. This issue is addressed implicitly, in terms of capital, according to an adequacy standard by the IFSB, which introduces the alpha factor as the proxy to estimate the potential liabilities levied to the Islamic banks that eventually will apply to the deposit's insurance corporation. In some Islamic finance operating countries, the deposit insurance scheme has been a standard practice; although, some adjustments need to take place. In conventional practices, the banks pay premiums to the Deposit Insurance Company (DIC) and then the DIC invest that premium in some investment portfolios. There exist two conflicting problems when it comes to Islamic banking:

i. In order to minimize adverse selection problems, the authority sets a ceiling premium rates for the deposit (in case of a flat-rate scheme). The banks that entertain the customers with deposit rates higher than the ceiling rates will be excluded from the deposit protection scheme. On the other hand, the returns given by the Islamic banking systems are based on the actual financial performance. The higher the financial performance of an Islamic bank, the higher the return given to the investors. There is a need to set out a risk-sensitive premium rate applied for the Islamic banking so that the system can still minimize the potential adverse selection problem and at the same time provides incentives to the bank to perform well.
ii. The deposit insurance scheme needs to separate the Islamic assets from the conventional. It will allow the DIC to invest the premium taken from the Islamic banking to the Islamic compatible instruments.

On resolution process, the Islamic banking should also be equipped with adequate procedures to deal with problem

banks and sound exit mechanism that is capable of minimizing contagion effect to other Islamic banks.

Liquidity has become very important to improve its operational efficiency and the confidence of the customers as the ultimate points of the financial services. To anticipate the unexpected but plausible event, the Islamic financial system should also be equipped with proper set of crisis management protocols outlining the mandates of the related financial authorities to formulize inter sector emergency financial policy in an extreme financial condition. The policy actions could be set out of the existing regulations. However, the protocol should define the criteria, fulfilling the extreme financial conditions agreed by other related institutions, including even the parliament.

Aspects of financial safety nets

Financial safety net arrangement is aimed at preventing potential failure of individual financial institutions, which would lead to systemic financial disruption and broader economic problems. The arrangement covers 3 important areas: a framework for liquidity support, deposit insurance plus investor and policyholder protection schemes, and crisis management policies.

Frameworks for liquidity support

Liquidity is one of key elements to support the operational sustainability of the financial system. Normally, the central bank provides emergency liquidity facility in terms of lender-of-the-last-resort (LOLR), applicable for conventional and Islamic banks as the systemic financial buffer against temporary disturbance in the financial market.

Deposit insurance

Deposit insurance schemes can serve as the last line of defense for customers in the financial market. In an adverse condition, the customers of the banks assume the first come first serve basis providing a better chance for the customers who withdraw their money earlier. Normally, a deposit protection scheme does not cover the whole value of the public funds deposited in the banking system. The Basel Committee and International Association of Deposit Insurers (2009) have released a set of core principles for effective deposit insurance systems. The concept of deposit insurance has to also cover Islamic banking since it is also vulnerable to experience deposit runs because of idiosyncratic disturbance. Practically, an effective deposit insurance scheme for Islamic finance needs to be supported by clearly defined concept of solvency regime.

Investor and policy holder protection scheme

The investor and policy holder protection scheme becomes more important in Islamic finance with the presence of share based instruments. Most of the protection schemes are designed to provide compensation due to fraudulent practices or other malfeasance in absolute terms, as a proportional of the loss incurred. In most cases, investor protection schemes have become as statutory and set as separate companies administered by the regulator of the market. The scheme should promote good governance practice and minimize the potential of having moral hazard problems. Ultimately, this protection scheme helps to level the playing field across different sectors. In order to address this issue, the IOSCO (2003) has issued objectives and principles of securities regulation that put this protection scheme in context.

Crisis management

Financial policies should be set based on two possible conditions: normal business and periods of crisis. The financial crisis may be caused by natural disaster or other idiosyncratic failures that can adversely affect the financial system. Islamic financial institutions are not immune and could adversely be affected by the crisis. The CMP covers the steps to identify potential threats to the financial stability which are sourced from problems in the general banking industry, currency vulnerability, interest rate and other possible indicators leading to the financial crisis. The CMP should be equipped with threshold function in defining the financial crisis since each country would have its own structure and characteristics that determine the level of financial resilience when facing a significant turmoil. In general, the establishment of CMP is aimed at two objectives. First, the CMP serves as the anticipatory action to maintain the operational soundness of the financial system even if it operates under significant financial pressure so that the intermediary function can always be performed. Second, the CPM should promote possible prompt corrective actions to stabilize the system whenever necessary. In order to make the CMP effective, there are a few steps that are worth considered to be taken as follows: business continuity plan (BCP), framework for coordination, early warning system, and stress test.

Islamic banking supervision

The Islamic banking industry has IFSB as its international regulatory standard setter to equip the industry with sufficient standards. Technically, the Islamic banking industry can benefit from the current development that has taken place in conventional industry. The majority of the regulatory framework can still be applicable to Islamic banking operations like the 25 BCPs that have been internationally adopted.

Group 1 – principle 1 – the standards needs to address the position of fatwa authority within the banking industry contributing to the legal certainty in a case of dispute. There should be clear definitions around the banking authority that governs the whole range of Islamic banking issues, including Shariah compliance. The dispute settlement mechanism needs to involve a proper process that is pro-efficiency and that avoids unnecessary cost per transaction. Group 2 (principles 2–5) the standards need to define Islamic banking permissible activities that in some particular areas might be incompatible with their conventional counterpart. Islamic banks allow the operation of mutual funds within the banking activities while theirs are classified as a capital market activities. On the licensing activities, the Islamic banking authority needs to consider sufficient knowledge of Shariah banking by the top management and the shareholders of the bank to minimize the operational risk (particularly regarding the Shariah compliance aspect) besides the general banking activities like financing, money transfer, maintaining

deposits, etc. Like any other companies, Islamic bank ownership is transferable through an acquisition process. Therefore, the transfer of ownership needs to go through a thorough examination process. The authority should also assure that competent persons having high integrity are in place to run the business. Group 3 (principles 6–18): Islamic banking can follow the Capital Adequacy and Risk Management Standards set by the IFSB. The standards have to accommodated the Islamic financial instruments in the Risk Weighted calculation and set out the definition of capital applicable to the Islamic banking operations.

Although, it still adopts the standardized approach using a risk-slotting menu in determining the level of credit risks. In the prudential measures, particularly in the risk management standard, the Islamic banking industry can follow the standards set by the BIS. The Risk Control System (RCS) applies both to Islamic banking and conventional banking. The differences mostly take place in the product interpretation process. Islamic banking has different types of products that translate into the same payoff curves and risk building blocks. For example, the assessment of the credit risk on the mudharaba contract requires a correct understanding on the contractual arrangement to define the state of default, the probability of default and the residual value, which eventually determines the price of the product. The same approach goes to other types of risk, i.e. market risk, liquidity risk and operational risk.

The Islamic banks may not have a direct impact on the interest rate risk since they do not have interest based instruments that adjust the price of the instruments contractually like interest based derivatives. However, the changes of interest rates in the market may cause a demand of the instruments since the investment vehicles do not differentiate the segment of the market. On the liabilities side, the changes in interest rate may also influence the appetite of the investors to put their money in the Islamic banks. In order to maintain the liquidity, the Islamic bank may adjust the returns to the investors to keep them loyal to the bank. Group 4 (principles 19–21): the supervisors of Islamic banks may use the BIS standards in formulating a proper supervision strategy that consists of reporting systems, techniques and approaches. The on-site and off-site supervision have been standard practice involving comprehensive reporting systems to reflect the actual financial soundness of the Islamic banking institutions. The supervisors use the on-site supervision to verify the information reported through the off-site reporting system and to have a closer look on the particular problem in a more focused way. The Islamic banking system may complement the reporting system with Shariah compliant aspects in assuring the Islamic banks operate within the Shariah principles. Group 5 (principle 22): Islamic banking uses the internationally recognized accounting standards (IAS) and financial reporting (IFRS) complemented by the AAOIFI standards to capture the Islamic financial transaction more appropriately. As a matter of fact, the AAOIFI standards were developed in compatibility with the IAS standards. Group 6 (principle 23): Islamic banking may use the BIS standards in formulating corrective and remedial power of supervisors. Group 7 (principles 24 to 25) Islamic banks may be a part of conglomerate business and conduct international operations. The supervisory activities should be able to perform consolidated supervisory activities capable of capturing potential risks resultant from financial and non-financial activities within the same business group. Besides, the supervisory framework applied should be able to define responsibilities shared between home and host countries when it comes to the cross border banking activities.

Assessment of insurance supervision

Similar to the Islamic banking industry, the takaful industry may also benefit from the current development in the insurance industry by adopting relevant principles of the insurance supervisory framework. The table summarizes the areas peculiar to the takaful practices taking assumption that almost international insurance standards are applicable to the general takaful industry.

Group 1 (principles 1 to 4) the standards need to address the position of fatwa authority issuing the Shariah standards applicable to the takaful activities. At the operational level, the supervisors have also a responsibility to assure the Shariah compliance besides the prudential issues. Group 2 (principles 5 to 8) the standards need to define the scope of business activities that are Shariah compliant. The scope covers the takaful contribution collecting process, investment process and operational management. Consequently, the persons running the business activities should have an adequate capacity in terms of prudential measures and Shariah compliant issues, and integrity. This includes the possible transfer of controlling parties that could potentially change the policy direction of the companies. The existence of tabarru pools is unique to the takaful industry; hence, the takaful operators need additional guidance in managing the funds to minimize potential moral hazards in the usage of the funds. Group 3 (principles 9 to 12) the standards need to address the corrective actions taken in the area of Shariah compliance to minimize the violation of Shariah rules. One of the possible corrective measures is to combine the suasion and the financial penalty as one enforcement factor since the deterioration of the public confidence may result in financial loss. The same as the insurance industry, the takaful authority should have a sound exit policy allowing an exit process without causing unnecessary contagion effect to the system as a whole. Group 4 (principles 13 to 17): operationally, takaful operators may have different products and structure (like tabarru funds). The takaful industry may apply the same prudential standards to achieve operational soundness, contributing to the operational sustainability at the institution level and systemic stability such as the use of solvency ratio (capital adequacy) and other methods relevant to the risk assessment process. Group 5 (principles 18 to 21) the takaful industry may use the same principles plus additional items on the disclosure material containing additional Shariah compliance reports and additional business conducts. The IFSB has issued a standard guidance on the conduct of business for Islamic financial institutions, including takaful operators. The implementation of conduct of business is supposed to be borne by the commitment of the industry. It does not have punitive action at the event of violation. Group 6 (principles 22) the industry may implement the same ICPs standards in the area of anti-money laundering and combating the financing for terrorism since there is no Shariah issue involved in the analysis. A full adoption of this standard

would improve the profile of the takaful industry in terms of financial integrity internationally. Group 7 (principles 23 to 24): the main issue on the group wide supervision and macro-prudential surveillance is the compatibility in the reporting system so that the consolidated figure represents financial position and performance accurately. A financial conversion process may be required to facilitate the consolidation process to converge the interpretation. Group 8 (principles 25 to 26) the takaful supervisor would need to develop cooperation domestically (with other financial supervisory agency within the country) and to achieve mutual understanding between host and home countries particularly in the area of Shariah interpretation. In some cases, different interpretation on the Shariah aspect may lead to different assumptions in the Islamic financial contract such as an insolvency regime in the Islamic financial transaction.

Assessment of securities market regulation

Islamic capital market basically plays the same function as the other capital market except for with Shariah compliant issues. The Shariah compliant issues restrict certain prohibited business activities and financial instruments containing interest-bearing concepts and speculation. The Islamic capital market serves as melting point facilitating the investment activities between the investors and the capital holder efficiently. A review has been done resulting in the conclusion that IOSCO principles are applicable to the Islamic securities market with some recommendation. Generally the recommendations touch the areas that recognize Shariah principles with formal regulation, giving the authorities the power to deal with Shariah compliance issues. These recommendations are to minimize the Shariah compliance risk that may disrupt public confidence regarding the Islamic segment of capital markets. The recommendations cover regulatory instruments relating to the prudential measures, reporting frameworks and entry policy ensuring the intermediary has the relevant competencies in Islamic finance.

Group 1 – The principles relating to the regulator (1–8) set out the status and the position of the regulator. The principles state the importance of having the operational competence and independence to arrive at the highest professional standards. Like other financial regulators, the capital market regulators should also be supported by a clear defined legal framework to assure its effectiveness of the regulatory process. The relevance to the Shariah issues covers the regulatory power over the Shariah compliance aspect, the consistency over the Shariah interpretation and the capacity of the regulators to understand the Shariah principles. Group 2 – The principle for self-regulation (9) sets out the framework of self-regulatory organization involving some direct oversight responsibility and observing standards of fairness and confidentiality. The same principle is applicable to the Islamic system. Group 3 – The principles for enforcement of securities regulation (10–12) set out comprehensive supervisory tools to ensure the enforcement of securities regulation covering inspection, investigation and surveillance. The regulators should be able to ensure the sufficient level of compliance of the companies to the regulatory framework set by the regulator in order to achieve sufficient level of investor protection including the inspection over Shariah compliance issue and the power to rectify any possible incompliance problem. Group 4 – The principles for cooperation in regulation (13–15) set out the framework for cooperation with other domestic regulators and other regulator in foreign countries in the areas of information exchange and operational assistance in the discharge of their function and exercise of their powers. However, different jurisdictions may have different interpretation over Shariah principles that give different implication to the application technically. Therefore, mutual recognition by home and host supervisor is very important. Group 5 – The principles for issuers (16–18) set out the basic requirement should be fulfilled by the issuers. The requirements include accurate and timely financial reports for disclosure purposes, adherence to the international accounting and auditing standard so that the investors are treated fairly and in equitable manner. All types of risks should be represented objectively in the financial report. In order to achieve a sufficient level of compatibility, the convergence of financial reporting system between the conventional and Islamic financial reporting is important. Group 6 – The principles for auditors, credit ratings agencies, and other information service providers (19–23) set out the regulatory requirements for adequate level of oversight on the auditing companies, credit rating agencies and other entities offering financial analysis services. The requirements are meant to assure that the investors have unbiased and accurate information about the market arriving at greater confidence over the market. These institutions are subject to registration and periodic review by the supervisory authority. Group 7 – The principles for collective investment scheme (24–28) set out the regulatory requirements for collective investment activities. The requirements include the legal foundation, structure of collective investment scheme, disclosure, asset valuation redemption process and assurance that the companies invest in Shariah compatible instruments. Group 8 – The principles for market intermediaries (29–31) set out the regulatory guidance for market intermediaries in order to protect the interests of the clients. There is a need to prescribe prudential requirement reflecting the level of risk undertaken by the intermediary companies and its responsibility, particularly when dealing with failure of the market intermediary containing systemic risk that could possibly creating instability. Operationally, the intermediary companies should also sufficient knowledge about Islamic finance to minimize reputation risk and to ensure that the intermediary companies apply Shariah compliant risk management techniques. Group 8 – The principles for secondary market (33–38) set out the regulatory guidance for the establishment of the secondary market. The regulatory principles should be able to promote transparency minimizing the potential of having manipulative practices and unfair trading activities. Besides prohibiting usury, the Islamic finance also prohibits unproductive speculative activities which try to gain financial profit out of speculative transactions which do not reflect the real economic activities. Operationally, the liquidity in the Islamic financial market is also important which may offer benefits to the market players to gain more efficiency in the liquidity management. However, excessive liquidity can also built out of speculative financial transactions that may make the financial market more vulnerable against market disturbance. The Islamic financial authority may prescribe an alternative mechanism to facilitate the financial transactions that are compliant with Shariah principles.

The guiding principles also cover the oversight of large exposures and the settlement of securities transactions to ensure fairness, effectiveness and efficiency. All the prudential frameworks set to the capital market are expected to reduce the systemic risk and promote sustainable economic development. The link between the observance of the 38 principles and market development and stability is very important. The implementation of the 38 principles needs some preconditions to be met including company law, established contract law, clear tax law, bankruptcy law, banking law, competition law and an efficient judicial system.

19. Assessing the supervision of other financial intermediaries

Non-bank islamic financial institutions

Conceptually, standalone-low-leveraged finance companies do not need an intensive supervisory framework since they operate with their own financial sources. Any operational failure of this financial institution will not create systemic implications, and any transactional disputes fall under common commercial law. There is no immediate impact on financial stability, although some significant impact on the productions can also trouble other production sectors within their production chains. Currently, the ability of the financial authority to expand its supervisory activities to the non-bank financial institutions is very important when it comes to the assessment of the cross-sector wide conglomerate financial activities. The risk-based capital adequacy assessment takes into account the financial conditions of any financially related companies capable of influencing the financial soundness of the Islamic banks, takaful and other highly supervised institutions. Islamic financial institutions should address the same importance for conducting consolidated supervision to minimize the myopia when assessing a group-wide financial soundness.

ZISW institutions

In most Muslim countries, the development of Islamic social institutions has just reached the infancy stage. Currently, almost no regulatory framework exists in a comprehensive way to optimize its presence in supporting the economic development. However, some countries have started to equip the institutions with stronger legal foundations by ratifying Zakat and Waqaf acts as the basis for their operations. So far, there has not been an international effort to set out guiding principles for zakat and waqaf operators as well as the supervisory authority to operate soundly.

Zakat-infaq-sadakah institutions

Despite the slow pace of development, some countries have taken serious steps to establish the legal foundation for zakat operators. The areas of regulation cover the objectives of the establishment that emphasize the development roles in the economic development, the activities of the institutions, reporting system and possible punitive actions taken in the case of violations to the zakat regulations. Financially, the operational failure of any zakat institutions will not create systemic disturbance since the funds collected by the zakat institutions is non-claimable. However, the Islamic financial system succeeds in mobilizing the zakat funds, the outreach of the system will improve very much since it is low cost and can sustain the basic consumption of the poor even in the period of economic downturn. The purpose of the regulatory and supervisory framework is to minimize the potential misuse of the funds and improve the public confidence in performing one of the important religious duties at the economic front. At the macroeconomic level, the presence of zakat system can dampen the economic volatility since the consumption level can always be maintained, providing opportunity to the production sector to still operate during a period of recession. The zakat system can equip the financial system with effective measures for financial inclusion programs. Some human capital development programs need to be developed to achieve operational effectiveness in distributing the funds, which is beneficial to the poverty alleviation program. In some countries, the zakat fund is also used for working capital of the poor when they start up the business. Some of the fund is also allocated to sustain health programs for the poor in terms of free medication and the development of health facility like small hospitals.

Waqaf institutions

Different from zakat, infaq and sadaqah institutions, the management of waqaf funds needs to maintain the value of the funds, and all the assets managed should be allocated according to the statements of the waqaf providers when it was submitted to the management. As mentioned earlier, types of waqaf may vary from fixed asset waqaf (like lands, houses and buildings) to cash waqaf. The designation of waqaf can also be time infinite or fixed-term, which is notable when the period ends. Some countries have already ratified the waqaf act to provide a stronger legal foundation for waqaf management to allocate usage of waqaf assets effectively. The waqaf act defines the basic activities of the waqaf funds and all the relating parties engaged. The waqaf institution is set up as an independent body that is free from vested interest and audited externally to assure that the institutions are well-managed. The asset of the waqaf institutions should be properly registered and managed so that the value of the funds managed will not be looted or mismanaged that could result in the decrease of the net value of the waqaf funds.

Rural and microfinance institutions

Despite the simplicity of the regulatory framework, the regulation applied for microfinance institutions may include legal registration, regular financial reporting representing its financial performance, regular reporting of conduct in business operations, and securing proper license. An international initiative has been done to address the issue on possible standard guidance applicable to micro finance institutions under the Consultative Group to Assist the Poor (CGAP). The initiative has been successful to release guiding principles on regulation and supervision of microfinance institutions. Generally, the guidelines consist of two types of regulations: non-prudential regulations and prudential regulations.

Non-prudential regulations set out the basic requirements supporting the environment, supporting efficient microfinance

activities, particularly non-banking microfinance institutions, which have very limited regulatory frameworks. The non-regulatory regulations cover the legal foundation, allowing the companies to extend their facilities legally, good governance and business conducts, support on the macroeconomic policy (including interest rate ceiling and special tax treatments), and transformation mechanism.

Islamic microfinance institutions may benefit from the current development in the microfinance regulatory framework. Like the Islamic banking industry, Islamic microfinance institutions, particularly to those collecting public deposits, need to always maintain its solvability level high. The depositors of the Islamic microfinance behave like the banking depositors. However, due to its size, the prudential regulation should be kept as simple as possible to minimize the regulatory 'cost' without sacrificing the prudential measures. Most of Islamic microfinance institutions operate under cooperative frameworks opening up wide opportunities for the public to participate as shareholders besides collecting public deposits. Besides Shariah related aspects, Islamic microfinance industry can still adopt the CGAP regulatory framework. The peculiarities to the Islamic microfinance lie upon the recognition of Islamic modes of finance, the adoption of the Islamic accounting standards and the price limit set whilst the rest can still be adopted fully.

Non-bank microfinance institutions, in much simpler structure, resemble the banking institutions; therefore, some of the prudential regulations are similar to those of the banking industry. The prudential regulations put much of emphasize on solvency level and the quality of the exposures. The solvency level is indicated by the minimum capital and capital adequacy ratio. The regulations relating to the quality of exposures cover provisioning, documentation, governance structure (supported by monitoring and reporting), concentration risk, and liquidity position. The guideline principles also put one pillar to state the importance of deposit insurance schemes for the microfinance industry. In order to simplify the supervision process, the guideline provides an alternative supervisory process by using a well-managed commercial bank as the apex to assure the business activities are conducted efficiently as well as prudently. Like its conventional counterpart, Islamic microfinance can adopt the prudential standards for Islamic banking but according to a simpler version, which puts emphasize on the solvability level and the quality of exposures. Islamic microfinance can adopt the existing regulatory framework relating to the quality of exposures that cover provisioning, documentation, governance structure (supported by monitoring and reporting), concentration risk, and liquidity position. The monitoring system should also contain the Shariah compliance aspect to assure public confidence is maintained as high.

20. Assessing financial system integrity – anti-money laundering/combating the financing of terrorism

Anti money laundering and combating terrorism are both considered part of good governance, which is beneficial in strengthening financial sector supervision and promoting better integrity of the international financial system. The AML/CFT tries to minimize the illegally obtained money and investments activities through an outside party to conceal the true source. The AML/CFT is mutually complementing with a wide range of United Nations conventions and resolutions promoting international cooperation in preventing and containing drug trafficking, organized crime, corruption, and efforts to finance terrorism. It covers all financial institutions, including bureau of change, wire remittance transfer, cash couriers, insurers, brokers and traders and also nonfinancial business and professions like lawyers, accountants, and trust and company service providers. Operationally, the financial institutions should practice core principles to enhance know-your-customers (KYC) rules, suspicious transactions reporting, and other due diligence requirements helping to support the AML/CFT regimes. The AML/CFT has been an international initiative and adopted in the various international standards like Basel Committee on Banking Supervision (BCBS), International Association of Insurance Supervisors (IAIS) and International Organization of Securities Commissioners (IOSCO). The BCBS has recognized the money laundering issue in 3 documents: statement on prevention of criminal use of the banking system for the purpose of money laundering, 25 BCPs and customer due diligence for banks. The IAIS has issued guidance paper 5 regarding AML notes for insurance supervisors and insurance entity. Parallel with the 2 standard setters, the IOSCO has also issued a resolution on money laundering to be implemented by the securities regulators in each individual country. The adoption of the AML/CFT is considered important to improve the financial stability since the money laundering activities could create an adverse impact to the country macroeconomic performance, national reputation and cross-border externalities.

A country with a strong indication of money laundering activities may have less potential to attract foreign investment and be more volatile to international capital flows and exchange rates. Internally, money laundering may also distort resource allocation and distribution of wealth. In most cases, it is costly and time consuming to eradicate the money laundering activities. After all, all economic and financial transactions are based on trust wherein the government needs to keep its integrity at all times. The government should ensure that the existing legal foundation provides legal power to exercise necessary actions such as freezing, seizing and confiscating the proceeds of crime and terrorist funding on the widest range of institutions (financial and non financial institutions). The law and measures also need to assure the international cooperation. Some preconditions that need to be in place in order to make the implementation of the AML/ACT effective include among others: the implementation of transparency and good governance, sound financial sector policy and infrastructure, appropriate measure for combating corruption, high ethical and professional requirement of the supporting institutions such as court system, and AML/CFT culture.

21. Assessing the legal infrastructure for a financial system

The operational soundness and sustainability of the financial system heavily depends upon the legal foundation assuring legal rights, predictability, and fair and impartial enforcement of rules and regulations. In general, the legal

infrastructures covers the central banking operations and the law regulating banking, non-banking operations and the markets. From the financial sector perspective, the financial regulation cover central banking law, banking law, capital market law, etc. In a broader term, those regulations also cover insolvency regime and creditor rights, financial safety nets, ownership, contracts, contract enforcement, accounting and auditing, disclosure, formation of trusts and asset securitization, etc.

Financial sector legal infrastructure

When establishing a legal foundation, the Islamic financial system may need to establish new acts like an Islamic banking act, a takaful act, and a zakat and waqaf act. In some particular areas, the Islamic financial system may still use the existing legal infrastructure with some modifications or amendments like the central bank act, payment system act, governing law for government debt management, capital market act and financial safety net act. One of the main objectives of establishing new governing acts is to provide more space and flexibility for development where Islamic finance has some operational distinctive features.

1. Central banking law should define the mandate of the central banks to conduct monetary policy by using Islamic instruments and channels. The mandate should also allow the central bank to facilitate the Islamic financial institutions to get a Lender of the Last Resort facility when the market is struck by an unexpected liquidity crunch.
2. The recognition of the Islamic banking activities is stated either in the existing banking act or separate Islamic banking act. The banking act should define the operational activities of the Islamic banks, including its products and services, the power to regulate and to supervise according to prudential guidelines and well translated Shariah principles.
3. The payment system act should state the mandate to facilitate financial transactions of the conventional markets and Islamic financial market, and to develop necessary infrastructure for Islamic financial markets whenever necessary.
4. The governing law on government debt management should state the mandate to issue government fiscal instruments both conventionally as well as through Islamic instruments. Regular issuance of local government bonds (sukuk) can also be used as one of liquidity and monetary instruments.
5. The capital market act (facilitating Islamic instrument and conventional or separate Islamic capital market) should state the Islamic capital market operations covering the Islamic capital market products, modes of transactions and Shariah related governance besides the common regulatory framework generally applicable.
6. The recognition of the takaful industry is stated either in the existing insurance act or separate takaful. The act should define the operational activities of the takaful institutions including the products and services, and the regulatory powers.
7. The governing law of a financial safety net should formally include the Islamic financial system allowing the related authorities to react against unexpected financial shock.

Just like its conventional counterpart, the Islamic financial system requires other supporting laws including commercial laws, creditor right and insolvency systems, access to credit and land rights, and supporting judicial system.

1. Commercial laws normally facilitate general commercial business transactions, which inspire other business-related laws such as company law, etc. The amendment is aimed at recognizing Shariah-based transactions formally as another acceptable basis of commercial contracts.
2. The adoption of profit and loss sharing contracts, including their derivatives such as hybrid contracts, has to be accommodated when defining the creditor rights and insolvency regimes. This will be the basis of the bankruptcy concept, solvency regime and deposit insurance scheme.
3. Judicial system refers to the efficiency and effectiveness of a dispute settlement system, which also recognizes the Shariah principles.

22. Assessing information and governance infrastructure

The assessment on the information infrastructure covers 3 main areas. They are the framework for monetary and financial policy transparency; the accounting and auditing framework that helps to define and validate the information that is disclosed to the public and the regulatory authorities, and the arrangements to compile, process, and share information on financial conditions and credit exposures of borrowers and other issuers of financial claims.

Monetary and financial policy transparency

The central bank plays its function as the monetary authority controlling (i) the money supply, (ii) availability of money, and (iii) cost of money in order to attain a set of objectives oriented toward the growth and stability of the economy. The policy-making rests on the relationship between the cost of money in an economy and the total money supply. Through a variety of controlling instruments, the central bank tries to influence and optimize the economic outcomes covering economic growth, inflation, exchange rates with other currencies and unemployment. The central bank holds a monopoly of money issuance and has all power to alter the money supply and thus influence the interest rate and eventually achieve the ultimate economic goals. In order to perform this function, the central bank as the monetary authority must have a credibility in the market that makes private agents believe that these announcements will reflect actual future policy.

If the monetary authority believes that private agents anticipate the low inflation, it will provide incentives to the market by adopting an expansionist monetary policy and vice versa. Besides the technical capabilities, the central bank should be able to show its independence and transparency, since lack of clarity can serve to lead policy away from what is believed to be the most beneficial. The IMF has issued a document providing guidelines to the monetary authorities to gain credibility from the public. As a part of the financial industry, Islamic financial institutions may also be used as channels for monetary transmission by using Shariah compatible financial instruments, particularly

when the size of the business of the Islamic financial system becomes significant. The central bank might use Shariah compatible central bank certificates in order to complement the existing central bank certificate used with conventional banking institutions or other instruments, which have the potential to be used as Islamic monetary instruments, like government sukuk.

Pillars no 1 to 4 describe the clarity of roles, responsibilities and objectives of central banks for monetary policy that should be well-defined in the legal documents; the openness to the public about the process for formulating and reporting monetary policy decisions in order to gain public confidence; the level of information dissemination to the public about the monetary policy; and, the methods to set criteria of the accountability and assurance of integrity by the central bank. The laws should explicitly give mandate to the central bank to conduct monetary policies using 2 possible channels of monetary transmission, resulting in clear monetary signals to the market effectively. Pillars no 5 to 8 mention the requirements for other financial agencies supporting the effectiveness of the monetary operations. Just as with the monetary authority, there is a need to have clarity of roles, responsibilities and objectives among the financial agencies; openness in formulating and reporting of financial policies; publicly available information on financial policies, and accountability and assurance of integrity by financial agencies. The positions of regulatory authorities of the Islamic financial system should be clearly defined. Each country may have different approaches towards the supervisory structure. Some may adopt the single peak approach (the combination of the supervisory functions under one single roof) and some may separate the supervisory authority for bank and non-bank institutions (including securities market). The Islamic financial institutions report their financial position in a compatible structure to the conventional so that the consolidation process can be done easily. In order to fulfill the requirements as one of the monetary instrument, the government sukuk should be issued regularly in the local currency and traded with a sufficient level of liquidity.

Accounting and auditing assessments

The assessment of the financial soundness is based on the financial assumptions and standards set in the accounting standards. Therefore, a core component of good corporate governance is an accurate disclosure based on high quality accounting and auditing standards. The assessment process reflects the adoption of such accounting standards, which serve as a precondition to support effective supervisory frameworks. Moreover, financial disclosure is very important for informed financial decisions, effective resource allocation and effective functioning of the market. Inability to implement such accounting standards very well can reduce the ability of the supervisory authority to filter the sound financial institutions from the unsound ones. This becomes important especially when the conglomeration exists, which requires consolidated supervision in place.

These accounting and auditing standards, which have been developed by the International Accounting Standards Board (IASB), evolve over time. Currently, there are 36 effective IAS–IFRS standards, with 11 interpretations, addressing the general-purpose financial statements designed to meet the needs of shareholders, creditors, employees, government agencies, and the public at large for information about a public entity's financial position, performance, and cash flows. Some of the standards of IASs and IFRSs are very important in the financial sector assessment process. The IAS 1 deals with the content of financial statements generally. The IAS 30 sets out requirements to the disclosures by banks and other similar institutions of their income statement, balance sheet, and contingencies and commitments, including other off-balance sheet items. The IAS 32 and IAS 39 set out requirements on the recognition, measurement, and disclosure of financial instruments.

For the auditing purposes, there are 33 ISAs, accompanied by a "Code of Ethics for Professional Accountants" and other related engagement standards. Some auditing standards relevant to the financial industry include ISA 220, 230, 240 400, 520 and 700 setting out the quality control, documentation, responsibility to consider fraud and error, risk assessments of internal control, analytical procedures, and the auditor's report on financial statements respectively. Like the accounting standards, the IASB and the IFAC's IAASB constantly revise and update the standards to reflect current trends and issues in financial reporting and auditing, which reflect globalization, capital flows, regionalization, technology changes, and so forth. In order to promote the global adoption of the standards, the World Bank has developed a program relating to the FSAP-ROSC focusing on the institutional framework, comparability of national and international standards, compliance with national standards, and action plan by the respective countries. The Islamic financial institutions need to adopt internationally recognized accounting and auditing standards as well as accommodating the transactional uniqueness of the Islamic finance. The AAOIFI has issued a number of documents covering accounting standards, auditing standards, governance standards and Shariah.

The AAOIFI has already issued 26 accounting standards covering the very basic objectives of the financial statements of the Islamic financial institutions, which are compatible with conventional international accounting standards. Some countries have already adopted the AAOIFI accounting standards into their national accounting standards for the adoption by the industry besides keeping the IASB accounting standards wherever required. Each country may decide different level of adoption towards the AAOIFI standards depending upon their readiness of the country to really translate and harmonize the AAOIFI standards into their existing accounting standards. The accounting standards have also been complemented by the auditing standards. The auditing standards put emphasize on the Shariah aspects besides common auditing process. The AAOIFI standards on governance put more emphasis on the roles of Shariah supervisory board which distinguish the Islamic financial institutions from other financial institutions.

The AAOIFI have also issued documents relating to the Shariah standards which serve as underlying principles for Islamic financial instruments. However, the adoption of Shariah standards is subject to the approval of the ulama council in each country whether the standards confirm

their Shariah interpretation. Eventually, the financial authorities operating Islamic financial system should be able to declare the accounting regime adopted in the system to avoid misconception when interpreting financial reports particularly when it comes to group wide consolidated figures.

Credit reporting system and financial information services

The credit reporting system has become a formidable tool to minimize adverse selection problems. It provides high-quality credit information about the credit customers. Ideally, the system is fueled by data from banks, other financial intermediaries, private firms, retailers and others. They share certain accurate and reliable information, which is exchangeable through rapid access systems that support a well-functioning credit market. In order to maintain the quality of the information, the credit reporting system should meet certain technical criteria: the system must be open, the data collection covers positive and negative information, data maintenance is kept for a reasonable timeframe, and the data should be updated in real time. Practically, the data reporting system should be governed by several legal foundations covering law on bank secrecy, data protection law, consumer protection, fair credit and consumer credit regulation, and provision with respect to privacy and personal or corporate secrets in existing laws. It is used to support both onsite and offsite supervision, ultimately facilitate macro prudential surveillance since the supervisor has access to individual data. Islamic financial systems would need the credit reporting system as a mean to minimize the adverse selection problem. The Islamic financial system can use the existing information systems, employing slight modifications relating to the data fields describing the classification of the Islamic financial products. In a wider horizon, efficient informational exchange among the Islamic financial institutions and conventional financial system can avoid the loophole potentially used by unsound customers to maximize their own benefits.

Corporate governance

Good Corporate Governance (GCG) provides positive impact to the operational efficiency of the companies since it harmonizes the relationship among the management, its boards, shareholders and other relevant stakeholders (including the communities). Operationally, the GCG can bridge the gaps between the management who runs the companies and the shareholders. To a broader degree, the implementation of GCG contributes to financial stability and promotes market confidence and fosters market disciplines. The harmonization of the relationship covers the property rights of shareholders, the mechanisms of exercising and protecting those rights, and the way of ensuring a fair return. Those relationships are set based on proper incentive mechanisms and effective monitoring activities. The GCG serves as one of the preconditions in achieving effective supervision, which is mutually reinforcing with other financial prudential standards such as BCPs, IOSCO and other standards. To address this importance, the OECD has issued OECD Principles of Corporate Governance outlining the four fundamental principles covering responsibility, accountability, fairness and transparency. The principles have been adopted as one of the 12 key standards for sound financial systems by the Financial Stability Forum. The IFSB and the AAOIFI have issued documents relating to the practice of the Good Corporate Governance (GCG) although the emphasis is put more on the role of Shariah boards. This confirms that the Islamic financial institutions may adopt the common standards of Good Corporate Governance for general use, complemented by the Shariah board related standards. The same goes for the disclosure regime where Islamic financial industry should promote more market power to objectively govern the industry. For the Islamic financial industry, which promotes the use of sharing based financial transaction, the transparency becomes very essential to reduce agency problem.

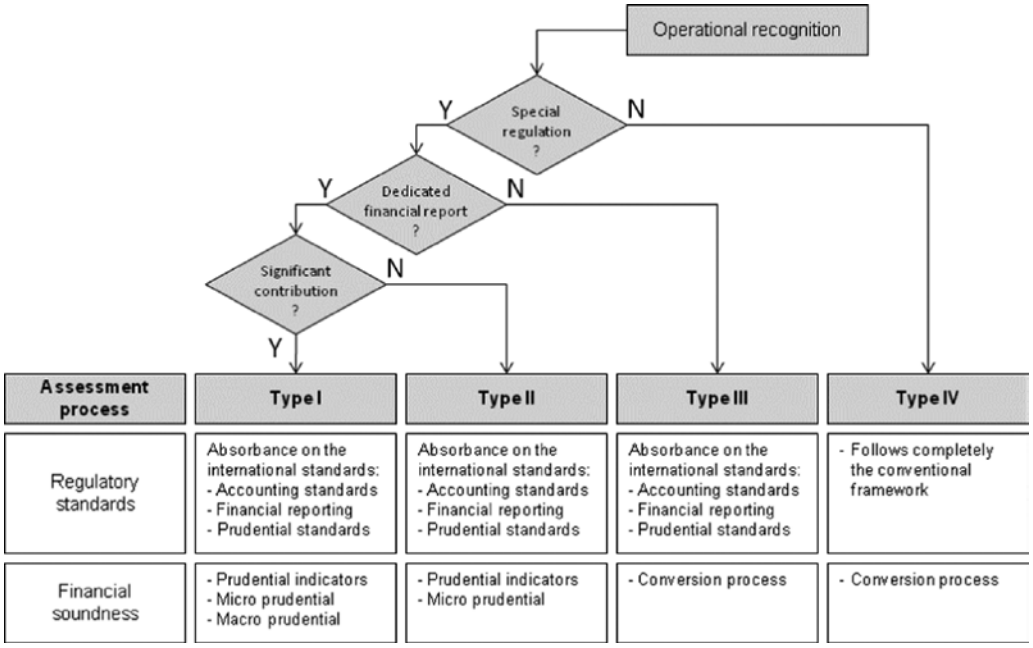
Disclosure regime for financial institutions

Market forces is very essential in supporting self-regulatory regime in the financial market and has become one of the important pillars in the international prudential standards such as Basle Standards and other supervisory standards although standard element of the financial disclosures have been covered in the IFRS standards. At the national level, disclosure standards are outlined in the banking laws, listing requirements of the securities regulations and applicable company laws. Practically, market discipline serves as an effective tool to limit excessive risk taking behavior by banks covered by the safety net. Market discipline is important when the supervisory approach has shifted from the compliance-based supervision to the risk based supervisory review. In particular, pillar III of Basle II provides 13 templates to facilitate the financial disclosure issue. The templates cover scope of application, capital structure, capital adequacy, credit risk (general), credit risk (standardized approach), credit risk (IRB approach), equity (banking book) positions, credit risk mitigation, securitization, market risk (standardized approach), market risk (internal models approach), operational risk, and interest rate risk in the banking book. The Islamic financial industry should encourage the convergence between IFRS and Islamic financial reporting.

Systemic liquidity infrastructure

Systemic liquidity is the setting of institutional and operational arrangement that provide first liquidity effect to the market players in achieving effectiveness and efficiency. This arrangement includes central banking, banking and other financial institutions. The market infrastructure involves the design and operation of payment systems and securities settlement systems; the design of monetary policy instruments and procedures for money and exchange markets operations; public debt and foreign exchange reserves management strategies and operations and microstructure of money, exchange, and securities markets.

The Islamic financial industry heavily relies on an efficient and reliable liquidity infrastructure consisting of payment systems, securities settlements, monetary and foreign exchange settlements, government market securities and foreign exchange reserve management. It can benefit from the existing infrastructure, which is already able to support operational efficiency. Technically, the newly established



Assessment process	Type I	Type II	Type III	Type IV
Regulatory standards	Absorbance on the international standards: - Accounting standards - Financial reporting - Prudential standards	Absorbance on the international standards: - Accounting standards - Financial reporting - Prudential standards	Absorbance on the international standards: - Accounting standards - Financial reporting - Prudential standards	- Follows completely the conventional framework
Financial soundness	- Prudential indicators - Micro prudential - Macro prudential	- Prudential indicators - Micro prudential	- Conversion process	- Conversion process

Exhibit 5. The level of presence.

industry can use the Real Time Gross Settlement (RTGS) to provide the customers and the companies with a more efficient payment system. The Islamic financial system may need the Delivery Versus Payment (DVP) type of settlement more than to the PVP (Payment Versus Payment) to facilitate the exchanges of underlying Islamic underlying assets. The industry needs to also develop liquidity market that trades securities (including government securities). In most instances, Islamic financial market needs liquidity and flexibility to let the market participants achieve its operational efficiency.

23. Implementation

The degree of presence and operation of the Islamic financial industry varies in every country. In some countries, the industry has just reached an introductory phase, whilst in others the industry may have played a significant role in the economic development. There are possibly four ways to adopt the Islamic financial system, as illustrated in **Exhibit 5**. Type I represents the countries that allow the Islamic financial institutions to operate with full adoption of the conventional regulatory and supervisory framework. Type II represents the countries that adopt dedicated regulatory standards for the Islamic financial industry without having dedicated financial reports that accommodate the operational differences of the Islamic financial transactions. In type I and II countries, the financial authorities need to have conversion programs that translate financial information into conventional reporting standards so that the financial figures can fit all the existing financial ratios and analysis. Type III represents the countries that already developed dedicated financial reports representing the actual Islamic financial transactions based on particular Shariah contracts besides adopting dedicated regulatory standards.

Since the share of the Islamic financial industry is still small, dedicated macro analysis is not exercised to compliment the nation wide financial analysis. Type IV represents the countries that already have dedicated financial reporting, regulatory framework and significant contribution of Islamic financial industry within their national financial industry. The issue of financial stability should also cover the Islamic financial industry as the complementary part of the macroeconomic analysis. The adoption of the regulatory framework depends upon national discretion. The implementation of the iFSAP initiative should also consider the conditionality of the assessed countries based on the optimality criteria in developing the regulatory structure and the infrastructure.

Conclusion

In order to achieve operational soundness, the development of the Islamic financial system requires concerted efforts by the stakeholders internationally. The efforts may take place in several areas as follows:

1. It would be required to develop further international regulatory standards by the international Islamic standard setters – in most instances, the development of an Islamic regulatory framework may still use the existing regulatory framework wherever it still relevant. The development of the regulatory standards needs to also involve the conventional counterparts in order to build up mutual understanding between the two systems.
2. The development of appropriate tools for complementing the existing assessment framework is also needed since the assessment process should cover the whole financial system including the conventional and the Islamic. Therefore, the assessors should be equipped with sufficient knowledge of Islamic financial systems, particularly when they relate to the financial stability issues involving financial ratios and infrastructures.

3. The implementation of the assessment process needs to consider the conditionality of the Islamic financial system. The Islamic financial system that significantly presents in one particular country needs a full range assessment process. On the contrary, a limited assessment process may be adopted for countries that operate the Islamic financial system at the very early stage.

Notes

1. Different interpretation would somehow lead to the legal uncertainty in the area of cross-border Islamic financial activities.
2. By year 2009, 40 countries, which are IDB and IFSB member countries, have completed the assessment process with more members are underway.
3. The IDB-World Bank Working Group on Islamic Finance (WGIF) met in Jeddah during January 24–25, 2009, to initiate the discussion with other stakeholders of the IFS industry.
4. IRTI-IDB, in collaboration with Centennial Group, has produced an initial document titled Towards Developing a Template to Assess Islamic Financial Services Industry (IFSI) in the Bank-IMF Financial System Assessment Program (FSAP).
5. During the development of the compilation guide, the IFSB technically collaborated with the IMF to assure the compatibility. The IFSB had been a member of CCE reference group who are responsible for developing the metadata.

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Islamic finance and financial stability: A review of the literature

Ahmed Belouafi[1], Chaouki Bourakba[2], Karima Saci[3]

[1]Associate Professor of Islamic Economics and Finance, Islamic Economics Institute, King Abdul Aziz University, PO Box 80214, Jeddah 21589, Kingdom of Saudi Arabia, E-mail: ambelouafi@kau.edu.sa, Phone: 00 966 542748829
[2]Assistant Professor, Faculty of Business and Administration, Imam Muhammad Bin Saud University, Riyadh, Kingdom of Saudi Arabia, E-mail: chawki62000@yahoo.fr
[3]Assistant Professor, Effat University, PO Box 34689, Jeddah 21478, Kingdom of Saudi Arabia, E-mail: ksaci@effatuniversity.edu.sa

A paper accepted for presentation at the 9th International Conference for Islamic Economics and Finance (9ICIEF), Istanbul, 09–11 September 2013.

Abstract - This paper provides a critical review of the Islamic Economics (IEs) and Finance (IF) literature that have examined the stability of the Islamic Financial System (IFS) and its institutions vis-à-vis the conventional interest-based system. The authors have been able to analyze thirty-four investigations over a thirty-year period, from 1983 to 2013.

The research aims to provide an account of the main findings and conclusions of the literature, discuss the robustness and comprehensiveness of these findings, and highlight some venues for future explorations. To meet these objectives the study utilizes an analytical "evaluative" framework as its main investigative tool.

The results identified two main periods: pre- and post-subprime financial crisis eras. The pre-crisis era has been dominated by theoretical investigations, while the post-crisis era has been dominated by empirical studies. The results, also, show that there is a big divergence between the theory and practice of IF. Theoretical studies claim the "superiority" of an IFS based on pure "equity" and participatory modes of financing, while empirical studies provide mixing results.

It is anticipated that the findings of the study will benefit academia, policy makers, industry players, and other stakeholders alike. Benefit in terms of understanding financial stability complexities and the difficulty in its measurement. More importantly, the paper highlights the contribution that the existence of Islamic financial institutions and the principles that govern their operations can make to enrich the diversity of the on-going discussion taking place in the prevailing conventional literature of Financial Stability (FS).

Keywords: Islamic banks, financial stability, Z-score, GARCH, financial ratios

List of Abbreviations

CBs	Conventional Banks
CFS	Conventional Financial System
FCs	Financial Crises
FS	Financial Stability
GCC	Gulf Cooperation Council
IBs	Islamic Banks
IEs	Islamic Economics
IF	Islamic Finance
IFIs	Islamic financial institutions
IFS	Islamic Financial System
LPB	Limited Purpose Banking
NPA	Nonperforming assets
PLS	Profit and Loss Sharing

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1. Introduction

In 1985, the Federal Reserve Bank of San Francisco convened a two-day conference that gathered some leading financial experts, policy makers and academicians[1] to address the FS issue of the conventional financial system (CFS) from different angles and perspectives. The proceedings of the conference were published in a special volume titled "*The Search for financial Stability: The Past 50 Years.*"

After about a quarter of a century, in 2007–2008, the World was hit with, by far, the largest financial crisis that the it had ever seen since the inflictions of the Great Depression of the late 1920s and early 1930s. The far-reaching magnitude and consequences of the recent global financial crisis has brought, once again, to the forefront the prolonged and the long-awaited issue "*the search for financial stability.*" Pro-founding questions, similar to the ones that had been addressed in the 1985 conference, have been on the surface in a more pressing manner: What is financial stability? Why is it that important? What should be done, and/or can be done, to ensure its attainment and to benefit from its effects? Last but not the least, why has it not been possible to attain such an "elusive" goal despite "the great moderation"[2] that was proclaimed by advocates of the deregulation in 2004—three years prior to the crisis' eruption? And are there any "effective remedies" and/or "greatly moderated structural changes" that can be pursued to overcome the instability impasse?

Within the climate of this heated debate, Islamic financial institutions (IFIs) and the principles that govern their operations received a great deal of attention, as we will see in section III, that examined the reality of their stability as proclaimed by their proponents. Nonetheless, it has to be acknowledged that discussion surrounding stability of the Islamic financial system is not new; the available literature suggests that such a discussion can be traced back to the early 1980s. However, most if not all pre-crisis studies have been theoretically conducted on an "abstract model" assumed to be purely based on equity and participatory modes of financing. The crisis' eruption has triggered empirical inquiries that have tried to capture the ground reality of these institutions as documented in the next section.

This research aims to provide a critical review and account of some theoretical, empirical and other investigations that have been carried out in this area. To meet the intended objectives, the study will address the following questions:

- What is FS and why is it so important?
- What are the main findings and conclusions of the reviewed literature?
- How robust are these findings and conclusions?
- What are the underlying assumptions, methods and arguments utilized to arrive at and/or to support the obtained results?

The research will scrutinize a number of carefully selected studies that have been conducted before and after the eruption of the international financial crisis.

The remainder of this paper is organized as follows: Section II explores financial stability's definition and its importance. In section III, the literature is critically analyzed and discussed. Section IV concludes with some remarks and venues for future elaboration.

2. Financial stability: definition and importance

Although used in economic policymaking rather frequently following the recent financial crisis, financial stability (FS) has proven to be a difficult term to exactly define and even more harder to measure (Allen and Wood 2005, Schinasi 2009, Gadanecz and Jayaram, 2009, and Mohammed et al., 2012). Given the complexity of modern financial systems as well as the global trends observed in recent years, financial stability has been associated with multidimensional conditions broadly attached to the well-functioning of financial systems. Allen and Wood (2005) provided the most comprehensive conceptual framework within which financial stability can be characterized. It encompasses various elements that set up the grounding blocks for a good definition. They claim that public welfare has to be a key objective to any policy intended to establish financial stability. Also, they stressed the importance of the measurability of financial stability and the fact that it has to be under the control of a specific public authority. This would allow responsible policy makers to react in a timely manner to the early signs of financial distress and loss of stability. The entity responsible for maintaining financial stability has to have enough authority to resolve issues related to financial instability. This might influence a broad spectrum of institutions and organizations that have no direct relationship to the root cause of the observed problems. Financial stability is also considered as a dynamic concept that allows for further development in the financial system rather than rigidly prevents natural fluctuations and changes.

Given the ambiguity and impreciseness associated with defining financial stability, most authors associated the loss of stability with excessive risk, crisis and negative externalities (e.g. Ferguson 2002, Schinasi 2004, Gadanecz and Jayaram 2009, Pereira da Silva et al., 2012). Hence, to attempt to clearly define what financial insatiability is, one has to look into its driving sources and identify when the financial system is said to lose its stability and function in a way that adversely impacts economic conditions. Houben et al., 2004 and Mohamed et al., 2012 suggested both Macro and Micro theoretical approaches that can explain the reasons behind the occurrence of financial instability. In the macroeconomic approach, two key drives are thought to trigger instability. These are intense fluctuations in prices and over leveraging in the economy. They argued that one of the core objectives of finance is for households, firms and government to accumulate wealth and improve fixed assets, which in turn leads to an observed increases in the prices of the associated transferable claims. Thus, too much borrowing and investment are linked to the future realization of these claims. Minsky (1959) claimed that when the economy is booming, investors are encouraged to engage in more speculative activities. The increase in assets prices increases the investor's willingness to finance these activities through debt commitments, which drives the interest rates high. Hence, more credit is used in financing speculative activities rather than real investment projects, resulting in a fragile financial structure. If the expected

returns from the speculative activities do not exceed the debt, most speculators go bankrupt and the economy ends up in a debt deflation. This process requires sound risk management practices, particularly in relation to credit and liquidity risks, without which the financial system becomes unstable and prone to crisis.

The microeconomic approach concentrates on the importance of information asymmetry and irrational behavior of economic agents. In the instance of loss of confidence in financial institutions in response to rumors or banking credits, the withdrawal rate of economic agents deposits increases forcing financial institutions to liquidate their claims and accept possible substantial losses. This may shake the credibility of these institutions and engenders banking panics that would eventually translate into excessive instability and crisis.

Given what characterizes financial stability and the core causes and effects of its loss, it becomes apparent that for the financial system to function well and promote further growth in the economy, it needs to maintain stability. When emerging to mitigate information and transaction costs, financial systems provide one fundamental function which is "they facilitate the allocation of resources, across space and time, in an uncertain environment" (Merton and Bodie, 1995). Financial instability damages this allocation creating negatively lasting effects on outputs growth. The recent financial crisis confirmed how serious the loss of stability is, not only in relation to the scale of the financial crisis but also how fast it escalated.

3. The literature: analysis and discussion

An Overview

To facilitate the identification of the general trends that shape the literature of IF and FS on one hand, and to ease the comparison between the results of these studies on the other, the investigated sample of the literature has been divided into three main categories as illustrated in Figure (1).

As illustrated in figure (2) the sample of the researches is dominated by theoretical and empirical investigations; the latter in particular. These two categories constitute slightly above ninety per cent of the total number of the studies analyzed in this paper. This trend has given a rise to a number of interpretations. One of this is the view that regards this orientation as evidence of the "robustness" and "soundness" of the Islamic financial institutions (IFIs) and the inherent stability feature resulting from the principles that lay the ground for their operations. In fact the limited cases of distressed IFIs since the inception of this type of intermediaries in the sixties[3] till now may support this claim. The other interpretation may simply relate the literature trend to the infancy factor of the industry and its insignificant presence at the international financial stage.[4] Indeed this argument is also supported by ground reality as the total value of the entire IF industry does not exceed the one per cent threshold of the total value of the international financial system. Whatever the argument that can be made, the authors believe that as far as FS is concerned it is so difficult to go for this argument unless substantial evidences are objectively provided and assessed from a cross examination of a large pool of the actual practices of these intermediaries.

Turning to the distribution of studies over the covered period, figure (3) shows that the subprime or the international financial crisis, as some would like to ascribe it, attracted more attention to the stability of the IFS. About seventy five per cent (25 investigations) of the reviewed studies have been conducted over the post-crisis years, while about twenty-five percent (9) has been carried out over the span of about a quarter of a century (i.e., 1983–2006).

4. Analysis and discussion of findings of the theoretical studies

Table (1) below presents a summary of the main findings and conclusions of the reviewed theoretical and case study investigations. The table, also, highlights the major utilized methods of analysis in those studies. It is apparent from the last culumn, on the right, that almost all studies[5] claim the "superiority" and the inherent stability of the IFS over that of its conventional counterpart. What are the bases of such claims? And how robust are they?

From a careful examination of those treatises we found that, the authors' elaborations have been based, implicitly or explicitly, upon the following arguments and assumptions:

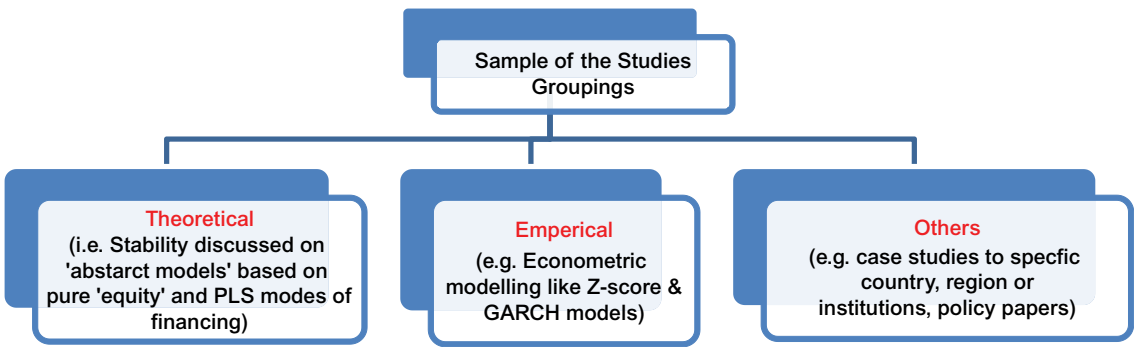

Figure 1. Categorization of the reviewed literature.

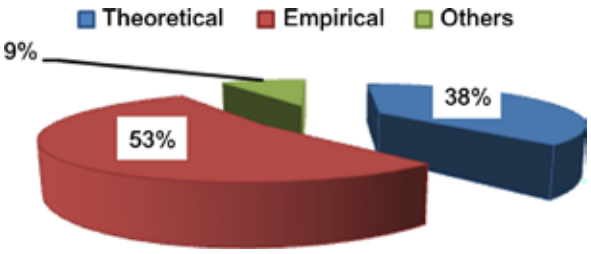

Figure 2. Distribution of the sample of the studies by category.

1. Debt and leveraging are the main driving sources of financial instability in the prevaling conventional financial system (CFS), Askari (2012). These two features are the prime result, to a large extent, of the existence of an *ex-ante* predetermined rate of return in the form of "interest" ("*Riba*" or "Usury") in the current practices of the CFS. According to the reviewed literature, many renowned conventional economists, from the beginning of the 19th century until now, have observed a number of common features that precede the occurrence of financial crises (FCs), Askari et al. (2012). Among the features relating to the presence and wide practice of "interest" are the following[6]:
   - An extended period of low interest rates as was the case in the subprime financial crisis of 2007–2008.[7] Such a policy has led to the huge growth of a non-backed expansion of credit. Soros (2008) noted "when money is free [or quasi-free], the rational lender will keep on lending until there is no one else to lend to," Askari et al. (2010). This situation has been attributed to the development of another axiom; it is the fact that "too much money is chasing too few assets." Under such a scenario there is no other way that this "too much money" can be absorbed except through the appearance of a bubble(s) that will grow without any economic foundations. The appearance of a bubble or bubbles will feed the expansion of the unbacked credit, and the vicious circle continues until the bubble (s) burst. If such a situation arose, the huge volume of the non-backed credit will meltdown, as it was no more than mere promises that were sought to be validated at a certain point in the future. Thereafter, another cycle of the bail-outs programmes, from the tax payers money, and the cheap money through zero or bound zero interest rate policy (ZIRP), quantitative easing and other sophisticated measures will come out from the tool box of "the conventional wisdom" of policy makers to the rescue of the "too-big-to-fail" institutions and to fix other financial and economic disruptions.
   - The unique status and sensitivity of interest as a "price" makes the maintence of its "appropriate"[8] level a very difficult, if not impossible task to attain, Stiglitz (1989) explains "*the interest rate is not like a conventional price. It is a promise to pay an amount in the future. Promises are often broken. If they were not, there would be no issue in determining credit worthiness. Raising the rate of interest may not increase the expected return to a loan; at higher interest rates one obtains a lower quality set of applicants (the adverse selection effect) and each of one's applicants undertakes greater risks (the adverse incentive effect). These effects are sufficiently strong that the net return may be lowered as the bank increases the interest rate characterized by credit rationing.*" Buiter (2009) went further by stating that "*debt, characterized by fixed financial commitments, can be a poor financing choice in a risky, uncertain world where the private and social costs of default are high …*"
   - Minsky (1993), whose work is well known in this domain, departed from the mainstream postulate of the Efficient Market Hypothesis (EMH) to propose the Financial Instability Hypothesis (FIH) instead, has been cited in various instances of the reviewed literature. His extensive work, in the study and analysis of financial crises, that has been carried out for about forty years[9] led him to conclude that there is a fundamental flaw in the conventional economic system. This flaw is related to the type of financing regime and the contractual arrangements that develop over time,[10] "*a fundamental property of all capitalist economies is the existence of a system of borrowing and lending based upon various margins of safety … a debt instrument or a lease provides for payments to be made on account of both interest and principle. An equity liability has only a contingent commitment to make payments; dividends need to be paid only if earned and declared, and there is no contractual need to repay principle. For any given cash flow, from operations or from the fulfillment of owned contracts, the greater the share of equity financing in a balance sheet the greater the margin of safety that protects the owners of the non-equity liabilities.*"

It is, therefore, apparent that based on the above arguments and observations, the authors of the reviewed investigations share Chapra's view that the inadequate market discipline in the current system is the primary cause of FCs, and this indiscipline is, in turn, the result of the risk-shifting paradigm under the "interest-bearing"

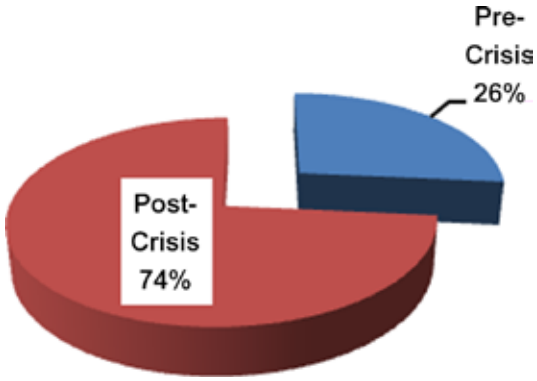

Figure 3. Distribution of studies over time.

Table 1. Summary of the findings of the theoretical and other reviewed investigations.

Author (s) and publication year	Sample	Method of analysis	Main findings
Zarqa, M. A. (1983)		• Tentative remarks; e.g. Agreement of many conventional economists that debt financing is a major factor destabilizing investment in capitalist economies; the speculative demand for money is a source of instability in the Keynesian system; the view held from corporate finance that an increase in debt-financing (as opposed to equity-financing) of a firm increases its risk of insolvency and magnifies the relative fluctuations, "hot money" movements are a destabilizing factor, and strict prohibition of interest eliminates the loan market, and implies that all business financing must be based on various forms of equity.	• Equity financing is intrinsically more stable than one based on interest.
Chishti, S. U. (1985)		• The relative stability of investment under the two systems of fixed and flexible returns to capital is examined through qualitative general model of two differential equations to express financing conditions and investment behavior. • The model is closely related to Minsky's approach of analyzing the inherently unstable character of a financially developed and sophisticated capitalist economic systems. • The added wrinkle to Minsky's model is to interpret the fixity of financing terms, vis-a-vis the uncertainty of profits to be mainly responsible for the gap between cash flows and payment commitments.	• The spread between cash-flows (i.e., profits) and payment commitments (i.e., interest payments) which is the main source of instability in investment. • The real source which generates the abovementioned gap is the fixity of the dated payment commitments versus the uncertainty of cash flows. • IF has a built-in stabilizer to reduce the volatility of investment. • Islamic financing facilities make the payment commitments a function of cash flows.
Khan, M. (1986)		• Theoretical aggregate macroeconomic model is used to study the behavior of the Islamic banking system. The framework is based upon the model developed by Meltzer (1951) and extended by Fernandez (1984).	• The Islamic banking model; based on equity and participation bears resemblance to proposals made in the literature on the banking reform in many countries, especially USA. • The IB model may prove to be better suited to adjusting to shocks resulting from crises (i.e., shocks to assets are absorbed by liabilities). • Thus the real values of assets and liabilities in this model would be equal at all points in time. • The banking system discussed in the paper is a "two-window" model: one window for demand deposit (100% reserve + no return or interest to be paid), the other for investment purposes based on PLS or equity mechanisms (no guarantees on principal and return + no official reserve requirements).

(*Continued*)

Table 1 - *Continued*

Author (s) and publication year	Sample	Method of analysis	Main findings
			• Many eminent western economists (e.g. Fisher (1945), Simons (1948), Friedman (1969)) Western economists have argued that the current (one-sided liability) interest-based financial system is fundamentally unstable.
Mirakhor, A. and Zaidi, I. (1991)		• Development and use of a simple general equilibrium model for an open-economy to compare the stability of an interest-free PLS (equity) based economy vis-à-vis the prevailing interest-based system. • The study is an extension of previous researches that have been based on a closed-economy presumption (e.g. Khan (1986).	• The IFS has the capacity for better adjustment to macroeconomic disturbances that require the shifting of resources from the traded to the non-traded sector than does the conventional interest-based system. • The IFS would be based on a "two-tier *Mudarabah*," or the 'two-windows model;" 100 per cent reserve for demand deposits (i.e. deposits of this category are regarded as *Amanah* (safe-keeping), and a PLS arrangements for investment deposits.
Zuberi, Habib A. (1992)	Time-series data covering a period from 1973 to 1989 on Pakistan were used.	• A modified version of the Keynesian type demand function for money has been applied. • Separate estimates were made for the velocity of circulation of money. • The hypothesis: public's demand for non-interest bearing money tends to be stable relative to the interest-bearing demand for money.	• The velocity of circulation of money has been stable. • The desired demand for real money is positively related to real GDP and negatively to interest rate. • The active support by the government in the operations of the banking industry can bring about the desired results. • The results do not support the hypothesis that the publics' demand for money tends to be more stable in the absence of interest-bearing financial assets.
El-Gamal, M. (1997)		• The stability of the institution of Islamic banking from a micro-economic point of view, where the survival of this institution depends on its ability to maintain sound financial positions for its customers (devout Muslims, and others). • An evolutionary game-theoretic model of the dynamics of Islamic banking in the existence of other interest-based financial institutions.	• "The necessary and sufficient condition for Islamic banking to survive in the long run is the existence of agents who are willing to interact symmetrically with the Islamic and the interest-based parts of the economy, and that those agents deal amongst themselves in an Islamic way." • The Malaysian experiment of a dual-system that support and regulate the two "tiers;" Islamic and conventional may support the author's finding.

Chapra, M. U. (2005)	Observations about recent crises. Examples: The US stock market crash of 1987, the bust of the Japanese stock and property market bubbles in the 1990s, the 1992–93 ERM breakdown, the Mexican crisis of 1995.	• Systemic and intellectual analysis based on observing the recurrence of financial crises over the past few decades. • Arguments and analysis of some conventional economists and institutions about the imbalances created by interest-based instruments.	• "Interest" creates market indiscipline because of the assurances given to a depositor or a banker to claim a return without participating in the risks of the banking business. • Greater role for equity and risk sharing instruments to bring market discipline and stability to the financial system.
Chapra M U. (2008 & 2009)	Observations about recent crises. Examples: • The US stock market crash of 1987 • The Asian crisis 1997–98 • The Long-Term Capital Management (LTCM) collapse in 1998 • The "dot.com" bubble burst in 2000 • The US sub-prime mortgage crisis of 2007	Intellectual analysis and arguments based on: • The "impossibility" of designing a new financial architecture without first determining the primary cause (s) of the crisis or crises. • The work of eminent Western economists; e.g. Fisher, Simon, Galbraith, Minsky and Rogoff with regard their analyisis of the recurrence of Financial crises (FCs) and their "call" for Greater reliance on equity financing." • The absence of the "risk-sharing" element in financial practices created the "market indiscipline," and thus the culmination of the abnormalities of "debt explosion," "high leverages," and speculation.	• The false sense of immunity from losses introduces a fault line into the system. • One of the major causes of these crises is the absence of risk-sharing,; Risk-sharing along with the availability of credit for primarily the purchase of real goods and services = greater market discipline + reduction in instability. • Greater role for equity financing, but debt still has a role to play. • The widening of the "housing finance cooperative" schemes to cater for the needy like the "sub-primers". But the pool of money sources should be extended to include: banks, corporations and rich individuals.
Askari et al. (2010)		• Sequence of analysis and arguments to conclude the inherent stability of the IFS vis-à-vis the inherent instability of the CFS. The analysis has been based on: • Deduction of the common factors that led to FCs to draw the general pattern of the identification and sequence of these factors. • The factors that led to the crises are absent in the IFS. • The proposed plans to eliminate crises factors from the financial sector like the Chicago plan and Limited Purpose Banking (LPB) proposed after the INFC are of equity nature of the financial claims and obligations. These proposals resemble the IFS which is an equity-based system. • A theoretical model to prove the inherent stability of the IFS. This model is based on the classical assumption of full employment equilibrium besides total preclusion of debt and debt trading.	• The general pattern displayed by the historical record of FCs reveals that "each episode was preceded by rapid credit expansion, a speculative boom and excessive price volatility in one or more asset classes. This boon is then followed by a burst of that asset. This in turn leads to asset price deflation and banking failure." • "Conventional banks (CBs) fail to meet inherent stability conditions even in the presence of prudential regulations." • "The instability of the conventional finance is not limited to the role of commercial and investment banks."

(*Continued*)

Table 1 - *Continued*

Author (s) and publication year	Sample	Method of analysis	Main findings
			• "The credit multiplier notion is irrelevant for IF. The corresponding notion is savings multiplier." • The main principles of IFS like the prohibition of interest contribute to its inherent stability. • IBs do not create and destroy money through the credit multiplier as is the case under CBs. • "The classical model, based on full employment, is representative of an Islamic economy where interest is precluded." • "An IFS is a PLS equity-participation system." • The equity-based system is not an alien to the Western thinking in financial intermediation. • Under the IFS maturities of assets and liabilities are assumed to be matched.
Iqbal Z & Mirakhor A. (2011)		• Systemic and intellectual analysis of the prolonged episodes of financial turbulences and some of the proposals that have been suggested by some eminent conventional economists. • The Chicago plan, the limited purpose banking (LPB), and the analysis of conventional economists like Fisher, Allais & Minsky have been cited to prove the inherent instability of the conventional financial system. • Besides the reference to the credit multiplier and money creation under the conventional system as endogenous features that feed the persistent instability of the conventional system.	• "Only a financial system along Islamic principles is immune to instability." • "For a given regime of financial institutions, the lesser the weight of debt refinancing, the greater the stability of the system to be." • "The Islamic system would not be expected to experience deep boom and bust cycles." One of the reasons for this feature; "IBs do not create and destroy money." Besides financing is tied to real activities, no speculation, gambling and the like." • The ideal IFS would be based on "two-window" model of intermediation; 100 per cent reserve for demand deposits, and a PLS mechanism for investment deposits. This last feature will eliminate the rigidity of the interest-based system in its guarantees of principals and "returns = interests" in isolation from the performance of real activities.
Hassan M K and Kayed R. (2010)		• Systemic analysis of the causes of the crisis and measuring these causes against the intrinsic principles of the Islamic financial system. • The resilience of the IFS is seen through the absence of the factors that led to the sub-prime crisis; "Such crisis would not have occurred under an Islamic financial system – due to the fact that most, if not all, of the factors that have caused or contributed to the development and the spread of the crisis are not allowed under the rules and guidance of *Shariah*."	• "Government bailouts of existing banking system neither present long term solution to the problem nor give assurance that similar crises will not happen in the future." • "Evidence at hand strongly suggests that IF is well endowed to deliver noteworthy contributions towards a more healthy and stable international economy". For instance, "the principle of, "no pain, no gain" embedded in the Islamic financial structure … [can] help introduce greater discipline into the financial system."

		• Theoretically, it would be impossible for a crisis resulting from the factors that triggered the like of the subprime mortgage crisis to take place in the Islamic capital markets sector." This is due to several reasons; among them are: ban on interest, ban of selling what one does not own or possesses, ban "to sell a debt against a debt, IF is based on equity capital rather than debt. • The above results are based upon many assumptions. The foremost among them is "Muslims always practice Islam and abide by its teachings in financial activities and daily life." • "There is no absolute assurance that IF, once mature, will weather a similar financial crisis in the future unless it commits itself to being *Shariah*-based (the substance) rather than *Shariah*-compliant (the form)." Therefore, only "an honest implementation of Islamic theory of finance is potentially capable of solving, and in all probability averting, such crises from happening."
Askari, H. (2012)	• The analysis has been based upon the following arguments: • The assertion that "The Quran prohibits debt based contracts" and "Islam offers a system that prohibits all debt" • "An Islamic bank is assumed to match deposit maturities with investment maturities" • Stability of the IFS is seen through the "lenses" of the instability of the conventional system. The analysis is based "debt prohibition or elimination and its associated characteristic "risk-shifting" to "equity and participatory financing" with "risk-sharing" as its main instinct. Use of some recent financial turbulence, such as the US subprime as an evidence for that. • "Conventional banking is based on a fractional reserve system that creates money and encourages borrowing and leveraging." Assets and liabilities mismatch has become a chronic feature of such a system. • Proposals to reform CFS close the IFS are neither new nor alien in the West (e.g. the Chicago Plan and LPB).	• "The absence of debt and leverage, financial failure is localized and prevented from infecting the entire financial system." • "Commercial banks to restrict their mandates to two activities: (i) cash safekeeping (100% reserves against checking deposits), and (ii) investing client money in a mutual fund. • "Full government monopoly in the issuance of currency. Commercial banks are barred from "money creation." • "The tax bias against equity finance must be removed, if policymakers want to eliminate recurring of financial crises." • "Policy makers must discourage excessive borrowing, leveraging, and risk-shifting and instead encourage risk-sharing and equity finance."
Shafique et al. (2012)	• The research is based on a descriptive framework by extracting important information and conclusions about IB performance from various reports and studies during the recent financial crisis of 2008.	• "Performance of Islamic banks during the global financial crisis is better than conventional banks." Thus they are "more stable." • "Risk in IBs is less than their conventional counterparts, because of their interest free nature." • "Because of the global financial crisis there is an increasing demand for Islamic Financial systems in the Western world."

(*Continued*)

Table 1 - *Continued*

Author (s) and publication year	Sample	Method of analysis	Main findings
			• "It is proven through all reports, past records, famous authors and experts views that there is a less impact of global financial crises on Islamic banking system."
		Other Studies	
Chapra, M. U.(2007[15])	• The East Asia crisis. • The collapse of the hedge fund, Long-Term Capital Management (LTCM); • Foreign exchange market instability; and • The prevailing imbalances in the US economy	• This work reviews a number of financial crises and reasons behind them to determine the root cause or "cause of all causes"	• The fault line or "the root cause" in the international financial system resulting from the lack of adequate market discipline because of the absence of explicit risk-sharing. • Greater reliance on equity financing is a prime remedy of the fault line in the interest-based FS, but debt financing should not be totally ruled out, "the share of equity has to be increased and that of debt is to be reduced substantially." • The introduction of greater discipline in the financial system, which the prohibition of interest has the potential of ensuring, along with more effective regulation and supervision, should go a long way in substantially reducing volatility in the financial market and promoting faster development.
Ali, S. S. (2006 & 2007)	1 IB during the banking and Financial crisis of 2000–2001 in Turkey	• The author utilizes the "natural experiment" or a case study by studying the factors that lead to the closure of one Islamic finance house in Turkey. • The author utilized the "listing approach;" list all the plausible causes of bank failures identified in various other studies in context of conventional banks and relate them to how, why, and to what extent they are relevant for Islamic banks. • Analyze the role of each of the "listed factors" in the context of *Ihlas Finans*. • Provide some lessons for strengthening Islamic banks.	• Concentration of IBs assets in fixed return *Murabahah* contracts has exposed them to various risks leading to instability. However, they still retain the sharing feature on the deposits side which is a cushion for their stability. • The problem of *Ihlas Finans* was less likely to be insolvency, which was the case in many conventional banks, but liquidity crisis. • Capital Adequacy ratio in *Ihlas Finans* (5.39%) was less than other SFHs (7%), and much below the prudential measure of 8 per cent recommended by Basel Committee.

		• Deterioration of the liquidity ratio of IFH from 4.22% in 1999 to 0.53% by the end of 2000 during the crisis. • Exchange rate shocks coupled with liquidity crunch and eroded depositor confidence in the banking system were among the external factors that precipitated a run on *Ihlas Finans* before it collapsed. • Weak regulatory system for Special Finance Houses (SFH) and lack of official support also contributed to its collapse. • Weak internal management, imprudent financing within the group, and poor crisis management strategy as some of the differentiating factors. • There is a need to think and have a clear understanding of the nature of Islamic banking.
Islamic Financial Service Board (IFSB) (2010)	A sort of policy-oriented exploration based on: • Analysis of the basic features of IF, the theoretical composition of the balance sheet of a typical IB and their relevance to financial stability enhancement. • Examination of the current state of the industry and Islamic indices. • The existence of a *Shariah* board "adds another level of oversight which inherently safeguards against irresponsible practices." • Discussion of eight building blocks "to promote a resilient and efficient Islamic financial system." • "When embraced in its entirety, these essential features of IF reduce the risk of financial instability."	• "The Islamic financial services industry has thus been in a relatively stronger position to weather the global financial crisis, demonstrating its robustness as a stable form of financial intermediation." • "The inherent features of Islamic finance have the potential to serve as a basis to address several of the issues and challenges that have surfaced in the conventional financial system during the current crisis." • Inherent strength of IF derived from its key underlying principles; establishing a close link between the financial transactions and productive flows that will generate legitimate income and wealth. • "The features and value proposition inherent in the Islamic financial model can have the potential to contribute to global financial and economic stability." • Recommendation for the establishment of an Islamic Financial Stability Forum.

mechanism and the absence of risk-sharing as is the case under equity and participatory modes of financing system, Chapra 2007. According to Chapra, instead of making the depositors and the bankers share in the risks of business, it assures them of the repayment of their deposits or loans with interest. This situation has created "carelessness havoc" in the behavior of depositors and bankers alike; in such a way that they pay little attention to the soundness of the "financee" to concentrate on the guarantees and collaterals that they get. Thus to restore market discipline to the system, according to this analysis, a shift has to take place from the heavy reliance on debt financing based on interset-bearing instruments, to more of the like of equity financing and this will take us to the next point; the nature of financial intermedation in an IFS according to the postulations of these authors.

2. The IFS framework utilized in the analysis of the treatises is the one that is presumed to be based on "total" or "pure" equity and PLS participatory modes of financing. This model has been derived on the basis of the authors, explicit or implicit, convictions that this is the "Islamic" system that ought to be sought according to the requirements stipulated in the basic sources of Islam. For instance, some authors rely on their presumtion that "the Qur'an prohibits debt based contracts," and "Islam offers a system that prohibits all debts" as evidence to support their claim. To further strengthen this argument, these authors proclaim that the sort of the "IFS" they propose goes in "spirit," if not in line, with the reforms or the specified proposals of some conventional economists in the aftermath of major financial turbulences. The Chicago plan of the 1930s and Limited Purpose Banking (LPB) of Chamley and Kotlikoff (2009) have been mentioned as illustrative examples. Futhermore, there has been other explicit reference to IF principles by other economists in the light of the unfolding inflictions of the 2007–2008 financial crisis. Buiter (2009), an ex-LSE professor of economics, for instance, states that if too much debt is part of the problem, reducing that level through equitization is part of the solution. In stressing upon this point Buiter referred to the application IF principles, in particular "*a strong preference for profit and loss-sharing and risk-sharing arrangements and a rejection of "Riba" or interest-bearing debt instruments*." Two years later Rogoff (2011), a Harvard economist, echoed a similar tone, "*we need to recognize that the real problems [in the financial system] are rooted in excessive concentrations of debt … If G-20 governments stood back and asked themselves how to channel a much larger share of the imbalances into equity-like instruments, the global financial system that emerged just might be a lot more robust than the crisis-prone system that we have now.*" He went further to point out that "*perhaps scholars who argue that Islamic financial systems" prohibition on interest generates massive inefficiencies ought to be looking at these systems for positive ideas that Western policymakers might adopt.*" Chong and Ming-Hua (2009), also pointed out that the profit and loss sharing system subjects interest-free banks to greater market discipline.

The above points (1 and 2) represent the fundamental assumptions that the authors have used in their analysis to support the FS superiority of the IFS over that of its conventional counterpart. Nonethless, it has to be noted that these sorts of studies tend not to give due consideration to very fundamental issues. Among these are: the application of the "aspired model" is, at the end, bound by the strong adherence of "humans" on one hand, and the laws and regulations that prevail at the time of the application, on the other. Both factors are determinetal in success or otherwise of the "ideals" that are presumed in these researches. Some authors did acknowledge these facts by highlighting the tax and regulatory "biases" of most, if not all jurisdictions, towards debt instruments, particularily interest-based modes. Others have pointed out to the "heterogenesity" fact of economic agents under an applied IFS, where the whole Islamic system is not fully applied. Therefore, they questioned the "realisticity" of the presumption that "*Muslims always practice Islam and abide by its teachings in financial activities and daily life,*" El-Gamal, (1997) and Hassan and Kayed (2010). The degree of such an adherence varies considerably. Moreover, "adherent" or "practicing" Muslims are not living in an "isolated" village. Their societies, their economic and financial dealings do interact with economic agents of other faiths and cultures. Such reality will affect the sort of the "possible" and probably "plausible" financial model for that society or community. In the light of these and other factors some have gone further by acknowledging the "inaccurate" proposition of the "pure" equity financing regime under the Islamic system to be the "only plausible" model. For instance, in an unpublished note Zarqa[11] (2012) states, "*I asserted [in the 1983 article] that in an Islamic system … all business financing must be based on various forms of equity … I realized later that this assertion is not justified, neither by Islamic Shariah nor by the reality of Muslim economies past or present. This being the case, it becomes important to further examine the stability implications of Islamic debt*[12] *vs. conventional debt*." Hence, it is a gross error to rule out debt and debt instruments completely from an Islamic financial system, as some have suggested. This would neither be feasible nor possible.

Moreover, the assertion that Islam "prohibits" debt is an inaccurate interpretation of the Islamic point of view. Consulting the basic sources of Islam; *Qur'an* and *Sunnah* proves the contrary. For instance the longest verse in the *Qur'an* is the verse of debt (Chapter 2: Verse 282). Ironically, this verse came straight after the latest and the strongest verses that have prohibited and condemned *Riba* in a very explicit and comprehensive manner. This verse provides detailed measures and procedures that can be implemented to safeguard the interest of the parties entering into debt contacts, including deferred and installment sales. As a result, throughout the history of the Muslim societies present and past dealing with debt instruments have been practiced. Indeed, there are "discouraging" statements in the basic sources of Islam against the "unnecessary" use of debt,[13] but this does not make the issue "illicit" or "impermissible." There has to be a clear understanding and distinction between the two positions. Moreover, current practices of the IF industry has shown insignificant presence of PLS products on the assets side of these institutions. For instance, Al-Shubaily

(2011)[14] found that PLS modes of financing on the asset side of twelve Saudi banks constitute no more than three (3) per cent of the total assets of these institutions. In Malaysia, on the other hand, the situation is even worse. According to Chong and Ming-Hua (2009) "only 0.5% of Islamic bank financing is based on the PLS paradigm of *Mudarabah* (profit-sharing) and *Musharakah* (joint venture) financing."

On the liabiliy side in the Malaysian case "*Mudarabah* (profit-sharing) deposits, which account for 70% of total Islamic deposits, are more predominant," Chong and Ming-Hua (2009). But this "theoretical" arrangement has to be treated carefully as Chong and Ming-Hua (2009) have shown in their work that "Islamic deposits are not really interest-free, but they are very similar to conventional-banking deposits."

In spite of the above reservations, it has to be acknowledged that IBs have shown relative stability to the first wave of the last international crisis of 2007–2008. As a result, their "theoretical" proposition of pure equity or "superficial" link of financing to real activities may bring more discipline to the financial system's behavior. And this takes us to the asset-backing principle that govern the operation of IFIs. This principle has not been discussed thoroughly in the reviewed theoretical studies. Discussion of the effect and impact of such a principle is left to the empirical part in the section that follows.

Finally the essential message that the authors would like to make centers around the greater role that should be given to risk-sharing paradigms in the world of finance as opposite to risk-shifting paradigms that dominate the current shape of the financial system, "*whether the reforms implemented are called the Chicago Plan, Limited Purpose Banking, or Islamic finance, the message is unified: the world needs a financial system that reduces risk-shifting and debt financing in favour of risk-sharing and equity financing in order to create a financial system that promotes growth and minimizes instability,*" Askari (2012).

The authors of this research believe that there is a strong case for this "plea" and in the aforementioned analysis and argument. This plea deserves due consideration if policy makers and economists would like to widen the prospects beyond the "tool boxes and policies" of the conventional wisdom.

5. Analysis and discussion of the findings of empirical studies

As for empirical studies whose main findings and tools of investigation are presented in Table (2), it is apparent that about sixty per cent of them used Z-score and GARCH models, while the remaining utilized other techniques as demonstrated in Figure (4) below. It is also evident that the approach followed in the research is examining the stability of IF from a micro-perspective with a particular reference to Islamic banks. This is primarily due to the fact that Islamic banks, like their conventional counterparts, aim at financing the economy by channeling depository funds from savers to investors. As a result of this special character this kind of institutions has historically been heavily regulated.

To this extent both Islamic and conventional entities may be presumed to look identical if the argument stops here. However, this is not the case. The adopted platform of IBs is different in that they reject the use of interest rate and engage in profit and loss sharing projects attached tightly to real assets. Boumediene and Caby (2008) agreed that due to the risk sharing principle and asset diversity, Islamic banks are more immune to negative shocks. However, this theoretical argument has to be tested empirically in order to assess the extent to which Islamic banks are exposed to financial instability. The level of stability has been widely measured in conventional literature using the Z scores, and it has not been an exception in IF literature as is shown in figure (4) and table (2). For instance, the Čihák and Hesse (2008) investigation was one of the most influential empirical studies that looked at the stability of Islamic banks. They measured financial stability using the Z accounting scores defined as $z = (k + \mu)/\sigma$, where k is equity capital, μ is average return as percent of assets, and σ is standard deviation of return on assets as a proxy for return volatility. Assuming the returns are normally distributed, Čihák and Hesse (2008) utilized the Z scores to measure the number of times the standard deviation is covered by the realized returns. Hence, a lower Z score indicates a higher insolvency risk. Mitra, and Worrell (2005), Čihák and Hesse (2008), Beck et al. (2010), Shahid and Abbas (2012), Masood et al. (2011), Gamaginta and Rokhim (2012) and Altaee et al. (2013) all used the Z scores to proxy for financial stability. Čihák and Hesse (2008) (2010) claimed that the strength of such variable lies in that it is an objective variable as it intends to measure insolvency risk regardless of the specific characteristics that frame the functioning of any bank Islamic or conventional. However, one potential weakness associated with it is that, it does not take into account the fact that Islamic banks apply more protective strategies through having their investments backed up by real assets. Also, the profit and loss sharing principle allows these banks to pass on a proportion of their risk to the investors which reduced their overall exposure to risk and financial instability.

Unlike the theoretical studies, the findings of empirical researches are not so conclusive in one direction or the other. The situation is rather mixed. Some support the theoretical "superiority claim," others go in contrast with that and a third category may be considered as "neutral." How robust and conclusive are these results? And, what can explain about their departure from theoretical findings?

Several possible factors can be mentioned to explain this position. Two prime elements are at the forefront; these are:

1. The "applied business model" of IBs is almost identical to the conventional interest-bearing one. It is neither a "two-tier *Mudarabah*" nor a *Wakala* (agency) based model as was proposed by the "pioneers" and other "theoreticians" of IEs and finance. It is rather a specially "engineered" debt model, particularly on the assets side, to be *Shariah*-compliant through the work of *Shariah* advisory boards, lawyers and practioners. The guiding adopted framework, in the development of Islamic financial instruments, has been to design products in such a way that these modes are, almost, equivalent in economic and risk

Table 2. Summary of the findings of empirical studies.

Author (s) and publication year	Sample	Method of analysis	Main findings
2-1 - Empirical studies based on Z-score & GARCH models			
Martin Čihák & Heiko Hesse (2008)	77 Islamic banks and 397 conventional banks in 20 countries during the period 1993–2004.	Z-scores indicator	• Small Islamic banks (with assets under US$ 1billion) were financially more solid than conventional banks of the same size. • Large Islamic banks were less solid than conventional banks of the same size. • Small Islamic banks are financially more solid than large Islamic banks. • Market share of Islamic banks does not have a significant impact on the financial strength of other banks.
Aniss Boumediene & Jérôme Caby (2008)	14 Islamic banks and 14 conventional banks in nine countries. Over the periods of 2005–2009.	E-Garch and GJR-Garch	• Islamic banks were at least partially immune to the subprime crisis, and that these banks were not subjected to the same risks as conventional banks.
Thorsten Beck, Asli Demirgüç-kunt & Ouarda Merrouche (2010)	89 Islamic banks and 397 conventional banks in 20 countries during the period of 1995–2010.	Z-scores indicator	• Islamic banks seem more cost-effective than conventional banks in a broad cross-country sample. • Conventional banks that operate in countries with a higher market share of Islamic banks are more cost-effective but less stable.
Sayd Farook, M. Kabir Hassan & Gregory Clinch (2010)	50 Islamic banks and 150 conventional banks with a minimum of 5 years of data and a maximum of 15 years from period 1991–2005 in sixteen countries.	Z-score indicator	• The negative association between profit distribution management and financial stability is inconclusive. • Fixed rate asset concentration is almost invariably associated with lower financial stability. • There is some support for a negative association between profit and loss asset concentration and financial stability.
Masood, et al. (2011)	30 paramount Islamic banks functioning in different countries of the world for a period from 1998 to 2008.	Z-score indicator	• Smaller IBs are more stable than larger IBs. • Large IBs have greater income diversity then the smaller IBs.
Abde Elrahman Ezahi Saaid Ali (2011)	Bank-level data of 39 full-fledged IBs in 17 selected countries.	Z- score indicator	• IBs are associated with higher credit risk, but with lower overall risk. • IBs are financially stable.
Ghassanand Gendouz (2011) (in Arabic)	6 Banks in Saudi Arabia: 4 conventional and 2 Islamic, over the period 2005 to 2009.	Z-score indicator	• Mixed results. There is no clear evidence of the superiority of IBs. Insignificance presence of IBs in the Saudi financial system does limit contribution to the stability of the whole system.
Asa"ad Hamieed O. Al-ali & ImaneYousfi (2012)	10 conventional banks one (1)Islamic bank in Jordan over the period of 2005–2010.	Garch, Egarch & GJR-Garch	• Islamic bank were more stable than conventional banks.

Muhammad Ali Shahid & Zaheer Abbas (2012)	06 Islamic banks and 10 conventional banks in Pakistan during the period of 2005–2010.	Z-score indicator	• Small Islamic banks tend to be financially stronger than small conventional banks. • Large conventional banks tend to be financially stronger than large Islamic banks. • Small Islamic banks tend to be financially stronger than large Islamic banks, which may reflect challenges of credit risk management in large Islamic banks. • market share of Islamic banks had a significant impact on the financial strength of other banks.
Gamaginta & Rofikoh Rokhim (2012)	12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004–2009.	Z-score indicator	• The Islamic banks in general have a lower degree of stability compared to the conventional ones. • Small Islamic banks relatively have the same degree of stability with small conventional banks. • During the crisis period of 2008–2009, Islamic banks and conventional banks tended to have the same relative degree of stability. • The stability of full-fledged Islamic banks (BUS) is lower than Islamic business units (UUS).
W. Rajhi (2012)	467 conventional banks and 90 Islamic banks for the period 2000–2008 in 16 countries: 6 Southeast Asian countries and 10 MENA countries	Z-scores indicator	• Islamic banks had higher stability than conventional banks except for small Islamic banks. • Credit risk and income diversity are the most common cause of insolvency for Islamic banks. • Income diversification is a cause of insolvency for small and large Islamic banks in Southeast Asian countries. • An increase in LIBOR leads to a decrease in z-scores in small Islamic banks in Southeast Asian countries. • In Southeast Asian countries, large Islamic and conventional banks cannot coexist in the same system without crowding out effects in a competitive market.
Altaee et al. (2013)	Total observations are 653 for 97 banks: 405 observations are for 55 Conventional banks and 248 observations are for 42 Islamic banks covering the period 2003 to 2010.	Z-score as a dependent variable	• There is no empirical evidence that supports the hypothesis that says "there is a difference between the z-score of Conventional banks in the Gulf Cooperation Council (GCC) countries and Islamic banks in the same region for all three periods."
		2-2 - Other empirical studies	
Remali Yusoff Rodney Wilson (2009)	Malaysian banking system from period 1983–2001	OLS Equations: • The Islamic banks sharing deposits equation. • The conventional interest-based deposits equation.	• *Shariah* Compliant Deposits are more stable than their conventional equivalents.

(*Continued*)

Table 2 - *Continued*

Author (s) and publication year	Sample	Method of analysis	Main findings
Maher Hasan and Jemma Dridi (2010)	The research uses bank-level data of 120 banks (90 conventional & 30 Islamic), in 8 countries, covering the period 2007–10.	Financial ratios: Four indicators were; changes in (1) profitability; (2) bank lending; (3) bank assets; and (4) bank ratings.	• IBs have been affected differently than CBs. • In terms of profitability, IBs fared better than CBs in 2008; large IBs have fared better than small ones." This was reversed in 2009 as the crisis hit the real economy. • IBs "credit and asset growth performed better than did that of CBs in 2008–09. The growth was at least twice higher in IBs than that of CBs. • IBs showed stronger resilience, on average, during the global financial crisis. • Factors related to IBs "business model helped contain the adverse impact on profitability in 2008, while weaknesses in risk-management practices in some IBs led to larger declines in profitability compared to CBs in 2009. • "Adherence to *Shariah* principles precluded IBs from financing or investing in the kind of instruments that have adversely affected their conventional competitors and triggered the global financial crisis".
Kassim, H. (2010).	194 banks have been used in the study; 50 Islamic and 144 conventional.	• The study measures financial stability using three important indicators: • BS ROAV which is computed as the standard. • Deviation of ROA. • BS Tobin Q, which we calculate by equity by earnings. • Banks liquidity (BSLIQ).	• IBs are more capitalized than CBs. • IBs reported very small Nonperforming assets (NPA). • GCC CBs have higher liquidity levels than IBs. • Consumer confidence levels in IBs are higher than CBs in this region which operates both banks in parallel.
Hatem Derbel Taoufik Bouraoui Neila Dammak (2011)	Financial indexes of France, United States, Indonesia and Saudi Arabia, cover the period 16/07/1997–15/12/2009.	VAR model	• The transmission of the current crisis is weak in the markets which are based on Islamic finance.

Zouaoui and Redif (2011) (in Arabic)	4GCC IBs (2 in UAE, 1 in Qatar, and 1 in SA) over the 2007–2009period.	Markowitz (Optimal portfolio theory)	• IBs are quite resilient to crises" shocks as indicated by the good performance of some indicators such as growth in profitability, and the volume of provided credit.
Sutan Emir Hidayat & Muhamad Abduh (2012)	8 Islamic banks in Bahrain from period 2005–2010.	Financial ratios	• Islamic banking industry is not totally crisis-proof; • Financial crisis does give an impact upon the Islamic banking performance, particularly in Bahrain, but the effect comes after the crisis period.
Hajer Zarrouk (2012)	The research uses data covering 2005–09 for 20 Islamic banks in five GCC countries.	• The study focuses on an inter-temporal comparison of the performance of Islamic banks before and after the global financial crisis in the GCC region. • In this study uses 12 financial ratios to assess IBs" performance. The ratios have been grouped under four categories: (a) profitability; (b) liquidity; (c) risk and solvency; and (d) efficiency.	• The study suggests that Islamic banks fared differently from country to country during the global financial crisis. • Factors related to the IF model helped to contain the adverse effect on performance in 2008. However, weaknesses in risk management practices in some Islamic banks led to larger decline in performance in 2009. The performance of IBs in the UAE declined more than that in the other countries. • Islamic banks loan growth was higher during the crisis. • Overall IBs seem to be "relatively sound" during the crisis.

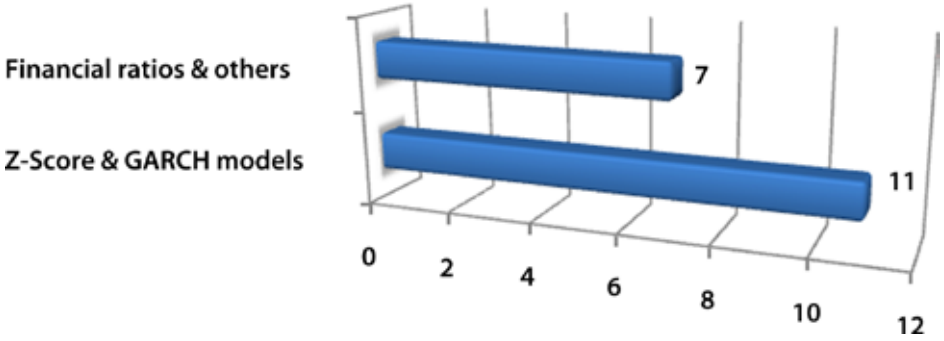

Figure 4. Distribution of empirical studies between econometric and other techniques.

characters to conventional debt instruments. Was this model pushed by the "unsupportive" regulatory regimes in many jurisdictions, or was it impacted by fierce competition of conventional banks, or was it driven by the profit maximization "short-sighted doctrine" of the "runners" and shareholders of these intuitions? These and other arguments have been in circulation for some time, but the fact is that this applied model is far from the "theoretical ideal" that was, and is still advocated by many Muslim economists, some jurists (*Fuqha*), and even some pioneer practioners.

2. The nature of empirical investigations involves the sense that they are very difficult, if not impossible, to arrive to the same conclusions all the time and by different or the same authors. These investigative tools are constrained by a number of factors; especially in the case of IBs. The paramount among these are:
   - Sample size, number of observations, and time span. The data provided in the table below highlights this issue very clearly.
   - Data availability, quality, and reliability are major obstacles in arriving at a very robust findings and conclusions. Many of the reviewed work have utilized commercial databases like Bankscope, while others have used Islamic Banks and Financial Institutions Information (IBIS) of the Islamic Development Bank (IDB) and *Zawya*. Furthermore, most, if not all investigations have consulted, in one way or the other whatever they have been able to obtain of the available financial reports produced by IBs to overcome some of the shortcomings in those data bases. In spite of the tremendous effort carried out by some authors, the lack of a unified or an internationally recognized accounting standards for IFIs is another dimension that should not be underestimated in affecting the results of quantitative investigations in Islamic economics and finance. A longstanding and very experienced Western economist, Volker Nienhaus (2012),[16] emphasized this point very clearly in discussing the "research and academic careers" of IEs and finance in Western higher education. Nienhaus pointed out that many "talented students choose interesting topics for empirical studies, but did not recognize the serious shortcomings of the data they used." Nienhaus went further to state that "many cross-country comparisons of Islamic and conventional banks – for example with respect to efficiency or profitability – use Bankscope data. This data base suffers from a number of misspecifications and gaps with regard IBs[17]." There is, even, another deeper dimension that many may not be able to detect due to their limited knowledge in IF instruments and practices. It is the issue of the product and instruments names; under such circumstance "even if the data was complete, a researcher can arrive at gross misinterpretations of IF in comparison to conventional finance if he or she does not consider that the same name can have different meanings for different institutions."[18]
   - The comparison and groupings inconsistency in some investigations in terms of putting at par the fully-fledged institution with an Islamic "unit" or "window" to derive some conclusions between these diverse entities.

The above remarks should not be interpreted as a call for the abandonment or drop of quantitative tools to examine particular issues in IEs and finance. The main message is the fact that a researcher and/or an investigator have to be cautious and aware of the limits and constraints of such tools, in interpreting the results or in drawing some lessons and policies.

Finally, despite all that has been said about "the applied business model" of IBs and the reservations that have been made against its practices, it has to be noticed that during the first wave of the subprime crisis the institutions of this model proved to be more resilient than their conventional counterparts. Was that due to their "insignificance" presence at the international financial stage, or was it due to their "conservative" policies as some authors have tried to highlight? The authors of this research discovered that regardless of any reason that was given to underestimate this fact, almost all of the reviewed empirical studies pointed out that IBs did not engage in the very toxic assets that brought renowned and long-established conventional institutions to a halt. However, some IBs have been affected by the second wave of the crisis (i.e. when the real economy was hit). And this is true. For those authors who have stressed this fact to prove that these institutions, like their

conventional counterparts, are not immune from the effects of FCs, this argument may not serve their end. On the contrary, the argument may support its antithesis, which states that IBs have "built-in" premises that may shield them from the fragility that conventional banks suffer from. These premises are derived from the basic tenets that govern the operations of IBs. In this regard the asset-backing principle may prove to be a very useful feature that allows Islamic institutions to absorb financial shocks more than their conventional counterparts.[19]

6. Concluding remarks

In this paper a considerable amount of financial stability literature about Islamic Economics and finance has been reviewed and assessed thoroughly. Based upon the analysis and the discussion carried out in the previous sections, the following remarks can be made:

- Despite the tremendous efforts that have been devoted to financial stability over the recent past and before, the world is still "*in search*" for its attainment.
- Given the interdependence and the complex interactions of different elements of the financial system within its inner structure, and the interaction with the real economy, FS proves to be a very difficult term to be accurately defined and even harder to measure. As a result, the construction of a "useful" macro model that encompasses these delicate aspects is still far from realization. But it might be a worthwhile exercise to devote some effort to overcome the stalemates that surrounds this issue.
- It seems that the subprime financial crisis that hit the US economy in late 2007 has triggered more interest in the stability of the IFS and its institutions. Over the past five years about five studies have been produced per year in comparison to less than one study being carried out in the pre-crisis era.
- Theoretical literature about IFs financial stability has almost been unanimous in its assertion of the superiority claim of this system over its conventional counterpart. The underlying assumptions and arguments of these treatises have been identified as: the endogenous fragility of the conventional interest-bearing financial system as demonstrated by the recurrence of FCs, the resemblance of the proposed financial reform plans to the IFS, and the "pure" equity and participatory financial instruments of the "ideal" IFS. In contrast, empirical studies are not so conclusive in one direction or the other. A number of factors have been identified and explored to examine the basis of the divergence between the findings of these two important blocks of the reviewed work.
- Two fundamental tenets have been highlighted from this review to constitute important "built-in" features that may stand behind the inherent stability of the IFS. These are: risk-sharing and asset-backing principles. This by no means should be interpreted as an underestimation or unimportance of other tenets of IF, on one hand, and the fact that the current practices of IFIs adhere strictly and "whole-heartedly" to these paradigms.
- The current regulatory, supervisory and tax framework proved to be biased towards interest-bearing debt instruments. This fact has been pointed out, not by the authors of the reviewed literature but by other prestigious institutions like the IMF and other conventional economists. Therefore, if policymakers incline to achieve certain degree of stability, a shift has to be made to provide a "level playing field" for equity modes of financing.
- Chapra and the "IMF-World Bank Muslim economist" professionals, like Khan, Mirakhor and Iqbal, have been the most proactive researchers in this aspect of the IFS. Their work has been persistently carried out from the mid-1980s until now. As a result, can an "Islamic" hypothesis that pinpoints the "cause of all causes" of FCs be developed out of rich analyses and literature?
- Though debt is discouraged under the IFS, this should never be equated to a "total" ban of debt and debt instruments. Therefore, there is a need for the "revisiting" of "Islamic theorems" of financial intermediation to assess their relevance and practicability. Thus, there might be a variety of models to cater for the various needs and to adapt to certain impediments and realities.
- History has shown that the regulatory and supervisory financial framework is a prerequisite for the successful implementation and safeguarding of financial systems. The IFS is not an exception in that. Hence, to exalt the system's optimality, an enabling environment for its nourishment needs due consideration in many conventional jurisdictions.

Notes

1. Like Robert Holland who spent twenty five years (25) at various positions in the Federal Reserve System (FRS or the Fed), and the distinguished classical historian of financial crises: Charles Kindleberger. In his opening remark Mr. Holland asserts that the "instability" is deeply rooted in the prevailing system. "***I do not believe that financial instability is born of bad management or lousy regulation. It is inherent in the kind of financial system we have built and seem to like."*** Robert C. Holland, 1985. "The Problem of Financial Stability," in "The Search for financial Stability: the Past 50 years" (ed.), Federal Reserve Bank of San Francisco, p1.
2. This was the title of the remarks made by Ben Bernanke, the then Governor of the Fed and its current chairman, at the meetings of the Eastern Economic Association in Washington, DC, on February 20, 2004. Bernanke concluded his remarks by explaining what is meant by this "phenomenon" and the possible factors that may have attributed to its rise: "The Great Moderation, the substantial decline in macroeconomic volatility over the past twenty years, is a striking economic development. Whether the dominant cause of the Great Moderation is structural change, improved monetary policy, or simply good luck is an important question about which no consensus has yet formed. I have argued today that improved monetary policy has likely made an important contribution not only to the reduced volatility of inflation … but to the reduced volatility of output as well." Ben S. Bernanke, 2004, "The Great Moderation", www.federalreserve.gov, accessed April 29th, 2012.

3. In his exploration of the failure of *Ihlas Finans,* in Turkey in 2001, Salman Syed Ali (2006 & 2007) mentioned some of the distressed IFISs; "Bank *Taqwa* was closed in 2001. *Faisal* Islamic Bank closed its operations in the UK for regulatory reasons." According to the available sources there have been some other incidents; the *Mit-Ghamer* experiment of the sixties in the rural of Egypt was brought to an end for political reasons, Kuwait Finance House went into difficulty in 1984 due to lack of diversification in its investment portfolio. With regard Faisal Bank that has been mentioned by Ali, it must be noted that Faisal Bank never operated in the UK. It was Al-Baraka International that had operated in the UK and ceased its operations in early 1990s, but it was able to honor all deposit obligations without any troubles, (Wilson 1999: 428).
4. The value of the entire industry does not constitute more than 1 per cent of the total value of the conventional financial total assets.
5. There are two exceptions to this general trend; one is explicit the other is implicit. The explicit is represented by Dr. Naqvi (1981, p. 127) who holds the view that a wholly equity-based system "will be highly unstable." This is because, according to him, equity-financing, in contrast to interest-financing makes the return on investment "a function of business conditions in general and of the efficiency with which the enterprise is being run. Hence an element of uncertainty is introduced into the investor's expectations. Hence, to hedge against the probability of a loss, ways and means must be found, through some kind of deposit insurance scheme, to guarantee … the normal value of deposits. [Otherwise] … not only the banking system, but the entire economy will become highly unstable." (Naqvi, p. 136). The implicit view is that of El-Gamal (1997). His study departed from the prevailing theoretical framework to construct a model based on "close-to-reality" postulation as he portrays.
6. It has to be noted that we are not denying or underestimating the contribution of other factors in triggering or worsening FCs, like the lax regulations it is, rather, a consistency of methodology that forced us to limit the discussion to factors relating to interest.
7. Yet these low or even zero-rates are presented as remedy tools in the aftermath of FCs. This paradox indicates the puzzling dilemma of the existence of interest rate itself.
8. A level that makes the economy grew, for quite a lengthy period of time, without booms and busts. It should be noted, here, that the concern is not normal business fluctuations relating to the ups and downs of the real economy, but rather the "abnormal" episodes that the economies suffer from as a result of the financial turbulences. The authors found this distinction very important as noted by the French Economist Paul Leroy-Bealieu (1843–1916) and probably others.
9. His first work appeared in 1957, and the last 1996; the year he passed away.
10. Minsky believes in the variety of capitalist systems.
11. We are very thankful to him for this and for sending us a soft copy of his 1983 article.
12. While accepting the possibility of establishing IFS based on debt Zarqa noted that: "(a) re-financing of old debt by issuance of new debt and (b) selling of debt to third parties, are both strictly prohibited", under such a system.
13. See Al-Suwailem (1999). "*Mawqif As-Shariah Al-Islamiyah Mina Ad-Dayn* (The Stance of *Shariah* on Debt)." Reprinted in Al-Suwailem (2011). "*QadayahFil Iqtisad Wa At-Tamweel Al-Islami* (Issues in Islamic Economics and Finance), pp. 11–104.
14. Youssef Al-Shubaily. 2011. p.2
15. The paper appeared in July 2007; a date before the eruption of the crisis in August of the same year. As a result it has been counted among the pre-crisis studies as displayed in figure (3) above.
16. Volker Nienhaus. 2012. In "Islamic Finance at Western Higher Education: Developments and Prospects" (Ed), Belouafi et al. pp. xxv–xxvi.
17. The consolidated and unconsolidated issue, as pointed out by Čihák and Hesse (2008), is a typical example of that.
18. The authors of this research came across an incident similar to this in a financial report of a GCC IB where the institution named an item in its balance sheet as an "installment or deferred" sale, whereas in reality it was a "*Tawarruq*" transaction that is widely practiced in this region, especially in Saudi Arabia.
19. One of the reviewers of the paper suggested that it might be a worthwhile, or even a better exercise, to compare Islamic banks with conventional banks of similar size in the non-Muslim countries or conventional banks of any size in Muslim countries. If that has been done, it would be interesting to highlight the respective results separately. If there would be no significant difference in performance/stability, this might indicate that "asset backing" in Islamic banking may, in practice, mean more or less the same as "old style prudent banking" in conventional banks. We first thank the reviewer for this remark, and second we think that this is an interesting dimension that has not been looked at in the literature. Therefore, future research might explore this issue.

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The role of Islamic banks subsidiaries in the transmission of liquidity shocks across countries

Mehdi Mili[1], Jean-Michel Sahut[2], Eryj Trimeche[3]

[1]Doctor of Finance, MODESFI, University of Sfax & CEREGE, University of Poitiers, Mehdi.Mili@isgs.rnu.tn
[2]Professor of Finance, Amiens School of Management & CEREGE, University of Poitiers, Jean-Michel.Sahut@supco-amiens.fr
[3]PhD in Finance, I.H.E.C. – University of Sousse, eryjtri@hotmail.com

Abstract - This paper studies the international transmission of bank liquidity shocks from multinational Islamic bank-holding companies to their subsidiaries. Based on a total sample of 120 Islamic and conventional bank subsidiaries, we test whether foreign bank lending is determined by different factors for Islamic and conventional banks. We estimate a model that includes subsidiary and parent bank characteristics as well as host and home country variables. Our empirical findings show that conventional parent bank fragility negatively affects lending by their subsidiaries. Nevertheless, we show that the parent Islamic bank does not significantly affect lending by subsidiaries. Finally, we examine the existence of market discipline in relation to the transmission of liquidity shocks. We further find that reduction in foreign Islamic bank lending is stronger for those that are dependent on the interbank market. We find that the depositors react to a deterioration of bank performance and punish their institutions by withdrawing money. We show that market discipline plays a more important role for Islamic banks whereas liquidity needs determine the change in for conventional banks.

Keywords: Islamic banks, credit supply, market discipline
JEL Codes: F15, F34, D4, G21, L1, N25

1. Introduction

The transmission of liquidity shocks of banks has been a widely discussed issue for several years. Most studies have investigated this issue in the context of developed and emerging countries in periods of crisis (Claessens et al., 2001, Haas and van Lelyveld 2010, Allen et al., 2012). The management of liquidity risk is at the heart of the control of banking system stability for the monetary authorities. Cetorelli and Goldberg (2012) suggest that banks' liquidity management may globally increase the international propagation of domestic liquidity shocks. This risk is more note worthy through the presence of foreign subsidiaries in the economy. Indeed, another stream of literature has identified a transmission of liquidity shocks between countries through bank subsidiaries.

This issue is of major importance for monetary authorities mainly for two reasons. First, the transmission of liquidity shocks is a systemic aspect. Thus, the distress of a small number of banks can lead to a systemic risk that affects the entire banking sector in the country. Second, with the evolution of the number of international banks, the strategy of subsidiaries in hostile countries may be affected by loans and deposit policies of parent banks. Based on the imperfections noted in the contractual relationship between capital providers and borrowers, the literature has introduced a new transmission channel to explain the propagation of monetary shocks from financial sphere to the real economy.

In this article, we aim to analyze the determinants of lending behavior of foreign subsidiaries in Islamic countries. In this context, we compare the effect of conventional and Islamic subsidiaries for the transmission of liquidity shocks to the host country by testing whether loans of foreign subsidiaries of Islamic and conventional banks are determined by the same set of factors. Moreover, we are willing to detail further analysis by examining market discipline exerted by depositors on Islamic and conventional subsidiaries. We attempt to test whether the characteristics of the parent bank and subsidiaries may explain the behavior of depositors in host countries.

The problem of liquidity shocks' transmission, in the context of Islamic banks, is very important to be addressed for two reasons. First, the development of Islamic finance has largely been catalyzed by the development of Islamic subsidiaries in several countries and the weight of these foreign subsidiaries may destabilize the banking sector in the host country. Secondly, the effect of foreign Islamic subsidiaries on the transmission of liquidity shocks from the country of origin to host countries has not been tested in the literature.

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In an Islamic financial system – as depositors share the risk with the bank and loans are based on the nature of the assets – this may contribute to market discipline and banking stability. The liquidity management is also relevant to an Islamic bank that holds illiquid assets, while its debts are liquid, while maintaining the value of its liabilities. Thus, since Islamic banks have the same structure and characteristics of the balance sheet of commercial banks, they are not immunized against liquidity risk. The potential mismatch between deposits and investment financing exposes Islamic banks to liquidity problems. Generally, banks maintain liquidity too much to avoid falling into liquidity problems; this may affect its profitability. Thus, creating a balance between the two objectives of safety and efficiency is at the heart of the problem of liquidity management.

Certainly, Islamic finance prohibits the payment and receipt of interest at an in advance fixed rate and forbids speculation principles that promote the stability of the financial system. However, the Islamic banks in the financial system are fraught with risks that differ in many respects from those caused by conventional banks as a liquidity risk.

Since Islamic banks are based in their operation on the connection between financial transactions and economic assets in accordance with the *Shariah*, they perform the same activity of mediation as conventional banks, except they do it with more constraints. The inability to comply with fixed income associated with low availability of Shariah compliant products, further limiting liquidity management's fields to be less risky for the bank and therefore the economy. Our objective is to address the role of Islamic bank subsidiaries in the transmission of loan and deposit checks on host countries by using aggregate data. We also evaluate the market discipline exerted by depositors on conventional and Islamic subsidiaries mainly in a period of crisis. To our knowledge, no study in the literature review has focused on the study of the credit channel between Islamic parent banks and their subsidiaries.

The rest of the paper is organized as follows. The second section provides the basic background on the role of Islamic and conventional subsidiaries in the transmission of liquidity shocks. In this section we highlight also studies focusing on the market discipline exerted on Islamic banks. The third section describes the nature of the data and empirical methodology used in this study. The forth section presents the empirical findings. Section five concludes.

2. Lending shock transmission by Islamic bank subsidiaries and market discipline

In this section we present the theoretical framework in which the problem of transmission of credit through Islamic subsidiaries was studied. We also present a literature review of research interested in the study of market discipline in the context of Islamic banks.

Lending shock transmission by Islamic bank subsidiaries

Our study is related to growing literature documenting the role of bank lending channels in the transmission of liquidity shocks internationally. Bank subsidiaries may affect the economies of the host country in two ways. First, a crisis liability that often occurs as banks panic in response to the random nature of depositor's withdrawals. This is based on the polarization of depositors' expectations and surely marks the limits of the policy's deployment. Second, a crisis of assets which is due to the irreversibility of the lending relationship: if a negative shock affects the profitability or chronic repayments for loans already made, then the bank is facing a liquidity risk, which itself may cause a race to liquidity.

Brokering activities of Islamic banks can reduce the contagion of liquidity between parent banks and their subsidiaries. Indeed, the modes of charged credit by Islamic banks, based on sales, do not include direct loans, rather, purchase, sale or installment sale including real estate and services. Shariah law imposed a number of conditions for the validity of these transactions to ensure that the seller also shares part of the risk, and in order to prevent these modes, borrowing and lending are considered the foundation of interest. One of these conditions is that the seller must own the property for sale and that Shariah law does not allow the bank to sell it. Once the seller has acquired ownership of the property subject of the sale on credit, he assumes the risk. Therefore, all sales are automatically excluded from incomplete Islamic contracts. Islamic finance can grow along with the expansion of the real economy and thus assist in decreasing the excessive credit growth is one of the main causes of the instability of international financial markets.

Loans of subsidiaries contribute to the financing of the growing demand for domestic credit. Heavy dependence on external capital exposes the foreign subsidiaries to the risk of non-renewal funding, even at the risk of sudden withdrawal of capital. The experienced liquidity crisis by the global banking system during the financial year 2008–2009 had particularly affected Muslim countries. Financing difficulties of parent banks and risk premiums rising have reduced funding for subsidiaries. In addition, the deterioration of the general economic situation led foreign banks to re-evaluate the risks in host markets and tougher lending conditions abroad.

Concerning the faced risks by depositors in the banking system, the latter requires the creation of a certain psychological confidence to their banks in order to strengthen the relationship between the two. This requires, on the one hand, confidence in the macro-economic health of the economy, and, on the other hand, confidence in the safety and soundness of the financial system and institutions with which the depositors deal. The first condition can be assured by the implementation of healthy monetary, fiscal and exchange policies, while the second can be achieved by providing greater market discipline in the banking sector. These elements need to be further strengthened by prudential regulation and effective control, emphasizing a particular way on the capital adequacy assessment and appropriate management of risk, internal control and external audit trying to achieve further efficiency and transparency. It is also necessary to improve and streamline the administration of companies, so those funds received by banks and firms are used more effectively to the ultimate benefit of both the financer and the user.

Khan and Khanna (2010) and Baele, Farooq and Ongena (2010) argue that Islamic banks have particular specificities

to attract deposits and lend under interest free contracts that attract depositors and borrowers for religious reasons. These contractual characteristics and motivation on both liability and asset sides may allow Islamic banks to protect themselves from liquidity shocks.

In this paper we aim to investigate the difference between Islamic and conventional bank subsidiaries' in the transmission of liquidity shock to host countries. Our work is related to a growing literature documenting the role of bank lending channels in the transmission of liquidity shocks internationally.

The majority of previous research studies interested in the role of subsidiaries and in the transmission of shocks have been conducted on conventional banks. Arvai et al. (2009) presented two different contagious channels that can be carried through inter-bank linkages and parent/subsidiaries relationships. In the case of the first channel, the problems of liquidity or solvency of a subsidiary may affect its parent, which feeds back on its other subsidiaries in other host countries through the channel of the common creditor. The parent banks of subsidiaries operating in host countries are in spin affected. A variant of this channel implies also that a subsidiary wants to reduce its exposure for reasons of portfolio diversification. This translates to withdrawals of deposits or the rising cost of financing the subsidiary, which can cause liquidity problems and affect, through the money market, other banks in the host country, as well as their parent and the markets in which they are active. In the case of the second channel, the problems of liquidity or solvency of the parent affect its subsidiaries, which is propagated by inter-bank linkages or through distrust in the banking system, the banks of the host country, in turn, impact their respective parent companies.

Shnabl (2011) suggests that the efficient market theory highlights that as long as investment opportunities are constant, shocks to financial institutions in one market should not affect lending in other markets. If financing frictions prevent financial institutions from accessing alternative financing sources to cover shortfalls, then liquidity shocks in one market may affect lending in other markets. Cetorelli and Goldberg (2012) show that the critical description of the bank lending channel is that banks' experience of a funding shock. If they cannot substitute liabilities with other external funding sources, such as by issuing certificates of deposit or attracting money market funds, the shock is transmitted to the asset's side of their balance sheets. Martinez Peria et al. (2002) and Haas and van Lelyveld (2006, 2010) suggest that subsidiary banks do not change their lending strategies in times of local crisis.

Bernanke and Blinder (1988), Bernanke (1983) and Bernanke and James (1991) tested the relationship between liquidity and changes in loans. They demonstrate that changes in the liquidity have real consequences on loan strategies of banks. However, these studies have ignored a number of variables such as economy-wide productivity shocks that affect both changes in supply and demand of loans at the same time. Loupias, Savignac and Sevestre (2003), Worms (2003) and Gambacorta (2005) show that liquidity positions of banks affect how banks react to a monetary shock in several European countries.

Claessens et al. (2001) suggest that foreign subsidiaries may be a factor of a financial instability. Infact, the relaxation of restrictions on foreign bank's entry can bring risks. Particularly, by increasing competition and thereby lowering the profits of domestic banks, foreign entry may reduce charter values of domestic banks, making them more vulnerable. This may have a destabilizing effect on the financial system, especially if the domestic prudential regulations and supervision are not sturdy.

From a public policy standpoint, Peek J. and E. Rosengren (1997) indicate that global bank credit flow is influenced by both domestic and foreign conditions. Moreover, a bank's capitalization will not be a sufficient statistic for predicting its willingness to lend. Nonperforming loans, even those yet to be reflected in capital ratios, or publicly disclosed, can alter the willingness of global banks to lend.

Several studies have addressed the role of conventional banks in the transmission of liquidity shocks. Kashyap and Stein (1999) find that, following a monetary contraction, small banks whose balance sheets are liquid reduce lending less than other small banks and large banks to maintain their lending irrespective of their liquidity positions.

In light of this synthesis, this paper contributes to the existing literature by exploring the role of foreign Islamic subsidiaries in the transmission of liquidity shocks. We also examine whether depositors exert market discipline effect on Islamic banks' subsidiaries. We address this issue by testing whether depositors are sensitive to the risk of Islamic subsidiaries in host country.

3. Market discipline of Islamic subsidiaries

Market discipline can be described as a situation in which depositors penalize riskier banks by withdrawing deposits. Both conventional and Islamic banks offer similar products and services, but the underlying contracts are different. For conventional banks, deposit and financing are based on the loan agreements. In contrast, Islamic banks provide their deposits and financing based on Islamic contract as *wadi'ah, Mudarabah, Musharakah* and *Murabahah*. The major reason why such practices are performed is that the interest is for bidden in Islam, and these products can prevent interest rates from being applied to transactions. Thus, this unique feature of Islamic finance has introduced a new way for the banking industry, and it affects all involved parties in the industry, including depositors, investors and borrowers.

Moreover, all these principles of Islamic finance are mainly based on risk-sharing between banks and their counter parties, which makes the risk's control adopted by the bank, one of the depositors' concerns. This allows us to prejudge that market discipline exerted by depositors on Islamic banks will be more pronounced than that exerted on conventional banks.

Market discipline was stated by the Basel regulatory framework as one of the three pillars required for the stability of the international financial system. The Islamic system is trying to achieve this discipline by ensuring that banks share risk with their depositors that contribute directly or indirectly to the risks of banking activities. Risk

sharing should help motivate depositors to carefully choose the bank where they invest their money and ask for more transparency of the chosen bank. It should also pressure banks to initiate an in-depth analysis of their credits and to make more effective management of their risks.

Heavy dependence on external capital exposes subsidiaries in host countries to the risk of non-renewal of funding (funding risk), even at the risk of sudden withdrawal of capital. The liquidity crisis experienced by the global banking system in 2008–2009 has particularly affected Muslim countries. Financing difficulties of parent banks and rising risk premiums have reduced funding for subsidiaries. In addition, the deterioration of the general economic situation led foreign banks to re-evaluate the risks in emerging markets and set tougher lending conditions abroad. Zaheer, Ongena and van Wijnbergen (2011) suggest that Islamic banks may be unable to buy wholesale deposits at a fixed rate and that these cannot be considered along with their Islamic loans substitutable securities that they hold in their portfolios. This can make the transmission of liquidity shocks across the Islamic banking segment more powerful.

Khaf (1996) illustrates that the proportion of deposits in Islamic banks is generally estimated to be higher than in conventional banks. Banks use the funds without remunerating the depositors. He suggested that Islamic banks must either share revenues with investors or reduce their dependence on these deposits. In addition, there must be someone who will bear the losses and ensure the safety of those deposits. Capital must be sufficient to absorb losses since most of banks are capitalized, and this lowers the charge on the depositors.

Depending on the funding strategy adopted, parents' banks can delegate more responsibility to their subsidiaries in terms of collecting deposits in host countries. Consequently, parent banks isolate their foreign subsidiaries by reducing the available funding. In many countries, the reduction in funding foreign subsidiaries may have destabilized the entire system. According to Herring (2007), the situation is even more serious when the foreign subsidiaries with significant shares in host markets become systemically important, while at the same time, they are not so important for the parent bank because of their small size relative to multinational banking groups.

Jacklin and Bhattacharya (1988) and Diamond and Dybvig (1983) support that failure to respond to liquidity problems can not only cause bank insolvency in the short term, but can also induce contagion effects. The risk undergoing by the banking system is that the failure of an insolvent bank can lead depositors of other banks to withdraw their deposits. Mokhtar, Smith and Wolfe (2003) argue that investment depositors at Islamic banks face the same things depositors of conventional banks face about loan loss provisions. They suggest that this is particularly of major interest because the investor would like to know the risks that their investments are exposed to. Habib (2003) discusses the implications of variable rate of return on the behavior of depositors and identifies a withdrawal risk that Islamic banks face. He argues that this risk introduces a market discipline's mechanism that reduces the moral hazardous problem in the bank operations.

Market discipline is widely adopted by regulatory authorities to limit bank risk-shifting incentives that are exacerbated through a financial safety net. We address this issue by asking the question: Do depositors require controlling risk-taking by Islamic subsidiaries in crisis period? The last global financial crisis has sparked a debate on incentives that may assist depositors to discipline risk-taking by their banks.

4. Methodology and data

In this study, we examine the relationship between parent banks and credit supply strategy of their foreign subsidiaries. De Haas and van Leyveld (2010) show that loan growth of foreign subsidiaries is not only determined by their own characteristics but also by the characteristics of their parent bank and the variables of host countries. Following their approach, we use the annual change of the logarithm of total loans of a subsidiary (ΔLoans) as the dependent variable of our estimation, which describes the evolution of loans of the subsidiaries.

In our work, we present a stylized model, which specifies the loan supply decision of bank subsidiaries in light of two types of variables; the first are specific variables of subsidiaries and their parent banks and the second are macroeconomic variables of both origin and host country. Specific financial variables banks for subsidiaries and parent banks include Return on Equity (*ROE*), equity to total assets (*equity*), assets liquid to total assets (*liquidity*) and we consider provisions for loan losses to net interest income (*Loan Loss Provisions*) as a proxy for credit risk following, among others, Gropp and Vesala (2004) and Nier and Baumann (2006). We expect the estimated coefficient of equity of Islamic subsidiaries to be positive, since credit transactions in Islamic finance are linked to effective and a real business, which is based on risk sharing between the bank and its customers. The estimate coefficient of non-performing loans' provision should have a negative sign, as banks reduce exposure in countries where they are experiencing problems.

We include a variable size (*size*), as a variable control, defined as the logarithm of total assets. Gambacorta (2005) shows that bank size is irrelevant; small banks are not more sensitive to monetary policy shocks than large banks. Finally, we include inter-bank report (Inter-bank ratio) defined as interbank lending to borrowing. The second group of variables consists of macro-economic variables of the host country. We include the growth rate of GDP (*GDP growth*) and the real exchange rate of the U.S. dollar (*real exchange rate*). We expect that lending by foreign banks increases with the local GDP and appreciation of the local currency.

The study of the effect of GDP on the credit supply is supported by the assumption that better economic conditions increase the investor's optimism. A higher exchange rate results in higher imports prices and, in turn, increased domestic prices. Accordingly, a higher exchange rate reduces exports' prices and thus leads to a higher demand for exports, Kia and Darrat (2007). As a result, the higher demand for resources creates a pressure on domestic prices and hence increases loans in Islamic banks.

In addition, to test whether the structure of the banking sector's liquidity affects the transmission of liquidity shocks

we include the variable (*concentration*). The concentration of the banking sector implies the importance of local banks in the host country. We estimate that more high concentration lower the role of foreign subsidiaries in the transmission of liquidity shocks.

The study of the transmission of liquidity shocks in the literature was very limited by the fact that it is very difficult to isolate the impact of credit supply shocks' credit application. Cetorelli and Goldberg (2009) suggest that the transmission of liquidity crisis through bank subsidiaries, including both cross-border lending, which has long been recognized as responding significantly to shocks at home or abroad, and internal capital-market lending, which is the internal flow of funds within a banking organization. Country-specific variables enable us to isolate loan demand effects to some extent. Moreover, we can potentially identify the external liquidity shock by including the inter-bank transactions of both home and host countries.

In a following step, to test the existence of market discipline and to identify its mechanism, we use the following variables. Firstly, we use the first difference of the log of time deposits, Δ*Time Deposits*. We expect a positive effect from the fundamentals of banks and term deposits. Indeed, existing studies have reported that depositors punish banks for excessive risk-taking by withdrawing their deposits. Similarly, we include that the change in bank deposits (ΔDeposits Bank) as the second market discipline measure.

We assume that a double evaluation of risks by both the counter-party and the bank should help introduce a healthy discipline in the whole banking business and eliminate a range of undesirable lending practices. Furthermore, the adoption of profit-loss sharing modes pressure Islamic subsidiaries into having adequate capital and sufficient loss-off setting and other reserves to provide an assurance to their depositors – particularly demand depositors – that their deposits are safe. We expect that the higher the capital and reserves are, the greater will be the ability of banks to attract deposits.

The sample used in this study focuses on banks' subsidiaries in the MENA region (Middle East and North Africa). Upon the period between 2000 and 2010, we collect financial data on 104 bank subsidiaries divided on 52 Islamic subsidiaries and 52 conventional subsidiaries. This paper combines financial data of subsidiaries and macroeconomic variables of both host and home countries to investigate determinants of loans shock transmission. The financial information on subsidiaries of conventional and Islamic banks was collected from IBIS (Islamic banks and financial institutions information) and Bank Scope database. Table1 provides descriptive statistics of our sample. The Z-statistic of the test for mean difference was also calculated to test the significance of differences in means of the variables between Islamic and conventional subsidiaries.

Our sample shows some difference between Islamic and conventional subsidiaries. In particular, Islamic subsidiaries are, on average, significantly greater than conventional banks. In terms of profitability, Islamic subsidiaries have lower return on equity. This may be due to their involvement in economic activities by offering different ranges of products based on the sharing of profits and losses, "*Moucharka* and *Moudharba*." These products are primarily based on a relationship of conviction between banks and a limited set of customers. Islamic subsidiaries show significantly higher liquidity. Conventional subsidiaries have higher loan provision than Islamic ones but the difference doesn't appear significant. These differences may affect the transmission of loan and deposit checks by the two types of subsidiaries.

In this study, we examine whether the transmission of a liquidity crisis Islamic banks and conventional multinational subsidiaries depend on the same financial and macro economic factors. We use a methodological approach similar to that of Haas and Van Lelyveld (2010). However, our work differs from their study by analyzing the effect of foreign Islamic subsidiaries in the transmission of liquidity shocks. Following Allen et al. (2010), we explore the effect of dependence of subsidiaries on the inter-bank market on their lending strategy. Then, we test the effect of parent banks on market discipline of their subsidiaries in host countries, taking into account the period of the last subprime crisis (2007/2008).

Table 1. Summary statistics of all subsidiaries – Islamic and conventional.

	All banks subsidiaries		**Islamic banks subsidiaries**		**Conventional banks subsidiaries**		
	Mean	**Std. dev**	**Mean**	**Std. dev**	**Mean**	**Std. dev**	**Z-statistic**
ΔLoan	0.286	1.501	0.623	2.212	0.027	0.279	0.788
ΔTime Deposits	0.381	1.237	0.422	1.304	0.161	0.766	0.984
ΔBank Deposits	0.179	0.947	0.194	1.401	0.169	0.388	1.233
Total Assets	5.11E+07	5.92E+08	7.79E+07	9.36E+08	3.69E+03	7586.427	3.782*
Loan Loss	180.829	540.082	146.242	86.502	278.631	690.004	0.161
Equity	1.47E+01	1.47E+01	1.96E+01	1.89E+01	1.17E+01	10.209	2.674*
ROE	7.84	26.571	6.211	24.258	8.867	27.913	0.129
Liquidity	37.143	36.749	40.208	22.039	35.096	43.821	3.581*
Interbank	153.659	222.338	135.273	200.838	692.96	129.829	0.171
Concentration	0.643	0.176	0.647	0.169	0.64	0.18	0.133
Cost to Income	74.267	74.026	94.284	103.144	57.832	25.797	0.003

*significant at 10%

5. Results and interpretations

Islamic subsidiaries and loan strategy

To test the impact of parent banks on lending strategies of foreign Islamic banks and conventional subsidiaries, we estimate the following model:

$$\Delta Loan_{it} = f(Bank_{it}, Country_{it}, ParentBank_{it}, ParentCountry_{it})$$

where $\Delta Loan_{it}$ is the change in the total loans of the subsidiary i in year t. $Bank_{it}$ and $ParentBank_{it}$ denote, respectively, vectors of variables specifics to the foreign subsidiary i and its parent bank. $Country_{it}$ is a vector of macroeconomic variables of the country where the subsidiary is located. $ParentCountry_{it}$ is a vector of macroeconomic variables of the country of the parent bank i.

The results of the panel model that describes the changes in the lending policies of subsidiaries ($\Delta Loan$) are shown in Table 2. The table summarizes the estimates for the entire sample, as well as separate estimations for Islamic and conventional subsidiaries. For each type of bank, we considered three specifications of different models. In the first specification, we consider only specific variables of subsidiaries as well as the macro-economic characteristics of their host countries. Then, we add in the following specification, the financial characteristics of the parent bank, and the origin country of the bank. In the third specification, starting from the observation that lending re-launching, during the last financial crisis, was censured by foreign banks funding, we introduce a new dummy variable (*crisis*), which characterizes the subprime crisis of 2007 and 2008. This variable takes the value 1 in the period of crisis (in 2007 and 2008) and zero otherwise. The variable (*crisis*) allows us to capture the direct effect of the recent financial crisis on the credit growth of Islamic and conventional subsidiaries. Khan (2010) found that Islamic banks enjoy substantially higher growth rate loans than other banks, including the crises period of 2008. In addition, we consider the interaction of this variable with the characteristics of each parent bank in order to explore the effect of parent banks during the recent financial crisis on both Islamic and conventional subsidiaries.

Regarding the estimates of the overall sample, we note that for each specification, the variable (*equity*) is significantly positive, implying that the size of the equity has a positive effect on the growth of the loan. Among macro-economic variables of the host country, only the variable *cost to income* appears significant. This shows that, generally, economic conditions of the host country have no direct effect on loan strategies adopted by foreign subsidiaries.

The effects of transmission of liquidity shocks through foreign subsidiaries of banks seems to be different between Islamic and conventional subsidiaries and do not depend on the same factors. Specifically, "lending-channel" is more relevant for conventional banks. More precisely, we find that the lending strategy of conventional subsidiaries is significantly related to its own specific financial variables. Thus, lending activities of conventional subsidiaries in host countries depends significantly on its own liquidity and size. While these two variables appear insignificant in the case of Islamic subsidiaries. In particular, we find that an Islamic subsidiaries' size is irrelevant; this means that small subsidiaries are not more sensitive to liquidity shocks than larger ones.

The results show also that capitalization affects how banks react to liquidity shocks. Higher capitalization reduces significantly lending of subsidiaries in host countries. Following Gambacorta and Mistrulli (2003), this result has two possible explanations. First, well-capitalized banks are less likely to suffer from liquidity crisis through loan losses since they are more risk-averse, as their borrowers are less risky. Second, well-capitalized banks can better absorb temporary financial difficulties on the part of their borrowers and preserve long-term relationship loans.

Concerning macro-economic variables of host countries, exchange rates matter only for conventional subsidiaries. This corroborates the results of Cook and Devereux (2011) who argue that the exchange rate exacerbates the impact of shocks in a liquidity trap for conventional banks that are increasingly affected by a systemic risk with the opening of capital markets. Contrary to the results of Classens and Horen (2009), we document that the income level of the home country does not significantly affect the supply of loans of conventional subsidiaries banks. While, the GDP level in the host country has an impact on the strategy of Islamic subsidiaries loans. In that case, a foreign Islamic subsidiaries presence could provide much needed stability to a country experiencing a severe domestic shock. Moreover, conventional subsidiaries appear significantly affected by the economic growth in the parent country. This confirms that the effect of liquidity shocks' transmission across countries is intensified by the foreign subsidiaries of conventional banks.

The coefficient of concentration appears insignificant for both Islamic and conventional subsidiaries. This result is contrary to that of Allen et al. (2010). This may be due to the different context of our study, which focuses on the concentration of Islamic foreign subsidiaries that are located in countries with a highly concentrated banking sector.

Another interesting result to deduce from this table is that we evidence the impact of parent characteristics on conventional subsidiary's lending during the last financial crisis 2007–2008. Indeed, loan loss' provision and liquidity of the parent bank significantly affects loans' growth of their subsidiaries in times of crisis. This shows that relative bank fragility reduces lending by subsidiaries.

Islamic subsidiaries do not seem significantly affected by financial variables of their parent banks in period of crisis. This result allows us to deduce that principles of Shariah allow Islamic banks to protect themselves against speculative shocks. Indeed, its precepts seem attractive especially in times of crisis. Islamic banks treat their customers as business partners. They have a vested interest to carefully assess the financial demands and assist debtors in difficult times, reducing the risk of liquidation of assets at bargain prices and the risk of systemic contagion. Finally, Islamic financial principles protect deposits and prevent excessive borrowing. The exercise of banking industry in an Islamic framework allows Islamic banks to reduce effects of the transmission of liquidity shocks across borders.

Table 2. Estimations of loan growth of Islamic and conventional subsidiaries.

	All banks			Islamic banks			Conventional banks		
	1	2	3	1	2	3	1	2	3
Subsidiary characteristics									
Loan loss	0.00002	−0.00003	−0.00002	−0.00007	−0.00416	−0.00634	−0.00006	−0.00005	−0.00004
(T–Student)	0.06	−0.07	−0.05	−0.01	−0.61	−0.87	−1.51	−1.37	−1.03
ROE	0.00384	0.00343	0.00255	**0.0479****	**0.0396***	0.03533	0.00022	−0.00001	−0.00030
	0.81	0.68	0.49	2.05	1.76	1.5	0.39	−0.02	−0.5
Equity	**0.0742*****	**0.0508****	**0.048****	**0.133*****	**0.0810***	0.06763	0.00519	**0.0086***	**0.0087***
	3.39	2.14	2	3.12	1.9	1.47	1.35	1.84	1.87
Liquidity	0.00033	0.00044	0.00054	−0.00855	0.01206	0.01242	**0.0004***	0.00030	0.00035
	0.13	0.19	0.22	−0.43	0.6	0.51	1.69	1.2	1.33
Size	0.15505	0.10711	0.13435	0.20344	0.19216	0.17448	**0.114*****	0.02506	0.03231
	0.94	0.67	0.72	0.69	0.68	0.5	2.74	0.57	0.59
Host country									
GDP growth	−0.00246	0.00042	0.00073	**−0.01*****	**−0.004****	**−0.009****	−0.00798	−0.00210	−0.00255
	−0.07	0.01	0.02	−2.56	−1.97	2.17	−1.47	−0.37	−0.45
Exchange rate	−0.04893	−0.01592	−0.01983	−0.06611	0.06092	0.11627	**−0.02*****	**−0.03*****	**−0.02*****
	−0.99	−0.3	−0.36	−0.6	0.47	0.79	−2.65	−3.23	−3.04
Concentration	−0.51085	−0.43611	−0.54415	−0.15852	0.10022	−0.29174	−0.61883	−0.07343	−0.17816
	−0.29	−0.25	−0.31	−0.05	0.03	−0.09	−1.29	−0.17	−0.41
Cost to Income	**0.00678****	0.00425	0.00388	**0.0114***	0.00838	0.00779	**0.0031*****	**0.003*****	**0.003*****
	1.97	1.28	1.14	1.86	1.4	1.26	3.02	2.86	2.82
Parent characteristics									
Loan loss		−0.00001	−0.00002		0.00152	0.00141		0.00000	0.00000
		−0.17	−0.19		0.31	0.17		0.05	−0.19
ROE		0.01415	0.02730		0.03379	0.05573		0.00278	0.00241
		1.09	1.41		1.03	1.28		1.48	0.74
Equity		−0.02142	−0.01980		0.00015	−0.01518		−0.00025	0.00152
		−0.76	−0.68		0	−0.26		−0.03	0.17
Liquidity		−0.00439	−0.00584		−0.04264	−0.04437		0.00056	0.00205
		−0.25	−0.26		−0.9	−0.81		0.24	0.56
Home country									
GDP growth		−0.01373	−0.01260		0.00610	0.02019		**0.027*****	**0.0064*****
		−0.4	−0.36		0.06	0.2		3.56	2.97
Crisis			0.34711			0.53218			0.11104
			0.49			0.27			0.85

(*Continued*)

Table 2 - *Continued*

	All banks			Islamic banks			Conventional banks		
	1	2	3	1	2	3	1	2	3
Interactions									
Crisis*P_Loan Loss			0.00039			0.00145			**0.00031*****
			0.48			0.14			2.8
Crisis*P_ROE			–0.01851			–0.04300			0.001219
			–0.92			–0.97			0.35
Crisis*P_Equity			0.00053			0.05689			0.008931
			0.02			0.65			1.41
Crisis*P_Liquidity			–0.00798			–0.04865			**–0.007*****
			–0.39			–0.61			–2.59
Constante	–1.74641	–0.99336	–1.23913	–4.11724	–5.26919	–5.21522	–0.22826	0.01938	–0.050639
	–0.76	–0.42	–0.47	–0.75	–0.92	–0.74	–0.47	0.04	–0.09
R-squared	0.01960	0.05550	0.04740	0.01540	0.02540	0.00880	0.02190	0.04900	0.0476

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

We conclude that conventional bank's subsidiaries have larger lending channel effects than Islamic bank's subsidiaries. However, the loan supply of Islamic subsidiaries is less likely to react to changes in economic and currency policy. This can be justified in two ways. First, they have fewer investment opportunities and are more likely to sit on a lot of spare liquidity. Second, one of the peculiarities of Islamic finance is that credits are granted for specific purposes involving the purchase or lease of real assets and may only grow in harmony with the growth of transactions in goods and services. Therefore, the opening of Islamic banks to international funding does not seem to have been a source of propagation of the initial shock. This shows that the exposure to international funding source countries from extant, that were likely to suffer more from the shock are instead provided for multiple and independent channels of shock transmission.

In order to better investigate the role played by Islamic banks on the transmission of liquidity shocks, we test whether the intensity of transmission of shocks depends on the degrees of intervention of Islamic subsidiaries on the inter-bank market. For this purpose, we divide our Islamic subsidiaries' sample into two groups according to the ratio of the inter-bank subsidiary. The first group consists of banks with inter-bank ratio below one. This means that loans are lower than borrowing; this group of banks is considered more dependent on inter-bank loans. The second group includes banks with an inter-bank ratio higher than one. In this case, loans exceed borrowing, so this group of banks is considered to be less dependent on inter-bank loans.

In other words, this means that the first group of subsidiaries finances its foreign loans by massive intervention in the inter-bank market, which is a risky strategy that affected the financial situation of many banks during the last financial crisis. In contrast, an inter-bank ratio above one means that a foreign subsidiary is a net lender in the inter-bank market. Therefore, the subsidiary should not have to be limited in loan liquidity crisis during the recent crisis.

Following Allen et al. (2011) we hypothesize that the shock is transmitted through the inter-bank channel to subsidiaries. However, as direct transactions between the foreign subsidiaries and the parent banks are not available, we aim to capture this effect by including the *inter-bank* ratio of the parent bank in the last specification. In our estimations, we do not include liquidity and inter-bank ratio's variables at the same time because liquidity is potentially determined by the inter-bank lending and borrowing.

The result estimations are presented in Table 3. Our results show that loan strategies of Islamic subsidiaries that are strongly related to the inter-bank market are strongly related to the performance of parent banks. In particular, this category of subsidiaries reduces their credits when the parent bank has higher loss provisions, and higher inter-bank ratio. The return on equity appears positively significant, implying that the more the parent bank is profitable the more related subsidiary to the inter-bank market increases its credit.

The size seems to have a positive effect only on subsidiaries strongly related to inter-bank market. The importance of bank size allows easier intervention on the inter-bank market, which enables it to respond to the demand loans.

Table 3. Loan growth and interbank dependency.

	Interbank<1				Interbank>1			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Subsidiary characteristics								
Loan loss	0.00297	0.00219	0.00303	–0.00176	–0.00016	–0.0069	–0.0083	–0.0250
(T–Student)	1.38	0.95	1.13	–1.31	–0.02	–0.9	–1.01	–1.37
ROE	**0.0288***	0.01251	0.01925	–0.01343	**0.0496****	0.03325	0.03225	0.02128
	1.81	0.72	0.86	–1.25	2.01	1.41	1.32	0.67
Equity	**0.0408****	–0.00487	–0.00327	0.00342	**0.157*****	0.06165	0.05740	**0.092***
	2.12	–0.12	–0.08	0.18	3.06	1.12	1.01	1.87
Liquidity	0.00144	–0.00003	0.00072		–0.01222	0.01056	0.01228	
	1.22	–0.02	0.54		–0.59	0.5	0.49	
Size	**0.7174****	0.29479	0.35671	**0.605*****	0.19959	0.13479	0.15967	0.12398
	2.06	0.48	0.58	2.78	0.66	0.45	0.44	0.28
Host country								
GDP growth	–0.05313	–0.05526	–0.06509	**–0.03***	–0.03006	–0.0207	–0.0167	–0.0523
	–1.46	–0.58	–0.68	–1.8	–0.3	–0.2	–0.15	–0.34
Exchange rate	6.02955	–10.6262	–7.84602	–3.70227	–0.06390	0.05791	0.10316	–0.0277
	0.93	–1.14	–0.83	–0.82	–0.56	0.45	0.68	–0.15
Concentration	–0.14383	–4.80465	**–7.0965***	**–3.531****	**–0.081***	**0.0783***	**–0.224***	**–1.63****
	–0.02	–0.53	–1.77	–1.98	–1.83	1.73	–1.69	–2.24
Cost to Income	**0.024*****	–0.00145	0.00558	–0.00430	**0.011***	0.00881	0.00912	0.01079
	4.21	–0.14	0.41	–0.68	1.71	1.4	1.4	1.31
Parent characteristics								
Loan loss		–0.00058	–0.00438	**0.0040****		0.00298	0.00301	0.00830
		–0.13	–0.73	2.1		0.54	0.29	0.58
ROE		0.02554	0.03514	**0.039*****		0.04911	0.05114	0.04119
		1.2	0.76	2.96		0.99	0.82	0.47
Equity		–0.06109	**–0.234***	**–0.091***		0.01053	–0.0047	–0.0177
		–0.63	–1.64	–1.92		0.21	–0.07	–0.26
Liquidity		–0.05829	–0.02878			–0.0211	–0.0144	
		–1.06	–0.44			–0.41	–0.24	
Interbank				**0.0091*****				0.00177
				6.78				0.53
Home country								
GDP growth		**–0.3*****	**–0.31***	**–0.3*****		0.07946	0.08598	0.19127
		–2.71	–1.87	–6.28		0.71	0.66	0.93
Crisis				**–2.6*****			0.00503	–3.7907
				–2.88			0	–1.09
Interactions								
crisis*P_Loan Loss			**0.0283***	0.01153			–0.0002	0.03557
			1.68	1.56			–0.02	0.88
crisis*P_ROE			0.09870	**0.434*****			–0.0086	0.06906
			1.15	4.46			–0.13	0.6
crisis*P_Equity				**–0.3*****			0.05688	0.08947
				–2.55			0.61	0.97
crisis*P_Liquidity			0.02432				–0.0424	
			0.88				–0.43	
crisis*P_Interbank				**0.009*****				–0.0009
				3.19				–0.25
Constante	–13.81726	16.53713	15.23955	3.74248	–3.85401	–5.6036	–6.5814	–3.0353
	–1.17	0.88	0.83	0.45	–0.66	–0.91	–0.89	–0.35
Observations	54	35	35	44	134	117	117	87
R-squared	0.04880	0.01850	0.04640	0.05070	0.01320	0.02350	0.00740	0.14080

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. T-student ***significant at 1%, **significant at 5%, *significant at 10%.

Bank capitalization seems to be crucial in establishing the potency of the bank lending channel, since the variable capitalization of subsidiaries appears positively significant for both groups. This confirms the results found in the previous table. Thus, the financial performance of the subsidiary and capitalization are two factors that allow the subsidiary to strengthen its credit as for conventional banks.

The effect of the turn on equity and the inter-bank parent bank's ratio on credit appears to be significant during the last financial crisis for both sub-groups. This can be explained by the substitution effect, which establishes that in times of crisis, funds are diverted from subsidiaries to parent banks that become more profitable. During the crisis, economic growth in the country of origin has an impact on lending by Islamic subsidiaries strongly linked to the inter-bank market. Islamic subsidiaries that are weakly linked to the inter-bank market seem unaffected by characteristics of parent banks even in times of crisis.

After this synthesis, we deduce that the loan strategy of Islamic subsidiaries weakly linked to the inter-bank market does not depend on the financial variables of parent banks, but mainly depends on the nature of the loans. We know that the transaction of Islamic banks are based on more accurate risk sharing and responds to *Shariah* rules, this is likely to affect their capitalization and refinancing structure.

However, the prohibition of interest does not allow Islamic banks to re-schedule unpaid loans by negotiating a higher remuneration of credits. Such a situation is likely to encourage borrowers in a weak financial situation to delay their payments voluntarily, which increases credit risk in Islamic banks. The *Foukahas* have not yet agreed on an alternative solution for this specific risk.

6. Islamic subsidiaries and market's discipline

To examine the existence of market discipline on Islamic and conventional bank subsidiaries, we estimate the following model:

$$MarketDiscipline_{it} = f(Bank_{it}, Country_{it}, ParentBank_{it}, ParentCountry_{it})$$

The same set of variables will be used to explain the variables of market discipline. We measure market discipline respectively by Δ*Time Deposits* and Δ*Bank Deposits*. The market must have the power to restore stability to the banking system through the behavior of depositors against the outstanding risk. The reaction of depositors results in an effect on deposits of subsidiaries. In particular, the Islamic system has features that can enhance market discipline since the relationship between the bank and depositors is based on risk sharing.

We expect that the sign of the variable loan loss provision will be negative. That is, any increase in provisions for loan losses should be associated with a higher expected write-off and therefore should indicate a riskier bank.

Table 4 presents the results for the entire sample of Islamic and conventional banks. The results confirm the existence of market discipline exerted by depositors on their subsidiaries. Market discipline seems more affected by their specific variables subsidiaries rather than the characteristics of their parent banks. In particular, we find that well capitalized subsidiaries can increase their time deposit. This may be explained by the fact that strengthening the capital of the bank is likely to reassure depositors and make more credible the message of a convergence of interests. The size of the subsidiary as well as the level of liquidity exerts a significant positive effect on time of the deposit. The *return on equity* has statistically significant effects on deposit growth during the period of crisis. This result highlights the role of the parent bank in a period of crisis in supporting their subsidiaries, which reassures depositors.

The results show, also, that an increase in loan loss' provisions of parent banks reduces deposits of subsidiaries in times of crisis. The negative sign of *loan loss' provisions* is consistent with our expectations. This may be due to the fact that problems encountered by the parent bank on its loan portfolio leads it to reduce its funding to its subsidiaries. Thus, if the parent bank seeks to preserve its liquidity crisis in the country of origin, their subsidiaries generally experience a reduction in their deposits.

On further analysis, an increase in loan loss provisions should be associated with a higher expected write-off and therefore should indicate a riskier institution. So, higher level of loan loss provisions is not viewed as a better protection.

It is also important to note that liquidity of parent banks significantly increases the deposits in foreign subsidiaries in the period of crisis. This may be explained by the fact that depositors can expect that the parent bank supports their subsidiaries by providing them with a sufficient liquidity in order to fulfill their obligations at maturity. Being persuaded to withdraw their funds without incurring losses, the depositors increase their deposits in subsidiaries.

Macroeconomic variables appear, globally, uninformative about the mechanism through which depositors exert market discipline on their banks. Thus, only the GDP of the home country appears significantly negative in the equation of the effect on time deposit, which implies that parent banks tend to support their subsidiaries during local economic contraction.

Table 5 reports the results of separate estimates for conventional and Islamic subsidiaries. Taken together, the results show that depositors exert a more significant market discipline effect on Islamic subsidiaries. This can be explained by the fact that customers of Islamic banks are related to their banks not only for financial transactions, but in that they trust that investment products offered by subsidiaries comply with Islamic rules of *Shariah* and believe that their banks do not take speculative risk which may affect the safety of their deposits. It appears that market discipline, which is an essential factor for banking stability, is not very pronounced in the conventional banks and may be explained by other possible factors such as the prudential banking regulations. The finding that the depositors exert higher market discipline on Islamic subsidiaries shows that they would be more motivated to monitor their banks than depositors of conventional banks.

Table 4. Market discipline of the entire sample.

	ΔTime deposits			ΔBank deposits		
	1	**2**	**3**	**1**	**2**	**3**
Subsidiary characteristics						
Loan loss	0.00285	0.00033	0.00153	–0.00014	–0.00016	–0.00018
(T–Student)	0.75	0.09	0.38	–0.73	–0.7	–0.78
ROE	–0.00181	0.01292	0.03341	–0.00171	–0.00171	–0.00153
	–0.08	0.55	1.34	–0.51	–0.46	–0.41
Equity	**0.06128****	**0.0618****	**0.0685****	0.00521	**0.00999****	**0.01190****
	2.05	2.22	2.31	0.34	2.12	1.91
Liquidity	0.00584	**0.0283****	**0.04169*****	0.00108	0.00085	0.00117
	0.45	2.24	2.66	0.64	0.47	0.62
Size	**0.33824***	**0.30960***	**0.3949****	0.05081	0.07562	**0.1548*****
	1.79	1.76	2.05	0.47	0.62	3.89
Host country						
GDP growth	–0.03543	–0.05017	**–0.0358****	–0.01290	–0.03836	–0.03949
	–0.53	–0.74	–1.94	–0.54	–1.31	–1.32
Exchange rate	**–0.1102***	0.00019	0.06419	–0.02775	–0.01887	–0.01083
	–1.69	0	0.66	–0.87	–0.47	–0.27
Concentration	–0.30815	0.71142	1.32277	–0.20303	0.11027	–0.06757
	–0.18	0.42	0.77	–0.17	0.08	–0.05
Parent characteristics						
Loan loss		0.00014	0.00358		0.00002	0.00000
		0.06	0.81		0.34	0.02
ROE		**0.03288***	0.02711		0.00414	–0.00433
		1.75	1.07		0.34	–0.27
Equity		0.07208	0.04719		0.02493	0.03503
		1.46	0.87		1.13	1.51
Liquidity		–0.02615	**–0.078****		–0.01438	–0.02168
		–0.71	–1.92		–1.05	–1.23
Home country						
GDP growth		–0.01078	–0.02728		0.00417	0.00880
		–0.25	–0.64		0.15	0.31
Crisis			**–2.647****			–0.62838
			–1.85			–1.08
Interactions						
crisis*P_Loan Loss			**–0.00464***			**–0.00044***
			–1.81			–1.71
crisis*P_ROE			–0.01126			0.00959
			–0.48			0.54
crisis*P_Equity			**0.2001***			–0.01672
			1.86			–0.61
crisis*P_Liquidity			–0.00354			**0.01761****
			–0.07		3.12	2.12
Constante	–2.85353	**–6.892****	**–8.9****	0.31758	–0.14173	–0.76382
	–0.86	–2.24	–2.28	0.22	–0.08	–0.4
Observations	93	80	80	326	278	278
R-squared	0.00330	0.08440	0.03700	0.00050	0.00000	0.00050

The table reports the fixed effects panel estimation results. The dependent variables are ΔTime Deposits, yearly change in time deposits and ΔBank Deposits, yearly change in bank deposits.T-student ***significant at 1%, **significant at 5%, *significant at 10%

The table shows that depositors of Islamic subsidiaries respond to banks' risk-taking. In particular, we find that a higher capital adequacy ratio leads to an increase in deposit growth, while a rise in the ratio of *loan loss provisions* has a significantly negative effect on deposits. In fact, an increase in loan loss provisions should be associated with a higher expected write-off and therefore should indicate a high level of risk for the bank. Our results of conventional banks are in line with those of Martinez Peria and Schmukler (2001) who find that depositors punish banks for risky

Table 5. Market discipline of islamic banks and conventional banks.

	Islamic banks						Conventional banks					
	ΔTime deposits			ΔBank deposits			ΔTime deposits			ΔBank deposits		
	1	2	3	1	2	3	1	2	3	1	2	3
Subsidiary characteristics												
Loan loss	0.028	0.027	**0.012**	−0.08	**−0.023**	**−0.001**	0.052	0.0080	0.073	−0.01	−0.090	−0.015
(T–Student)	0.72	1.07	2.28	−0.17	−2.41	−2.2	1.24	1.62	1.33	−0.24	−0.93	−0.02
ROE	−0.015	0.0124	0.033	−0.0095	−0.0069	−0.005	0.013	0.003	0.036	−0.03	−0.004	−0.0043
	−0.09	0.49	1.21	−0.63	−0.4	−0.28	0.43	0.93	0.83	−0.81	−1.52	−1.2
Equity	**0.06***	**0.06****	**0.06**	**0.018***	**0.0036***	**0.08***	−0.09	−0.005	−0.04	**0.02**	**0.017**	**0.019**
	1.95	2.02	2.01	−2.57	−1.99	−2.68	−0.84	−0.45	−0.3	6.17	2.62	2.87
Liquidity	0.005	**0.02****	**0.4****	0.02204	0.02057	0.024	0.064	0.00050	0.060	0.019	0.022	0.00029
	0.42	2.12	2.56	1.6	1.26	1.21	1.39	1.03	1.07	0.55	0.62	0.7
Size	**0.34***	0.304	**0.7****	0.04536	0.09519	0.174	0.102	0.07514	0.087	0.254	0.231	0.257
	1.72	1.62	1.91	0.22	0.4	0.61	0.75	0.5	0.51	0.63	1.08	1.56
Host country												
GDP growth	−0.03	−0.046	−0.02	−0.057	−0.0771	−0.086	−0.03	0.00395	0.083	−0.07	−0.011	**−0.014**
	−0.5	−0.62	−0.3	−0.84	−0.94	−1	−0.2	0.23	0.04	−1.16	−1.43	−1.78
Exchange rate	−0.110	0.002	0.082	−0.020	0.06744	0.057	−0.03	0.00276	0.062	−0.01	**−0.024**	**−0.026**
	−1.62	0.02	0.77	−0.26	0.6	0.45	−0.21	0.16	0.33	−1.26	−1.95	−2.11
Concentration	−0.238	0.590	0.953	0.47920	0.59060	0.544	**−1.8***	**−2.11***	**−1.9***	−0.58	−0.915	**−0.958**
	−0.12	0.31	0.49	0.22	0.24	0.21	−1.92	−2	−1.71	−1.1	−1.59	−1.64
Parent characteristics												
Loan loss		−0.01	**−0.04**		−0.003	−0.001		0.02	0.048		−0.024	−0.0273
		1.06	−1.87		−0.75	−0.2		0.17	0.56		0.2	−0.22
ROE		0.0330	0.027		0.00061	−0.069		−0.003	−0.08		0.003	0.0024
		1.61	0.95		0.02	−0.55		−0.71	−0.98		0.83	0.53
Equity		0.0737	0.053		0.03894	0.054		−0.019	−0.06		0.0034	0.008
		1.38	0.91		0.96	0.92		−0.76	−0.22		0.29	0.61
Liquidity		−0.026	**−0.09**		−0.031	−0.028		−0.003	−0.01		−0.006	−0.806

	–0.62	–1.83	–0.95	–0.61	–0.6	–0.94	–0.31	–1.43
Home country								
GDP growth	–0.010	–0.03	0.04520	0.074	–0.0001	–0.01	–0.004	–0.004
	–0.18	–0.61	0.47	0.69	–0.01	–0.09	–0.79	–0.66
Crisis		**–2.66**		–0.974		–0.23		–0.098*
		–1.69		–0.54		–0.67		–2.48
Interactions								
crisis*P_Loan Loss		–0.05		–0.001		–0.01		0.00171
		–0.89		–0.3		–0.51		0.01
crisis*P_ROE		–0.01		0.023		0.05		–0.072
		–0.5		0.58		0.58		–0.07
crisis*P_Equity		**0.05***		–0.021		–0.01		–0.003
		1.72		–0.1		–0.65		–0.33
crisis*P_Liquidity		–0.01		0.024		0.069		**0.0028***
		–0.02		0.3		0.69		2.69
Constante	–2.923	**–7.027**	–0.5163	–2.4603	–3.918	0.811	1.41482	1.406	**–1.17**	–0.43	–0.320
	–0.81	–2.06	–0.14	–0.54	–0.7	0.66	1.03	0.84	–2.28	–0.73	–0.44
R-squared	0.003	0.0955	0.026	0.00410	0.00260	0.014	0.091	0.03180	0.001	0.003	0.015	0.015

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

behavior, by withdrawing their deposits. Mokhtar, Smith and Wolfe (2003) support the information about loan loss provision is very important because investors would like to know the risks that their investments are exposed to. This will allow depositors to supervise the bank in order to help in the bank's discipline.

Table 5 also shows that for Islamic subsidiaries, market discipline depends on both their specific characteristics and their parent bank conditions. However, conventional subsidiaries do not seem significantly affected by variables of parent banks. Loan loss provision of parent banks negatively affects the time deposit of Islamic subsidiaries. This means that deterioration in the performance of the parent may have induced the participants in the interbank market to decrease their lending to the subsidiary. This confirms the view that depositors react to a deterioration of bank performance and punish their institutions by withdrawing their savings.

Conventional subsidiaries appear inversely affected by the liquidity of parent banks during crisis periods. This may have two possible explanations. First, conventional subsidiaries should seek other sources of funding in times of economic shocks, because their parent banks assume them more responsibility for the collection of deposits in the host country. Second, It is possible that following bank interventions and malfunction, depositors may become more aware of the risk of losing deposits, so they may start exercising stricter market discipline. So, Islamic subsidiaries can be a source of stability in the banking sector in the receiving country, unlike the conventional subsidiaries that can destabilize the banking sector by exerting more aggressive deposit gathering behavior in a period of crisis as they try to meet growing loan demand.

These results confirm the fact that on the liability side, demand deposits are guaranteed in Islamic banks. Indeed, one of the distinctive characteristics of Islamic banks is the use of sharing-risk of profit and loss principle to reward depositors. Singh et al. (2000) argue that Islamic banks will be more stable compared to conventional banks, as any shock on the asset side would be absorbed by the risk-sharing nature of the liability side. The religious prohibition of interest rates that include a return charged in a loan contract has important implications regarding the nature of deposits in Islamic banks. The contracts of *Qard* and *Mudarabah* are among the fundamental pillars of Islamic banking on the liability side. The current or checking accounts in these banks are considered *Qard Hasan* (interest-free loans), and these have to be fully returned to depositors on demand. Investment deposits in Islamic banking takes the form of *Mudarabah*, the investor named (*Rab al-mal*) assigns to the bank (*Mudarib*) the management of its funds under the principle of risk-sharing. The return on investment of the funds is uncertain, and neither the principle nor income is guaranteed. So, the depositor will be more risk averse and opt for a low risk/return deposit contracts.

Although the nature of risk sharing investment deposits will improve market discipline and increase the solidity of banks, these deposits do not constitute a permanent basis to the funds of the bank. These deposits can increase or decrease depending on the degree of confidence of depositors in the banks' profitability. Even if depositors

Table 6. Market discipline and interbank dependency.

	Inter-bank 1						**Inter-bank > 1**					
	Δtime deposits			ΔBank deposits			ΔTime deposits			ΔBank deposits		
	1	2	3	1	2	3	1	2	3	1	2	3
Subsidiary characteristics												
Loan loss	0.0056	−0.005	−0.004	−0.00018	0.003	0.022	0.0624	0.0181	0.0428	0.00196	0.019	0.014
(T−Student)	0.02	−0.18	−0.17	−0.32	0.04	0.33	1.35	0.36	0.81	0.4	0.03	0.02
ROE	−0.001	−0.002	−0.00093	0.0041	0.005	0.008	0.0084	0.027	**0.053***	−0.040	−0.02	−0.01
	−0.46	−0.59	−0.26	0.61	0.57	0.92	0.3	0.9	1.74	−0.28	−0.13	−0.11
Equity	**0.022***	0.0350	0.0393	−0.005	−0.06	−0.06	0.0624	**0.0***	**0.096***	0.00497	0.017	0.015
	1.75	1.2	1.24	−0.2	−0.98	−1.08	1.41	1.81	1.9	0.15	0.41	0.34
Liquidity	0.037	0.006	0.008	−0.030	−0.01	−0.01	0.002	**0.02***	**0.04****	**0.0236***	0.021	0.02
	0.42	0.07	0.77	−0.17	−0.59	−0.59	0.16	1.75	2.23	1.77	1.36	1.45
Size	0.137	0.131	0.3207	−0.0027	−0.43	0.11	**0.353***	**0.37***	**0.44****	0.11149	0.15	0.27
	0.52	0.29	0.59	−0.01	−0.44	0.12	1.68	1.71	1.98	0.56	0.69	1.02
Host country												
GDP growth	0.017	−0.042	−0.04838	0.04357	0.25	0.290	−0.041	−0.019	0.007	−0.093	−0.11	−0.10
	0.62	−0.55	−0.66	0.79	1.39	1.63	−0.57	−0.23	0.08	−1.44	−1.44	−1.36
Exchange rate	0.0297	0.066	0.1208	−0.0221	−0.01	0.160	**−0.144**	0.026	0.090	−0.051	0.015	0.030
	0.39	0.75	1.35	−0.13	−0.05	0.6	−1.96	0.26	0.74	−0.69	0.15	0.26
Concentration	0.819	0.200	1.3934	−0.64961	−4.53	3.1	−0.25	0.498	1.472	0.92769	1.261	1.089
	0.37	0.08	0.49	−0.14	−0.69	0.41	−0.13	0.24	0.7	0.47	0.55	0.46
Parent characteristics												
Loan loss		−0.0012	−0.00515		0.004	−0.03		−0.010	0.065		−0.15	0.017
		−0.35	−1.07		0.39	−0.31		−0.3	0.82		−0.36	0.22
ROE		0.0264	0.00033		0.037	−0.10		0.025	0.010		−0.01	−0.05
		1.32	0.01		0.66	−1.17		0.71	0.23		−0.04	−0.01
Equity		−0.025	−0.053		−0.02	0.090		0.056	0.050		0.033	0.042
		−0.54	−0.83		−0.2	0.56		0.9	0.78		0.86	0.77
Liquidity		−0.03	−0.0231		−0.09	0.051		−0.060	**−0.155**		−0.02	−0.02
		−0.84	−0.44		−0.92	0.42		−1.1	−2.41		−0.69	−0.51

Home country									0.01	0.012
GDP growth	0.025	–0.057		0.295	0.041		–0.061	–0.088		
	0.39	–0.44		1.01	0.13		–0.72	–0.89	0.18	0.12
Crisis								–2.960		0.265
								–0.86		0.14
Interactions										
crisis*P_Loan Loss		0.01155			0.007			–0.008		–0.0 3
		0.73			0.27			–0.87		–0.41
crisis*P_ROE		0.06916			0.180			–0.028		–0.02
		1			1.2			–0.47		–0.47
crisis*P_Equity		0.13838						0.2059		–0.01
		0.63						1.38		–0.18
crisis*P_Liquidity		–0.08596			–0.04			0.028945		0.00091
		–0.83			–1			0.32		0.01
Constante	–2.348	–3.429	0.59579	7.77	–7.35	–2.144	**–7.97**	**–10.2**	–1.272	–3.52	–5.89
	–0.67	–0.49	0.08	0.56	–0.49	–0.54	–1.96	–2.33	–0.35	–0.78	–1.09
Observations	53	40	55	41	41	77	64	64	132	115	115
R-squared	0.0369	0.0091	0.00000	0.015	0.019	0.0067	0.0551	0.0266	0.00180	0.008	0.002

The table reports the fixed effects panel estimation results. The dependent variable is ΔLoans, yearly change in loans measured as the first difference of the log of total loans. ***, **, * T-student significant at 1%, 5% and 10%, respectively.

could support investment losses up to a certain degree the capital of the bank will provide a high damping capacity. Generally, capital adequacy is important for Islamic banks, which constitute the basis that ensures its credibility.

The size of the bank also affects significantly the growth of deposits of Islamic subsidiaries. Since small banks cannot diversify their portfolios as well as the big banks, they need higher capital relative to their assets to strengthen the confidence of their customers to maintain their transactions core over the long term. For this reason, regulatory authorities in Islamic countries should encourage banks to reinforce their capital or initiate mergers to ensure greater financial strength.

As a synopsis of this table, we can deduce the attractions of Islamic deposits by subsidiaries cannot be explained just by a better performance or better service, but additionally by religious motivations of depositors. For lack of more advantageous alternative consistent with the *Shariah*, several depositors accept a low income or even no income. In addition, Islamic banks enjoyed, in the last years, the monopoly of the market for Islamic finance. Currently, the situation is altering in the future since Islamic banks are faced with competition growing increasingly among conventional banks, including multinational Western banks.

To explore more in depth the behavior of depositors, we test the market discipline of Islamic subsidiaries according to the importance of their intervention in the interbank market. In the following, we repeat the approach adopted in the previous section by dividing the sample of Islamic subsidiaries according to the inter-bank ratio. The first group contains the Islamic subsidiaries with inter-bank ratio below one. While the second group contains subsidiaries whose inter-bank ratio exceeds one. The results of estimations are resumed in Table 6.

The results show that bank capitalization affects differently the two groups of subsidiaries. Indeed, highly capitalized subsidiaries that are strongly related to inter-bank market have lower time deposit. While the nature of the risk-sharing investment deposits will improve market discipline and strengthen the soundness of subsidiaries heavily linked to inter-bank market, these deposits are not a permanent part of bank capital.

The level of deposits depends mainly on the degree of depositor's confidence in the strength and profitability of banks. Even if investment depositors would absorb losses to a certain extent, it is the capital of the bank that provides a high capacity for shock absorption. Capital adequacy is important for Islamic banks. It is the basic element that depends on the strength and soundness of banks. We find also that during the crisis period, the liquidity of parent bank plays a significant role in the market discipline of Islamic subsidiaries. Loan loss provision of parent banks leads to a decrease of both groups of banks.

Regarding the group of Islamic subsidiaries heavily related to an interbank market, we find that market discipline depends more on the characteristics of parent banks in the period of crisis. In fact, the size of the subsidiary has a significant effect on the growth of its deposits. This is

consistent with the expectation that larger institutions are perceived to be safer and more attractive to depositors.

Deposit growth of subsidiaries weakly related to the interbank market seems to be less affected by the characteristics of the host country. This shows that the structure of these subsidiaries deposits depends mainly on their financial performance and the financial situation of their parent banks. The nature of deposit contracts is based on real investment that ensures risk-sharing between the bank and its customer, rather than a simple financial transaction based interest rates.

When an Islamic bank faces a global crisis, specific depositors share with it the risk so that the likelihood of bank failure or panic is reduced. This ensures greater stability of Islamic banking and the superiority of Islamic finance to guarantee stability of the global financial system but risks being hypothetical if Islamic banks are not freed from the tendency to approach, sometimes overtly, modes and the operating logic of the conventional finance. It is particularly important that the Islamic banks find appropriate solutions to the obstacles that stand in front of a wider use of participatory financing in accordance with the hypothetical model of Islamic finance.

7. Conclusion

This paper discussed the role of Islamic subsidiaries in the transmission of Bank Liquidity Shocks in Loan and Deposit Markets. We tried to test whether foreign bank lending is determined by different factors for Islamic and conventional banks. Islamic banks differ from conventional banks with regards to participation in profits and funding methods used. This characteristic alters the nature of the risks incurred by Islamic banks and affects their strategies of lending and deposit collection. Based on a model including subsidiary and parent bank characteristics as well as host and home country variables, we show that the effects of transmission of liquidity shocks through foreign subsidiaries of banks seem different than Islamic and conventional subsidiaries. We found that the "lending-channel" is more relevant for conventional banks. Particularly, conventional parent bank fragility negatively affects lending by their subsidiaries. Nevertheless, we show that parent Islamic bank do not significantly affect lending by subsidiaries.

In a second part, we examined the existence of market discipline exerted by depositors on Islamic and conventional subsidiaries. Our main result shows that depositors of Islamic subsidiaries exert a greater market discipline on Islamic banking subsidiaries. We found that depositors react to a deterioration of bank performance and punish their institutions by withdrawing their deposits.

The greater market discipline that the Islamic system has the potential of introducing in the financial system cannot, however, eliminate the need for regulation and supervision. We conclude that market discipline also requires a standardized accounting framework and appropriate policies for the dissemination of information regarding both the assets and liabilities of Islamic subsidiaries. Special requirements of accounting modes of Islamic finance also need to be clarified in detail. This requires the establishment of uniform standards of transparency in the Islamic banking sector.

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Assessing the stability and resilience of Islamic banks through stress testing under a standardized approach of the IFSB Capital Adequacy Framework

Jamshaid Anwar Chattha
Islamic Financial Services Board (IFSB), Kuala Lumpur, Malaysia, E-mail: jamshaid@ifsb.org; jamshaid.anwar@gmail.com, Office: + 603 9195 1411 (DL)

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Abstract - Stress testing is an essential risk management tool that helps financial institutions to identify, assess and mitigate risks in their businesses. Stress tests have been and are an excellent tools for understanding the plausible impact of a "what-if scenario" in the banking industry. The global financial crisis has placed the spotlight squarely on stress tests. Though Islamic banks operate within the similar financial environment, their balance sheet composition calls for different treatment in stress testing.

Stress testing work has been extensively discussed by the international framework such as of Basel Committee on Banking Supervision and Committee of European Banking Supervisors and is reflected in the IMF work as well. However, the existing literature on stress testing is either mostly from conventional banks perspective or is dominated by the qualitative nature from an academic perspective. There is significant gap in the literature to address the specificities of Islamic banks and the stress testing implications. This paper explores this gap.

The paper develops a stress testing matrix – a step-by-step approach, which is used as a benchmark for simulating solvency stress tests for Islamic banks, followed by a stylised numerical example through a tractable Excel-based framework for solvency stress testing. The paper highlights various implications and relationships arising out of solvency stress testing for Islamic banks, including the vulnerability of Islamic banks under defined scenarios, demanding appropriate immediate remedial actions by the Islamic bank on future capital resources and capital needs. The paper notes that stress testing for risk management in Islamic banks seems to be an underdeveloped area where much work at all levels, including by supervisory authorities and market players, is required. Thus, it is hoped that the findings of the paper provide preliminary discussion on developing a comprehensive toolkit for the Islamic banks similar to what is developed by the IMF FSAP programme.

Keywords: Islamic banks, solvency, stress testing, financial stability, excel-based framework, IFSB Capital Adequacy Framework, Alpha (α)

1. Introduction

Almost every aspect of banking, be it Islamic or conventional, is influenced either directly or indirectly by the availability of the capital. Capital plays an important role in the banking industry. This is one of the key factors to be considered when assessing the safety and soundness of a particular bank. An adequate base of capital serves as a safety net for a variety of risks (in particular credit, market, and operational risk), to which a bank is or is likely to be exposed in the course of its banking business. Capital absorbs possible losses and

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thus provides a basis for maintaining the confidence of the depositors. A bank's balance sheet cannot be expanded beyond the level determined by its capital adequacy ratio (CAR). This means that the availability of capital consequently determines the maximum level of assets. Keeping in view the importance of capital in the banking institutions, the regulatory bodies in all jurisdictions prescribe minimum capital requirements under the Basel Capital Accords. The importance of maintaining the regulatory capital requirements and quality capital has been emphasized after the global financial crisis (GFC) of 2008, which produced unexpected influences across the banking industry. This equally applies to institutions offering Islamic financial services (IIFS)[1] because of the nature of Islamic banking operation in the banking industry.

The balance sheet of IIFS varies from its conventional counterparts in a number of ways, which in turn has a direct impact on capital adequacy of IIFS. On the left-hand side of the balance sheet, the Islamic financial instruments are asset-based (*Murābahah*, *Salam* and *Istisnā,* which are based on the sale or purchase of an asset, and *Ijārah* which is based on selling the benefits of such an asset), profit-sharing (*Mushārakah* and *Muḍārabah*), or *Sukūk* (securities) and investment portfolios and funds, which may be based on the above assets. Such instruments may therefore involve exposure to market (price) risk, with respect to assets, as well as credit risk, with respect to the amount due from the counterparty (see Section 2 for more detail on the specificities of IIFS). These specificities of IIFS, in particular relating to solvency (i.e. capital), call for stress testing to ensure the stability and going concern of an IIFS. However, there is a significant gap in the literature to address the specificities of IIFS from the perspective of solvency stress testing implications.

Stress testing has been a useful tool but appeared to be "*less of an issue*" until the GFC (2008), which challenged the global financial systems, indicating the usefulness of this tool in the banks and their respective regulators. Financial stress tests have not only been used as a risk management tool and key component of financial stability analysis but also as a crisis management tool, especially during the financial crisis. As a result, two notable stress testing exercises were conducted. The first exercise was by the US Supervisory Capital Assessment Program in 2009 and another by the Committee of European Banking Supervisors (CEBS) predecessor to the European Banking Authority (EBA) in close cooperation with national regulators and the European Central Bank (ECB) in 2010 and 2011 respectively. This has resulted in deciding the level of capital support and has boosted market confidence, and the revision of stress testing guidelines by the Basel Committee on Banking Supervision (BCBS) and EBA respectively addressed the issues which were not adequately covered in the previous stress testing framework.

The guidelines as mentioned above, however, did not cover the specificities of the IIFS operations, and this gap is successfully filled by the Islamic Financial Services Board (IFSB) in March 2012 by issuing the *Guiding Principles on Stress Testing for IIFS* (also referred as to IFSB-13) in the banking segment. These *Guiding Principles*, built mainly on the BCBS and the EBA framework for level playing field, have prescribed guidance on the issues that should be addressed by the banks and their respective supervisors. However, as such, the *Guiding Principles* do not provide any assistance to the IIFS on how to do stress testing so much as "what to do" principles. Based on the *Guiding Principles,* a *Stress Testing Matrix* (a step by step approach) is developed, as shown in Table 1, which is used as a benchmark for simulating solvency stress tests for IIFS in this paper.

Table 1. Stress testing matrix – step by step approach.

#	Items	Description of items	Remarks
Step:1	**Objective of conducting the stress testing**	• What is the objective of conducting stress testing and forecasting period (i.e., long-term or short-term)?	• Solvency stress testing with one year forecasting period
Step:2	**Risk Factors**	• What are the risk factors that are going to be considered in stress testing (i.e., identification of risk parameters that need to be stressed, e.g., credit risk, market risk, operational risk, displaced commercial risk, liquidity or solvency)?	• CAR with stress alpha (different levels of alpha) • *(Please see Section 2 and Section 4)*
Step:3	**Data requirements**	• Whether the quality data, which is critical in ensuring a successful stress test simulation and its results, is available or proxy data needs to be considered?	• Data relating to solvency stress testing is available and the assumptions are made where the data is not available *(Please see Section 4)*
Step:4	**Scenarios type and Scenarios stress (stress shock)**	• What scenarios are going to be considered – whether *historical scenarios* (i.e. backward looking scenarios) or *hypothetical scenarios* (i.e. forward looking scenarios) • What is the scope of the scenarios (e.g. local, regional, and global)? • What are different levels of stress shock (i.e., mild, moderate and extreme)?	• Combination of both historical and forward looking with expert judgment • Local and regional perspectives • Three stress shocks: business as usual (BAU) – mild, moderate, worst case (extreme) *(Please see Section 4)*

(*Continued*)

Table 1 - *Continued*

#	Items	Description of items	Remarks
Step:5	**Frequency**	• How often stress testing should be conducted (i.e., the frequency of conducting stress testing on the risk factors identified in (step 2) e.g., weekly, monthly, quarterly, semi-annually or an ad-hoc basis?	• Annually and/or ad-hoc basis *(Please see Appendix A)*
Step:6	**Methodology**	• What is the methodology of conducting the stress testing (i.e., sensitivity test analysis and/or scenario test analysis, or reverse stress testing, through appropriate deterministic and/or stochastic (or probabilistic) models? • Which approach will be undertaken either the top-down (TD) or bottom-up (BU) approach?	• Combination of both scenario and sensitivity analysis with deterministic model (using the IFSB-2 CAR formula) • Bottom-up approach *(Please see Section 4)*
Step:7	**Output and remedial actions**	• Using the step 2-step 6, has the output being generated? • Are there any appropriate and meaningful mechanisms for translating the stress test results into actions to support a range of decisions appropriate to the purpose of the stress test (e.g., restructuring the portfolio/ positions, reviewing liquidity adequacy and capital allocation, and risk limits)? • After reviewing the stress test results and having considered certain possible remedial actions, is there any need to undertake further stress testing with some adjustments	• Output demonstrates the deficiency in capital and difficulty in meeting the regulatory requirements • *(Please see Appendix A and Section 5)*
Step:8	**Disclosures**	• Has the IIFS made adequate disclosures of the stress testing results to the BOD and senior management and the supervisory authority? • Does an IIFS require making public the qualitative and quantitative information on the stress testing results?	• At the moment only to BOD and senior management

Source: Author.

Note 1: The above matrix assumes that governance process of stress testing exist in the IIFS (i.e., involving the guidance from the board of directors and supervision of senior management – outlining the ultimate responsibilities for approving and conducting the stress testing in the IIFS) and is included in an IIFS's risk management framework and also promotes a culture of risk identification.
Note 2: Once the IIFS has conducted a stress testing exercise as per the steps identified above, the respective supervisory authority will have to consider examining the stress testing exercise under on-site examination or through off-site surveillance.
Note 3: Once the IIFS has conducted a stress testing exercise as per the steps identified in the Stress Testing Matrix above, as per IFSB-13, the respective supervisory authority should examine the stress testing exercise under on-site examination or through off-site surveillance, among others, the following:

(i) Whether the IIFS have adequate procedures in place to undertake rigorous forward-looking stress testing.
(ii) Whether senior management has been sufficiently involved in the stress testing programme and the BOD is sufficiently informed.
(iii) Review the IIFS' methodologies used in the stress testing exercise and evaluation of the inputs (period of time during which the data sample is taken (normal vs. crisis), sample size, proxy data, simulation of data, etc.) carried out within stress testing methodologies.
(iv) Review whether the IIFS uses output from stress testing results (obtained through stress testing methodologies such as sensitivity and scenario analyses) appropriately, and shares results within the organization (such as with risk managers and senior management) and properly acts upon the results (e.g., by taking remedial actions if sensitivity tests show large adverse outcomes or reveal model weaknesses).

The conceptual and technical understanding of the stress testing has been discussed widely in the academic literature, from a macro stress testing perspective in particular (Sorge 2004; Cihak 2004a and 2004b; Jones et al 2004; Hoggarth et al 2005; Alfaro and Drehmann 2009; Foglia 2009; Otani et al 2009; Rouabah et al 2010; Souto 2010; Buncic and Melecky 2011; Borio et al 2012). However, the discussion has been centered toward assessing the implications for the conventional banks rather than the implications for the Islamic banks. This is could be argued due to a lower number of Islamic banks worldwide compared to their conventional counterparts. This highlights a significant gap that this paper attempts to capture.

This paper particularly focuses on developing the solvency stress tests, under standardized approach, as per the IFSB Capital Adequacy Framework (IFSB-2),[2] under various assumptions and stress scenarios parameters specific to IIFS, as the IFSB-2 calls for different treatment for the Islamic banks. The following three *key objectives* are deliberated in this paper:

- To facilitate designing and simulating of the solvency stress tests, under standardized approach as per the IFSB-2, including the establishment of macro-financial links, running scenarios with a variation of various assumptions, and stress scenarios parameters (such as regulatory push to minimum capital requirement with various levels of stressed alpha (α))
- To provide a stylised numerical example through a tractable Excel-based framework, on which the IIFS can withstand additional regulatory requirements and show that they would remain in compliance with all capital requirements after moderate to severe shocks
- To comprehend the potential remedial actions plan (as part of the stress testing matrix – a step by step approach to conducting solvency stress testing) envisaged by the IIFS for potential capital deficiency as a result of solvency stress testing and supervisory response

After employing two-stage methodologies in the solvency stress testing, the results suggest that the *Post-shock* CAR impact highlights the vulnerability of IIFS under defined scenarios and necessitate as an appropriate remedial action by the IIFS on future capital resources and capital needs, including main assumptions and drivers of movements in capital needs. The simulation also indicates that there exists a positive relationship between CAR and the volume of PSIA. This means that the CAR ratio is more sensitive to the PSIA ratio and has a multiplier effects on CAR. Furthermore, the simulation provides the impact on capital adequacy as a hypothetical supervisory adjustment of "alpha" (please refer to Section 2 and Section 4 for more detail on alpha) to a higher value under normal conditions and under stressed conditions. This explains how IIFS's capital adequacy is affected under different values of the "alpha" parameter and the implications of the stressing. Considering minimum CAR of 8% in the jurisdiction and different values of alpha, it is evident that the CAR for IIFS is highly sensitive to changes in the values of "alpha." For the same level of alpha, increase of PSIA financed assets in percentage terms increases CAR and, for the same level of PSIA financed assets, an increase in alpha reduces CAR.

The remainder of the paper proposal is organised as follows. Section 2 provides an overview of specific issues of Islamic bank emphasising particular stress test – the solvency stress test. Section 3 covers a literature review on the stress testing framework. Section 4 explains the data and methodology used. Section 5 analyses simulation results and discusses the implications and key issues in stress testing. Finally, Section 6 concludes and offers a way forward followed by an Appendices.

2. Specific issues of islamic bank requiring particular stress testing

Before identifying gaps in the existing framework with regard to stress testing for IIFS, it is necessary to comprehend the uniqueness of Islamic finance in the banking industry. The unique features of an IIFS call for special treatment (i.e. customisation in developing and executing the stress testing) in the stress testing exercise due to its diverse composition (i.e. different types of exposures) of the balance sheet in different jurisdictions (please see Figure 1). The underlying unique features of Islamic finance for Islamic banks are explained below:

2.1. Specificities of Islamic finance

The underlying unique features of Islamic finance for Islamic banks includes, among others:

- **Basis of *Shariah*:** *Shariah* (Islamic law) forms the basis of the framework of Islamic finance. The *Shariah* is derived from primary and secondary sources.[3]
- **Prohibitions:** The following are specifically prohibited – '*Riba*' (interest), '*Gharar*' (uncertainty – about the subject-matter and terms of contracts; this includes a prohibition on selling something not owned), '*Maysir*' (gambling, hoarding, and dealing in unlawful goods or services). Followed by these prohibitions, Islamic banks structure their products and processes according to *Shariah* rules and principles.
- **No re-pricing of sale contracts (*Murābahah)*:** Under Islamic finance, once the sale price is fixed for financing in *Murābahah*, the IIFS cannot claim more than the pre-fixed sale price, even if the assets were to become 'non-performing' or the benchmark has been changed either upward or downward.
- **Asset-backed nature of structures:** Typically all Islamic structures followed by an Islamic bank have an underlying assets backing the deal.
- **Adherences to procedures align with *Shariah* rules and principles:** Each *Shariah*-compliant financial contract is required to adhere to certain procedures. When a transaction misses a certain stage, the transaction will be rendered invalid in accordance to *Shariah* rules and principles. For example, in a *Murābahah* transaction, an IIFS is permitted to earn profit only as a reward for risks undertaken as evidenced by the IIFS taking prior possession of the asset. If the IIFS does not have prior possession, the transaction will be considered invalid. In this scenario, the IIFS need to carefully structure their transactions and adhere to procedures and steps to ensure that the profits earned are according to *Shariah* rules and principles.

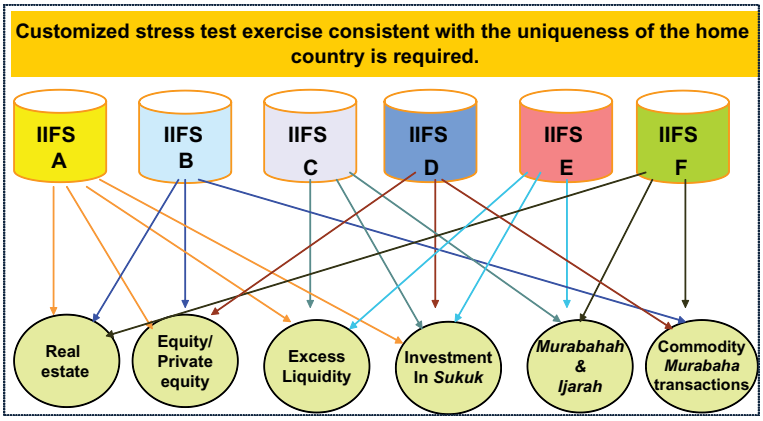

Figure 1. Diverse composition of balance sheet of IIFS in different jurisdictions.
Source: Author's study from various IIFS' annual report.

- **Risk transformation:** another unique feature is the existence of transformation of risk on the balance sheet of an Islamic bank. At different contract stages, transformation of risk takes place in *Shariah*-compliant financial contracts. For instance, in *Murābahah* transaction, the market risk transforms into the credit risk (i.e., market risk is applicable before selling the *Shariah*-compliant commodities to the counterparty and after selling to counterparty market risk converts into credit risk when the payment is on deferred terms) – see Table 2 above.

Based on the abovementioned explanation, the unique features of Islamic finance give rise to specific risks and issues as the balance sheet structure of an Islamic bank is different compared to the conventional institutions and, thus, they require additional work on risk assessment, measurement and management. Notably, the following specificities should be taken into consideration, as addressed by the IFSB:

- Unique risk characteristics of Islamic financial transactions and contracts have called for guidance on risk management controls from the perspective of an Islamic bank (addressed in IFSB-1)[4]
- In the capital adequacy of the Islamic bank, the calculation of risk weighted assets in each contract requires the recognition of various stages and requires special attention to investment account holders (IAHs) (addressed in IFSB-2)
- The presence of IAHs in the Islamic bank needs governance committee to protect the rights of IAHs (see IFSB-3)[5]
- Above all, the *Shariah*-compliance requirements in all aspects of the Islamic bank operation also need adequate *Shariah* governance system (see IFSB-10)[6]

2.2. Balance sheet structure of an Islamic bank and key issues for stress testing

In addition to specificities of Islamic finance as presented in Section 2.1, it is worth highlighting the balance sheet structure of an Islamic bank, which is also different compared to the conventional institutions (banks) and has different effects on risk management (please refer to Figure 2). In addition to the traditional banking risks (such as credit, market and operational risks), Islamic banks are also exposed to other specific risks such as *Shariah* non-compliance risk, fiduciary risk,[7] rate of return risk,[8] and displaced commercial risk (DCR).[9] Hence, while conducting transactions in the Islamic banks, there exists transformation of risk, which is inherited in the *Shariah*-compliant transactions (based on the types and stages of the contracts – see Table 2). Such specific risks should be well captured in stress testing scenarios, analysis and measurement of regulatory or economic capital.

2.2.1. Solvency (capital adequacy relating stress testing) – specific issues

As noted in the Section 2.1 under the *Shariah* rules and principles, once the sale price is fixed for financing, even if the assets were to become 'non-performing' or the benchmark has been changed either upward or downward, the IIFS cannot claim more than the pre-fixed sale price. Thus IIFS will be exposed to benchmark risk that should be captured through stress testing techniques to comprehend the vulnerability of an Islamic bank in the volatile benchmark regime. Hence, the need to ensure the solvency of an IIFS where, unlikely but not impossible, extreme price/rate changes are experienced.

An increase in capital requirements imposed by regulators or supervisors forces the Islamic bank to cut and decrease the

Table 2.

Applicable stage of the contract	Market risk	Credit risk
Asset available for sale	Applicable	N.A
Asset sold to customer	N.A	Applicable

Source: IFSB-1 (2005).

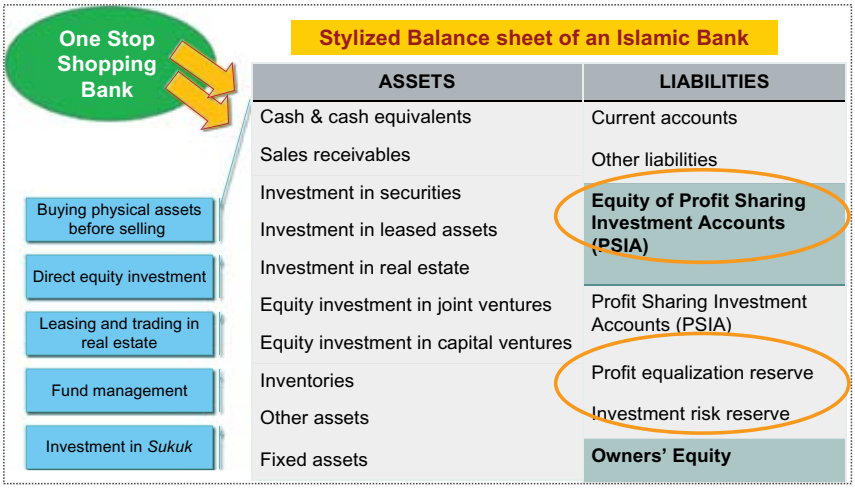

Figure 2. Stylized balance sheet of an Islamic bank.
Source: Author's study from various IIFS' annual report.

availability of financing for individuals and corporations. This regulatory burden should be stressed by Islamic banks in their stress testing programs which is taking into account the differences identified by the IFSB-2 in terms of capital adequacy. Capital adequacy is one of indicators of an Islamic bank's soundness. Hence, in order to determine capital assessment of the Islamic bank (i.e., whether an IIFS is undercapitalised), the stress testing techniques would be significant, and it will let us know how an Islamic bank's capital adequacy position will be affected in regard to crisis, also how much capital they may need in order to absorb losses and sustain financing.

In addition, while calculating the capital adequacy of an IIFS, when the supervisory discretion version of the CAR formula is applied, a proportion ("α (alpha)"[10]) of the risk-weighted assets financed by PSIA is included in the denominator of the CAR; thus the risk weights apply only to the proportion α of the assets financed by PSIA. It is important to take into account the stress conditions when determining alpha. DCR is likely to be higher during stressed conditions as investment returns tend to be lower. This increases the need for the Islamic bank to draw upon its reserves/shareholder funds in order to maintain the same level of payout to IAH. What will be the value of α used by Islamic bank under stress conditions? Therefore, stress testing techniques are required for determining the appropriate weight of α, which will be used for capital adequacy while employing a supervisory discretion formula in the denominator of CAR.

DCR is also an important consideration for the IIFS, especially with respect to recent smoothing practices among Islamic banks. Stress testing techniques are needed to determine the circumstances on the utilization of reserves – such as profit equalisation reserve (PER)[11] and investment risk reserves (IRR)[12] – to inquire whether they are sufficient enough to cover unexpected losses. Different stress testing scenarios will be needed to absorb abnormal shocks in times of stress.

In terms of credit risk, while calculating the CAR, *Shariah*-compliant risk mitigation techniques employed by the Islamic banks also requires considerations in the stress testing program, in particular to systematically challenging these mitigation techniques in the stress testing exercise (as not all the risk mitigation techniques are applicable to the IIFS, compared to their conventional counterparts).

Another risk factor relating to credit risk is non-performing financing (NPF) that will essentially determine the overall soundness of the Islamic bank, particularly in the case of economic downturns. Under standardised approach for credit risk, stress testing should reflect how an Islamic bank will be affected under various defaults which increases NPF which may erode net income of the Islamic bank. From this perspective, credit risk implications will be different in different contract cases, which will require the IIFS to consider different scenarios for stress testing. For instance, financing extended through predominantly *Murābahah* may require Islamic banks to consider different types of scenarios compared with *Ijarah* and *Istisna*.

Another consideration for the Islamic bank is defaults due to restrictions on recovery mechanisms. Hence, stress on default, either on total or selected portfolios, is regularly needed. The concentrations should be identified, and stress tests should be conducted on notably large concentrations.

With respect to market risk, while calculating CAR of an Islamic bank, it is important to note that an Islamic bank's investment book consists of investments in *Sukūk*, which are also prone to market shocks. So stressing the different types of *Sukūk* investment (i.e., variable rate *Sukūk* such as *Ijarah,* fixed rate *Sukūk* such as *Murābahah*, and *Mushārakah* or diminishing *Mushārakah, etc.)* undertaken by the Islamic banks is also imperative for the Islamic bank. In addition, the stress testing programs should also include the *Shariah*-compliant securitization at an Islamic bank. In this regard, the stress testing for capital treatment for the securitization exposures of an Islamic bank should be conducted where it acts in a capacity of an originator of a *Sukūk* issue, or as an issuer or servicer of a *Sukūk* issuance – that is, securitization exposures as mentioned in IFSB-7.[13]

3. Literature review and gaps

3.1. Conceptual understanding of the term "stress testing"

As defined by the BIS,[14] "stress testing" has been adopted as a *generic term describing various techniques used by financial firms to gauge their potential vulnerability to exceptional but plausible events.* In simple words*, stress testing is a process, which provides information on the behaviour of the financial system under a set of exceptional, but plausible, assumptions*. Stress tests, therefore, provide forward-looking assessments of risks to institutional level and system level. At institutional level, stress testing techniques provide a way to quantify the impact of changes in a number of risk factors (such as market risk, liquidity risk, credit risk, etc.) on the assets and liabilities of the institution. At the system level, stress tests are primarily designed to quantify the impact of possible changes in the economic environment of the financial system. The system level stress tests also complement the institutional level stress testing by providing information on the sensitivity of the overall financial systems to a number of risk factors. These tests help the regulators to identify structural vulnerabilities and the overall risk exposure that could cause disruption of financial markets.

3.2. General literature on the stress testing

Generally, stress testing has been discussed widely in the literature, in particular from a macro stress testing perspective (Sorge, 2004; Cihak, 2004a and 2004b; Jones *et al.,* 2004; Hoggarth *et al*., 2005; Alfaro and Drehmann, 2009; Foglia, 2009; Otani *et al*., 2009; Rouabah *et al.,* 2010; Souto, 2010; Buncic and Melecky, 2011; Borio *et al*., 2012). The financial crisis of 1990s led policy makers, researchers and practitioners to be more sensitive about vulnerability in financial systems. Among techniques, stress testing is considered one of the most reliable and trustworthy (Crockett, 1997).

According to Čihák (2007), stress testing is a generalized concept, which compiles a variety of techniques to study resilience to extreme events. Stress tests are valid and quite reliable to study stability of a given system or entity. In financial sectors, earlier stress testing is underestimated by applying it only on asset portfolios, but with the passage of time stress testing is applied not only on banks themselves but it is also functional on banking and financial systems as well.

Stress tests are particularly important from the perspective of supervisory authorities and policymakers because they provide useful benchmarks to assess the risks to the financial system as a whole (Čihák, 2004b). Accordingly, stress tests also help develop knowledge in a risk assessment framework among the supervisors and the financial institutions engaged in the process, and encourage collaboration and wider understanding and perception of risks by different regulatory institutions. In turn, this can contribute to a better understanding of the links between the financial sector and macro-level economy (Čihák, 2005b).

It has been noted that both Islamic and conventional banks managed to maintain a strong aggregate capital adequacy ratio in the post-shock scenario. However, intensity of change in the CAR was different for both groups of banks. The CAR ratio has increased by 1.6 percent in 2010, from 13.78 per cent in 2006, for conventional banks; however, the Islamic banks' CAR ratio has declined by 3.3 percentage point. This reflects more resilience shown by conventional banks, though at least 17.6 per cent of conventional banks have reported a capital ratio of less than 10 percent in 2010. This ratio, nevertheless, has improved considerably compared to earlier years in the period under review. This is also confirmed by the fact that conventional banks have assumed a rising trend in capital adequacy ratio in both scenarios as compared to a declining trend for Islamic banks.

International Monetary Fund (IMF) used stress tests to examine the financial stability in their member countries. IMF also used this test to forecast the potential threats for the stability of member countries' financial systems. IMF and WB jointly performed stress tests as part of the Financial Sector Assessment Program (FSAP). Since then the FSAP has been implemented so far in 120 countries and has addressed a variety of risks – essentially the credit risk, market risk, liquidity risk, and contagion risk. Many of these assessments are available on IMF and WB websites.

In particular, there are two recent papers published by the IMF that are worth mentioning. One is by Schmieder, Christian et al. (2012) on "*Next Generation System-Wide Liquidity Stress Testing,*" in which a framework to run system-wide, balance sheet data-based liquidity stress tests is presented. The paper covered a liquidity framework with three elements: (a) a module to simulate the impact of bank run scenarios; (b) a module to assess risks arising from maturity transformation and rollover risks, implemented either in a simplified manner or as a fully-fledged cash flow-based approach; and (c) a framework to link liquidity and solvency risks. In the paper, the framework also allows the simulation of how banks cope with upcoming regulatory changes (Basel III), and accommodate differences in data availability. A case study shows the impact of a "Lehman" type event for stylized banks.

The second paper is by Schmieder, Christian et al. (2011) on "*Next Generation Balance Sheet Stress Testing.*" This paper presents a "second-generation" solvency stress testing framework by extending applied stress testing work centered on Čihák (2007). The main contributions of this paper include (a) increasing the risk-sensitivity of stress testing by capturing changes in risk-weighted assets (RWAs) under stress, including for non-internal ratings based (IRB) banks (through a quasi-IRB approach); (b) providing stress testers with a comprehensive platform to use satellite models, and to define various assumptions and scenarios; (c) allowing stress testers to run multi-year scenarios (up to five years) for hundreds of banks, depending on the availability of data.

In 2012, Elsiefy conducted a stress test based on one sensitivity scenario. The test comprehended three kinds of risks, namely, credit risk, interest rate risk, and exchange rate risk. The mentioned analysis was conducted on five years of data (2006–2010). The sample included five conventional and 3 Islamic banks. He concluded that the pre-test CAR for the banking sector increased by only 1.1 percentage point between 2006 and 2010. He also observed that pre-shock CAR was 15.23% in 2006, which was increased up to 16.4% in 2010. Over the same period, post–test CAR has increased by 1.52 percentage point to

stand at 13.49 per cent in 2010, as compared to 11.96 per cent in 2006. The fact that this increase in the post-test scenario was higher than the increase in the pre-test CAR suggests that the overall pool of risks in the banking sector has declined.

3.3. Guidance from existing international framework for stress testing

In response to the current financial crisis, the financial industry, particularly the banking segment, has witnessed several regulatory developments among different standard setting bodies to deal with various prudential concerns. One of the prudential concerns has been to enhance and strengthen the existing stress testing framework from a financial stability point of view. Significant contributions by the BCBS, CEBS, and Committee on the Global Financial System (CGFS) in the area of stress testing are reflected in the following subsections.

In order to comprehend the stress testing practices among financial institutions, the guidance provided by the BCBS is very helpful in understanding the relevance of stress testing for the Islamic banks. This paper notes that broadly the BCBS has benefited from the comprehensive work of BIS-based CGFS in regard to stress testing. As a result, the BCBS introduced stress testing both in Pillar I and Pillar II of the Basel II framework, issued in June 2006. Subsequently, given the various developments in the industry, particularly in response to current financial crisis, the BCBS has enhanced the specific guidelines for stress testing practices by issuing *Principles for Sound Stress Testing Practices and Supervision* in May 2009. The BCBS document sets out a total 21 points comprising 15 "principles" for banks and 6 for supervisors.

The CEBS published its revised *Guidelines on Stress Testing* in August 2010. This CEBS document contains 22 points comprising 17 "guidelines" for banks and 5 for supervisors. The revised guidelines updated the *Guidelines on Technical Aspects of Stress Testing under the Supervisory Review Process* that were published in 14 December 2006, and complement the principles set out in the CEBS's *Guidelines on the Application of the Supervisory Review Process* under Pillar 2. The revised guidelines draw on the experience that supervisors have obtained by reviewing institutions' stress tests in recent years, and take account of the revised principles for sound stress testing practices and supervision published by the BCBS. The CEBS's guidelines are mainly built on BCBS guiding principles, which are supplemented by a range of annexes that focus on the stress testing of specific risks. The annexes explain the implementation of the general stress testing principles in the respective risk areas and illustrate existing supervisory expectations in those areas.

The Bank for International Settlements (BIS)-based CGFS, which monitors the stability of global financial markets for the G10 governors, has made significant contribution in the area of stress testing through conducting comprehensive studies on the practice of stress testing and its role in the risk management. For instance, CGFS has sponsored a task force (March, 2000) and working group (May 2004) on stress testing: i) to study the role of stress testing in risk management; ii) to identify which exceptional events were considered by market participants to be significant risks; and iii) to develop information on the heterogeneity of risk-taking at a point in time.

3.4. Gaps in the general literature on the stress testing

Though there seems to be extensive literature (including the international framework by BCBS and CEBS) on stress testing from many dimensions, it has skewed towards assessing the implications for the conventional banks rather than discussing the implications for the Islamic banks. It could be argued that this is due to the minority of the Islamic banks operating in society compared to their conventional counterparts.

In addition, one recent paper by Elsiefy (2012) covered three Islamic banks, but this paper as well seems to ignore the specificities of Islamic banks in terms of solvency (i.e., the capital adequacy requirement). The paper has not recognised the specific requirements such as the loss absorbency features of the IAHs and the role of "alpha" factor in the calculation of CAR of the Islamic banks. Also the scenarios and tests run in the paper lack the forward-looking assessment of the IIFS and the role of the supervisor to ensure that IIFS have considered specific characteristics, especially related to risk characteristics, capital adequacy and the position of IAHs, which is also an important stress testing exercise, yet it is not considered.

Therefore, it could be said that the existing framework focuses on the traditional risk, such as credit, market, and operational risk. However, it does not provide guidance on specific risks that the IIFS has exposed, such as *Shariah* non-compliance risk, fiduciary risk, rate of return risk, and DCR, which needs to be stressed by the IIFS. It also does not take into account the specific scenarios placing special attention on the presence and impact of the IAHs on the IIFS. This gap is addressed by the IFSB as highlighted below.

3.4.1. Guidance from Islamic Financial Services Board (IFSB)

In March 2012, in line with its mandate to promote the soundness and stability of the Islamic financial services industry (IFSI), the IFSB published *Guiding Principles on Stress Testing* for IIFS in the banking segment of the IFSI (IFSB-13) to address the specificities of IIFS with respect to stress testing. While addressing the specificities of the IIFS, the Stress Testing Working Group was tasked to prepare the IFSB-13 in order to acknowledge the significance of existing internationally recognised frameworks that sets-out sound principles and best practices pertaining to stress testing for conventional counterparts.

The IFSB intended that its guiding principles, as set out in IFSB-13, should incorporate the BCBS and CEBS while making appropriate adaptations to take into account the specificities of IIFS in terms of their risk exposures. In line with the BCBS and CEBS' framework on stress testing, IFSB-13 provided a comprehensive stress testing framework for both IIFS and supervisory authorities. The 29 Guiding Principles in IFSB-13 aim to provide a set of guiding ideas intended to complement the existing international stress testing framework, while taking into consideration the

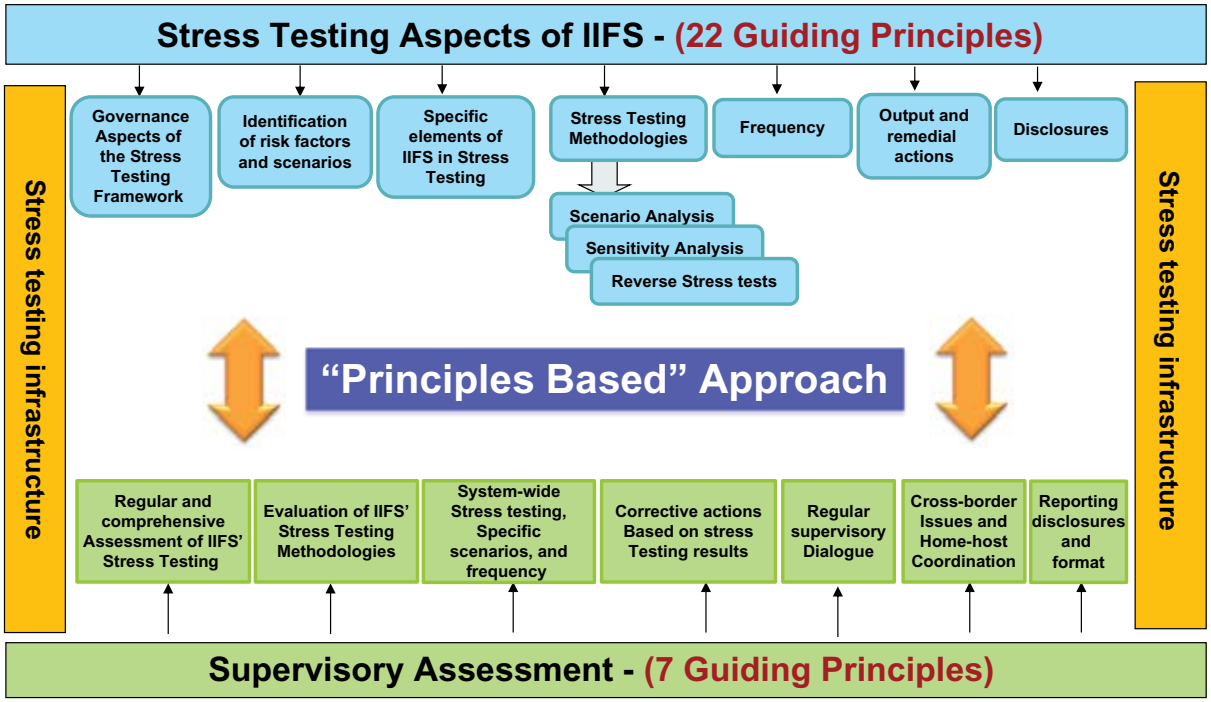

Figure 3. Stress testing framework by IFSB-13.
Source: Adapted from IFSB-13.

Twenty-two (22) guiding principles provide a framework for the Islamic banks with the aim to guide them in assessing and capturing vulnerabilities under various stress-testing scenarios including extreme but plausible shocks, in order to achieve the following, *inter alia*:

i. Identify how different portfolios respond to changes in key economic variables (e.g., benchmark rates,[15] foreign exchange rates, credit quality, etc.)
ii. Assess the quality of assets to identify existing and potential loss exposures
iii. Evaluate potential threats to the IIFS's ability to meet its financial obligations at any time arising from either funding or market liquidity exposures
iv. Estimate the impact of stress events on baseline profit (as profits normally act as the first line of defence before dipping into capital)
v. Analyse the IIFS's ability to meet its capital requirements at all times throughout a reasonably severe economic recession.

There are seven guiding principles for supervisory authorities, which can be used:

i. As surveillance tools for periodically testing the safety and soundness of the financial system (including IFSI)
ii. From a financial stability perspective, to identify "weaknesses" in the financial system and structural (systemic) vulnerabilities arising from the specific risk profiles of IIFS individually and collectively
iii. As a supervisory tool for designing macro-prudential policies.

specificities of IIFS as well as the lessons learned from the financial crisis in order to contribute to the soundness and stability of the IIFS, in particular, as well as the Islamic financial services industry on whole. The framework is reflected in Figure 3, and objectives of the IFSB-13 are presented below.

4. Data and methodology

4.1. Data requirements and depiction

Initially the study extracted data from Bankscope and Annual Reports four cross-borders operating Islamic banking Groups (at consolidated level) from four GCC countries from 2007–2012,[16] such as Dubai Islamic Bank Group (UAE), Al Rajhi Group (KSA), Kuwait Finance House Group (Kuwait) and AlBarakah Group (Bahrain). After thorough examination of the data, it emerged that granularity of the data and relevant details on the calculation process with respect to risk weighted assets (RWA) are not satisfactory to perform the solvency stress testing on actual banking group due to the following reasons:

- Lack of implementation of IFSB-4 (i.e., transparency and market discipline), as most of the banking group are following Basel II Pillar III approach
- Banking groups summarise the capital requirements for credit risk, market risk and operational risk,

but there are no clear disclosures on how the components of credit RWA (such as individual claims based on ECA, short-term exposures, exposures under profit sharing mode, exposures with preferential risk weights, past due receivables, and off-balance sheet exposures), and market RWA related components (such as total equity risk capital charge, total specific risk capital charge for Sukuk positions, total general risk capital charge for *Sukuk* and off-balance sheet financial instruments, total foreign exchange capital charge, total commodity risk capital charge, total inventory risk capital charge) are calculated
- There is no detail on the segregation of funds used for financing assets, that is, percentage of assets financed by group funds and through IAHs funds
- The CAR calculations do not indicate any impact of IAHs and related DCR, that is, how the IAHs are treated in the CAR

In the light of above shortcoming in the data, and using the data of the one of the groups after certain amendments and related assumptions, the study develops a stylised numerical example through a tractable Excel-based framework for solvency stress testing purposes to explain the stress testing process. The details of simulated data (including the capital structure, credit RWA, market RWA, other relevant information) with respect to IFSB CAR is presented in the Section 5 and in Appendix A.

4.2. Methodology

The methodology of this study employs two stage processes. Before applying the stress scenarios and shocks as indicated in Table 3, the CAR computation is required. Therefore, in the *first stage*, the CAR of the IIFS is calculated using the IFSB formulas, depending on how the IAH are treated in the respective jurisdiction, as shown below.

The IFSB issued its *Capital Adequacy Standard* (IFSB-2) for IIFS in December 2005. The IFSB-2 addressed specific structure and contents of the *Shariah*-compliant products and services offered by the IIFS and also provided detailed guidance on calculating capital adequacy requirements for IIFS. The IFSB-2 is largely based on the Basel approach, with the necessary modifications and adaptations to cater for the specific nature and characteristics of the *Shariah* compliant products and services. It uses risk weights derived from those proposed in Basel II due to the lack of historical data to modify risk weights for IIFS.

It should be noted that the underlying contract for IAHs is the "*Mudarbaha,"* which in principle does not allow the guaranteeing of either capital (principle) or fixed return on capital. Nevertheless, the pure *Mudarbaha* structure is rare in the Islamic banking industry from the capital adequacy requirements perspectives and it is mainly termed as the *'supervisory override'* on the basic structure of the PSIA due to supervisory prudential considerations. In the standard formula, it is assumed that the IIFS follows pure *Mudarbaha* and supervisory discretion formula assumes that IAH are treated as partially risk absorbent, so that the IIFS bears part of the earnings volatility of the assets funded by their investment. In such a case, IIFS include a corresponding proportion (known as 'alpha' (α)) of the credit and market risk-weighted assets financed by unrestricted IAH in the denominator of the capital adequacy formula. Both of these approaches are explained below:

(a) ***The standard formula (SF):*** The main principle under SF is that IAHs bear 100% of credit and market risk of assets funded by IAH and IIFS bears 100% of operational risk.[17] This highlights that in the absence of any smoothing of the profit payouts[18] to IAH by an IIFS, the IIFS is not required to hold regulatory capital with respect to commercial (i.e. credit or market) risks arising from assets funded by PSIA. This implies that the RWA funded by such accounts are excluded with respect to commercial risks in calculating the denominator of the CAR, leaving only the operational risk. This is called the "standard formula" and is calculated as follows:

$$\frac{\text{Eligible Capital}}{\{\text{Total RWA}^{19}\ (\text{Credit}^{20} + \text{Market risks}) + \text{Operational risk} \quad \text{Less} \quad \text{RWA funded by PSIA}^{21}\ (\text{Credit} + \text{Market risks})\}}$$

(b) ***The supervisory discretion formula (SDF):*** The main principle under SDF is that an IIFS bears a proportion of credit and market risk of assets funded by IAH.[22] The Greek letter "(α) alpha" is the corresponding proportion of assets funded by unrestricted PSIA, as determined by national supervisors. Similar to SF, IIFS bears 100% of operational risk. The CAR under this formula is calculated as follows:

$$\frac{\text{Eligible Capital}}{\{\text{Total RWA (Credit + Market risks)} + \text{Operational risk} \quad \text{Less} \quad \text{RWA funded by restricted PSIA (Credit + Market risks)} \quad \text{Less} \quad (1-\alpha)\ [\text{RWA funded by unrestricted PSIA (Credit + Market risks)}] \quad \text{Less} \quad \alpha\ [\text{RWA funded by PER and IRR of unrestricted PSIA}^{23}\ (\text{Credit + Market risks})]\}}$$

In both formulas:

- **Credit RWA comprise:** Individual claims based on external credit assessments,[24] short-term exposures, exposures under profit sharing mode, exposures with preferential risk weights, past due receivables, and off-balance sheet exposures. (see Table A2 in Appendix A)
- **Market RWA contain:** Total equity risk capital charge, total specific risk capital charge for Sukuk positions, total general risk capital charge for Sukuk, and off-balance sheet financial instruments, total foreign exchange capital charge, total commodity risk capital charge, total inventory risk capital charge. (see Table A3 in Appendix A)

Table 3. Stress scenarios.

Description	***Remarks***
20% ↓ (reduction) in the RWA (CR & MR) *funded by unrestricted PSIA* under moderate shock and 30% ↓ (reduction) under a sever shock	This means IIFS's funding (which is *50% of total credit RWA and market RWA under BAU*) will be left to *30% of total credit RWA and market RWA*) under moderate and 20% under severe shock respectively It is assumed that this reduction is top-up by the IIFS through other sources of funding. In addition, *RWA (CR & MR) funded by restricted IAH/PSIA would be NIL as IIFS does not offer restricted investment accounts* Further, RWA funded by PER and IRR (CR + MR) are 10% of *unrestricted PSIA/IAH*
RWA funded by PER and IRR (CR + MR)	Keeping constant, no change in the % for moderate and severe impacts
Stressed level of alpha: (a) $\alpha = 0.3$ to $\alpha = 0.5$ (b) Change in CAR assuming $\alpha = 0$ and $\alpha = 1$	The actual level of alpha depends on the respective jurisdiction and the values of alpha vary from 0 to 1 In this simulation, two extreme values and two values between 0 and 1 are considered to see the impact on the CAR
Credit RWA: • With moderate shock of 20% ↑ (increase) and a severe shock of 40% ↑ (increase) for *RWA of individual claims based on ECA category*, with 20% discount (haircut) to the amount of collateral, under comprehensive approach • With moderate shock of 20% ↑ (increase) and a severe shock of 40% ↑ (increase) for RWA for *exposures with preferential risk weights*, in particular, for *Murabahah or Ijarah* collateralized by commercial real estate, due to significant drop in housing prices	The minimum CAR are 8% in the IIFS
Market RWA: • With moderate shock of 15% ↑ (increase) and a severe shock of 40% ↑ (increase) in *total equity risk capital charge* due to significant drop in stock prices • With moderate shock of 15% ↑ (increase) and a severe shock of 40% ↑ (increase) for total *specific risk capital charge for Sukuk positions* taking into account the rating Downgrade of *Long term Sukūk (with the maturity of >1 to ≤5)* from AAA to AA– (2% haircut) to BB+ to BB– (15%) • With moderate shock of 15% ↑ (increase) and a severe shock of 40% ↑ (increase) in *foreign exchange capital charge* due to forex currency exposures and fluctuations	Under equity (stocks), the reference to country stock exchange performance is to be made
Operational RWA: • With moderate shock of 30% ↓ (decrease) and a severe shock of 40% ↓ (decrease) in *Gross income*, due to decrease in profitability because of high non-performing financing (NPF) linked to economic decline of the respective country GDP growth	For NPL, historical losses rate (referred as "NPF" rate) under a standardized approach is to be considered Under the Internal Rating Based (IRB) approach, the IIFS should consider the default rate and probability of default (PD) for individual clients or groups of clients
↓ (Reduction) in Capital by 20% (i.e., erosion of capital) under moderate scenario and 30% under severe scenario, through high NPF and decrease in retained profits linked to economic conditions	

- **Operational RWA** are calculated under the basic indicator approach, which uses gross income as a proxy measure of exposure for operation risk of the IIFS. Under this approach, the capital charge of an IIFS is equal to the average of a fixed percentage of 15% of positive annual gross income over the previous three years. (see Table A4 in Appendix A)

In addition, with respect to alpha, the IFSB's GN-4 (*Guidance Note on the Determination of Alpha in the CAR for IIFS, March 2011*) provides a methodology to estimate the value of alpha to be used in the supervisory discretion formula in calculating the CAR of IIFS. An algebraic approach to the determination of DCR and alpha is provided in GN-4 that can be used by supervisory authorities to decide the appropriate level of alpha across the industry. The relationship between unexpected losses to IIFS' shareholders and the character of PSIA is presented in Appendix B.

Using the GN-4 approach, alpha can be obtained using the following equations:

$$\text{DCR} = \text{UL}_2 - \text{UL}_0$$
$$\text{Maximum DCR} = \text{UL}_1 - \text{UL}_0$$
$$\text{"Alpha"} = (\text{UL}_2 - \text{UL}_0)/(\text{UL}_1 - \text{UL}_0)$$

Where:

UL_0 = Unexpected loss to shareholders when PSIA are treated as pure investment products
UL_1 = Unexpected loss to shareholders when PSIA are treated as pure deposit-like products
UL_2 = Unexpected loss to shareholders when PSIA are treated as being in-between pure investment and deposit-like products

In the *second stage*, after calculating the CAR, the study uses the combination of both sensitivity analyses (univariate) and scenario analyses (multivariate) in the solvency stress testing for Islamic bank. In particular, the paper considered *one-factor scenario* (such as a change in the expected benchmark rate of return) and a *multifactor scenario* (such as a range of rate of return risk scenarios combined with a change in foreign exchange rates).

According to IFSB-13, sensitivity analysis (univariate tests) measures the change in the value of a portfolio resulting from shocks of various degrees due to different risk factors, while the underlying relationships between the risk factors are not considered (e.g., a straightforward shift in probabilities of defaults, or the default of an IIFS's largest counterparties, or a decline in value of assets, or a migration of loans to a weaker classification). Furthermore, a sensitivity test isolates the impact on a portfolio's value of one or more pre-defined moves in a particular market risk factor or a small number of closely linked market risk factors on a *ceterus paribus* basis (i.e., holding all other factors constant). For example, if the risk factor is an exchange rate, the shocks might be exchange rate changes of +/–2%, 4%, 6% and 10%, while the relationship between such a change and other risk factors – for example, benchmark rates, expected rates of return, asset values, etc. – is not considered.

In contrast, scenario analysis specifies a set of concurrent events comprising a possible scenario that might occur. It encompasses the situation where a change in one risk factor affects a number of other risk factors. Scenario analysis contains simultaneous moves in a number of risk factors (e.g., equity prices, foreign exchange rates, benchmark rates, etc.), reflecting a set of concurrent events that the IIFS's risk managers believe might possibly occur in the foreseeable future. A stress test scenario can be based on a significant market context experienced in the past (*a historical scenario or backward-looking approach*[25]), or on a plausible market context that has not yet happened (*a hypothetical scenario or forward-looking approach or pre-defined scenario based on expert judgement*).[26]

Using the above stress testing techniques, the stress scenarios as presented in Table 3 are employed in the simulation of solvency stress testing.

5. Simulation results, remedial actions and implications

This section presents the key findings of the simulation and discusses the emerging implications for the IIFS in terms of solvency capital stress testing. Based on the data information, this section provides calculation of CAR for an IIFS using IFSB standard formula and also IFSB supervisory discretion formula with different levels of alpha to determine scenarios identified in the Table 3 in the previous section.

5.1. The relationship between PSIA, Alpha, and CAR – pre- and post-stress shocks analysis

The computation of numerator (i.e., eligible capital) and denominator (i.e., credit RWA, market RWA, and operational RWA, etc.) of the CAR of IIFS is provided in Appendix A (please see Table A1 to A4) under *bottom-up approach,* using three stress shocks, which are BAU (business as usual), *moderate shock* and *severe shock*. The results of the calculation are plugged into the IFSB formulas as discussed in previous section. While Table A5 provides CAR using IFSB standard formula, Table A6(i) to A6(iv) provide results on CAR using IFSB supervisory discretion formula, when $\alpha = 0.30$, 0.50, zero, and 1.

Chart 1 summarizes pre- and post-stress shock under a standard formula. Considering minimum CAR of 8% in the jurisdiction, it appears that under the BAU, the IIFS is well capitalized, having 15.18% CAR. However, when a *moderate* to *severe* stress shock is applied on selected categories of the credit RWA, market RWA and operational RWA the post-shock CAR under *moderate* and *severe* shock goes down to 9.85% and 6.24% respectively. This represents essentially how an IIFS with adequate capital could be exposed under defined scenarios. Post-shock CAR under *severe* stress appears below the minimum regulatory requirements, thus calling for immediate remedial actions by the IIFS on capital planning. In the financial distress circumstances, like GFC (2008), it should be noted that the regulator or supervisor may raise the minimum CAR, which would be a concern to the IIFS keeping in mind the results of Table A5. This emphasizes the need of conducting solvency stress testing regularly in the IIFS in normal and abnormal settings.

The simulation results also designate that there exist a positive relationship between CAR and the volume of PSIA.

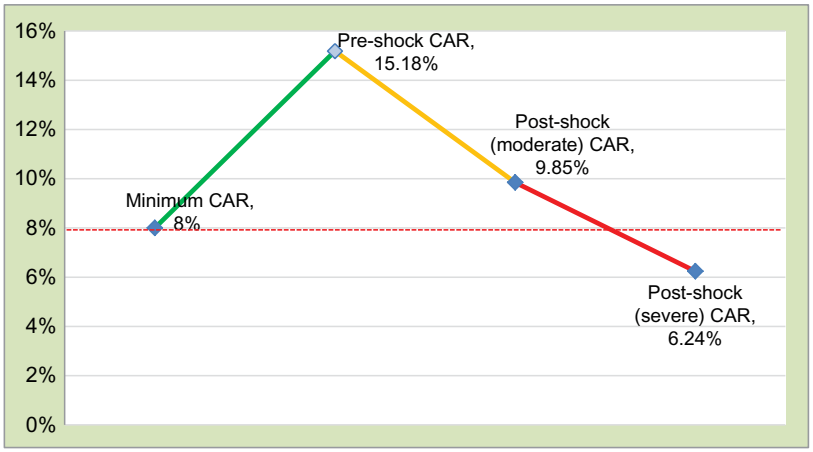

Chart 1. Pre- and post-shock CAR comparison under standard formula.
Source: Author's simulation of an IIFS. The red "dot" line reflects the minimum CAR.

This means that the CAR ratio is more sensitive to PSIA ratio and has a multiplier effect on CAR. This relationship is explained as follows: if the PSIA = 0 = > CAR is equivalent to Basel Formula (i.e., all the sources of funds are other than PSIA and hence considered liability of the bank) and CAR ratio appears in its minimum. However, if the PSIA = 100% = >, CAR would be in its maximum. According to Table A5, once the percentage of RWA (CR & MR) funded by unrestricted PSIA/IAH holders is raised from 20% to 30%, the CAR changes considerably 6.24% to 9.85%. Considering minimum CAR of 8%, this suggests how an undercapitalized IIFS stands out above the minimum CAR. Furthermore, once the percentage of RWA (CR & MR) funded by unrestricted PSIA/IAH holders is elevated to 50%, the CAR gets multiplier effects. This highlights the significance of PSIA in providing adequate buffers to IIFS.

Chart 2 provides the impact on capital adequacy of a hypothetical supervisory adjustment of "alpha" to a higher value under normal conditions and under-stressed conditions. This helps to explain how an IIFS's capital adequacy is affected under different values of the "alpha" parameter and the implications of the stressing. Considering minimum CAR of 8% in the jurisdiction and different values of alpha, it is evident that the CAR for IIFS is highly sensitive to changes in the values of "alpha" (please refer to Table A6(i) to A6(iv) in Appendix A for detail of results on CAR using IFSB Supervisory Discretion Formula, when $\alpha = 0.30, 0.50, 0$, and 1). For the same level of alpha, increase of PSIA financed assets in percentage terms increases CAR and for the same level of PSIA financed assets, increase in alpha reduces CAR (IIFS will be bearing more risk and keeping more capital when alpha increases). For instance, when the alpha 0.30 is applied at IIFS, then the pre-shock CAR, under BAU, is 12.55%; however, for the same level of alpha 0.30, when a *moderate* stress shock is applied, then the post-shock CAR is reduced to 8.93%; and likewise, post-shock CAR under *severe* stress goes at 5.88%, which is far below the prevailing

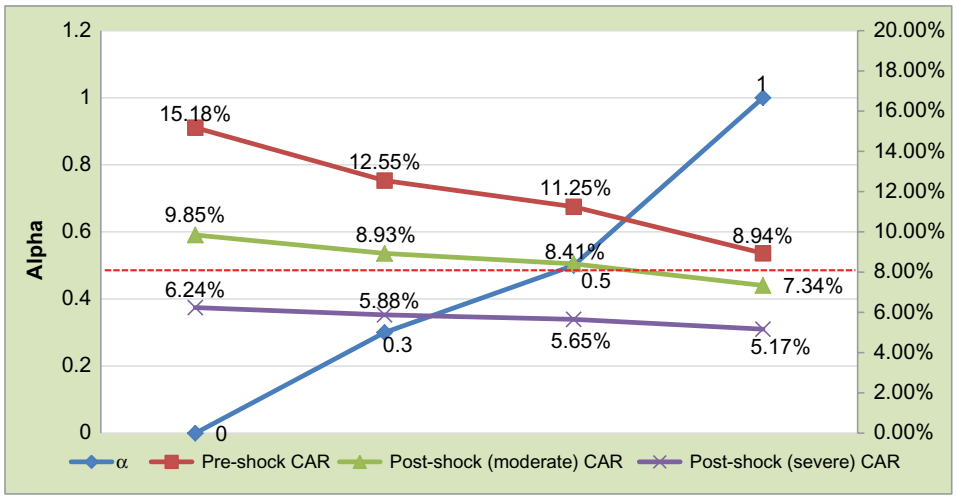

Chart 2. Pre- and post-shock CAR comparison under supervisory discretion formula.
Source: Author's Simulation of an IIFS. The red "dot" line reflects the minimum CAR in the jurisdiction.

minimum CAR in the jurisdiction. Chart 2 also indicates that when the alpha is zero, then the pre-shock CAR of the IIFS, 15.18%, is at its highest, which is also equivalent to pre-shock CAR under the standard formula.

It is also noticeable from Chart 2 that as alpha moves from zero to 1, the characteristic of PSIA changes from being a pure investment-like product to more of a pure deposit-like product, requiring increasing amounts of shareholder capital (additional capital requirements for IIFS). This relationship is also presented in the Appendix B. However, in practice, it should be noted that alpha is between zero and 1, because IIFS does not always make a payout to the UIAH according to market rates, nor does it strictly follow the rate of profit on investments made with the *Muḍārabah* funds. IIFS uses various techniques of setting aside or drawing from reserves, or making donations from shareholders' funds, in order to smooth the returns with a view to setting aside some reserves in good times and avoiding paying low returns in times of low profits (para. 35 of IFSB GN-4). It is also worth mentioning that the higher values of alpha may be applicable in jurisdictions where IAH tend to be highly protected by the governments and central banks for strategic reasons. Supervisors should base their judgments on the actual legal status of PSIA in their jurisdictions (i.e., whether PSIA are explicitly/implicitly protected by the central bank and/or deposit insurance).

Despite the fact that IIFS across the industry are well-capitalised due to predominantly common equity-based capital structure compared to their conventional counterparts. Nevertheless, Chart 2 shows that an IIFS with adequate capital could be vulnerable under defined scenarios through stress testing. Chart 2 reflects the post-shock (*severe*) CAR, in which all the post-shock CAR values are below minimum requirements, which necessitates an appropriate immediate remedial action by the IIFS on future capital resources and capital needs including main assumptions and drivers of movements in capital needs. This also indicates whether the IIFS maintains an appropriate capital buffer to support its operations at all times and absorbs unexpected losses resulting from the risks incurred through the IIFS's business activities.

5.2. Remedial actions

Once the results are produced then the IIFS should take appropriate actions. The list of actions would depend on the objective of stress tests at the IIFS. Nevertheless, an IIFS should have strategies approved in advance with regard to the actions that would be taken based on the results of the solvency stress test in identifying the points requiring remedial actions, such as those provided below. The level of authority for such actions should include the BOD and senior management.

a. Adjusting positions and restructuring the various credit and market risk relating exposures in specific sectors, countries or regions in order to decrease the vulnerability of the portfolio to large losses in the event of the stress conditions
b. Future capital resources and capital needs of an IIFS under adverse scenarios
c. The composition and quality of capital (e.g. an IIFS's ability to raise additional capital through common stock and other forms of capital in the market such as hybrid or debt capital through *Sukuk,* etc.)
d. Transferability of capital during periods of severe downturn or extended market disruption, taking account of potential funding difficulties (i.e., the possibility that a crisis impairs the ability of even very healthy IIFS to raise funds at a reasonable cost) that may be expected in stressed conditions (para. 154 of IFSB-13)

One of the measures available to management, while examining the adequacy of capital within IIFS, may be the raising of additional capital. However, the presence of a capital buffer, of appropriate quality, can be a significant mitigating factor as higher levels of capital increase the degree of freedom management has when taking mitigating actions. Therefore, an IIFS should be aware that capital raising in stressed market conditions would be quite challenging, so that considering other possible alternatives may be necessary.

Following the range of remedial actions envisaged by an IIFS in response to the results of the solvency stress testing, the IIFS should be aware that under the supervisory review process of Pillar 2, their respective supervisors would examine IIFS's stress testing results as part of a supervisory review of the IIFS's internal capital adequacy assessment process (ICAAP), in order to ensure that they maintain an appropriate capital buffer to support their operations at all times. In this way, supervisor should take a more holistic view of all the remedial actions and their impact on the IIFS and taking into consideration the magnitude and likelihood of potential stress events, the overall IIFS's risk management framework, and its risk mitigating policies (para. 172 of IFSB-13). In cases where a supervisory assessment reveals material deficiencies in the solvency stress testing and its usage, the supervisory authorities should require the IIFS to detail a plan of corrective action aimed at improving the stress tests.

5.3. Key challenges and issues

Despite the usefulness of the forward-looking stress testing as a risk management tool, there are several challenges and issues that can impede the accurate execution of a stress testing exercise within the IIFS. An IIFS and its respective supervisors should pay due consideration to these challenges and issues. Some of the key challenges and issues are discussed below:

- Up-to-date, *comprehensive and high-quality data* is needed when conducting credible stress tests and therefore lack of necessary data would be considered a major challenge for IIFS. There is also a possibility that the data may not be up to date or the IIFS may not have access to the breadth of data needed for proper stress testing. This issue should be resolved within a reasonable period of time by the management of IIFS (i.e., establishing a strategy and a plan, with the involvement and approval of the BOD for acquiring the data needed). To overcome data gaps, it is vital to start collecting data and explore relevant proxies for stress testing. The proxies may be derived internally from other assets that possess similar risk characteristics or externally through industry

benchmarking. Nevertheless if proxies are used, IIFS would have to document the source and any known limitations comprehensively (para. 21 of IFSB-13).

- The existence of relevant *models and modelling expertise* for the proper functioning of stress testing exercises. This would be another key challenge for IIFS as lack of adequate models may weaken the capacity of IIFS to take account of sectoral interlinkages as well as contagion risk (para. 24 of IFSB-13). Once the development of a model (in-house possibly with the help of consultants) or acquisition of a model (from software vendors) is completed, then the model needs to be validated. This means that the model validation requires the inclusion of an expert opinion on the effectiveness of the models that would be used in the stress testing programme by the IIFS
- Availability of *comprehensive guidance on conducting the stress testing* will be key issue for IIFS. In the absence of such guidance, IIFS may not conduct standardise stress testing resulting in underestimation of risk. In this context, IIFS will benefit from specific guidance from the respective regulator or supervisory authority on specific scenarios and shocks while conducting stress testing.
- With respect to *solvency stress testing*, a cautious approach is required when conducting stress testing on consolidated basis (e.g., Albarkah Banking Group, Dubai Islamic Bank Group, AlRajhi Banking Group, Kuwait Finance House Group, etc.), due to different levels of implementation or different treatment of Basel frameworks across the subsidiaries of the parent. Some subsidiaries might be using Basel I, some still at Basel II, and few may have started the implementation of Basel III. These variations in calculating regulatory capital requirements can produce different and misleading results that should be given due consideration. For instance, the credit risk component in the denominator of the capital adequacy ratio can be calculated in three different ways of varying degrees of sophistication, namely (i) *standardised approach* (ii) *foundation internal ratings-based (IRB) approach* (iii) and *advanced IRB approach.*[28] Similarly, market and operational risk components in the denominator of the CAR can be calculated in different ways.
- Some IIFS may demonstrate that their *liquidity buffers framework* is robust enough having liquidity coverage ratio (LCR) and net funding stability ratio (NFSR) more than 100% or 200%, and therefore the stress testing may not be justified in their context. This is may be a rare case but certainly should not be treated as a main reason for not conducting the stress testing on IIFS-level as there is significant trade-off in liquidity and profitability.
- Some IIFS may establish that the *real estate market* in their respective jurisdiction has not been prey of any external shock resulting in crash in last 10 years or 20 years, and therefore the stress testing with respect to real estate is not relevant. IIFS should note that the global financial crisis (2008) has indicated the interlinkages and cross-border transactions flows which have potential to impact the local markets due to foreign participation in the local market. In this context, the IIFS should conduct real estate stress testing taking into account cross-correlations and inter-connectivity of the markets.
- Another significant challenge for the IIFS under the stress testing would be that the stress testing results remain within the *risk appetite statement* of the IIFS as approved by their BOD depending on the business risk profile. If the results exceed the risk appetite then the BOD may have concern on the continuity of stress testing exercise and would call for reconsidering the severity of scenarios and assumptions made in the stress testing.
- The supervisory authorities should take *holistic view of stress testing results* of the IIFS. Some IIFS may pass the stress test with their own data, variables and scenarios. However, when the supervisory recommendations of the scenarios and variables are provided, then the IIFS may fail the stress test. In this case, the challenge for an IIFS would be on the submission of results to the supervisor for validation of the stress testing programme.
- Some IIFS may keep the *CAR at par* (i.e., keeping CAR close to minimum regulatory capital requirements), and would be prone to the results of the stress tests under defined scenarios. This can often underestimate the risk of IIFS. To avoid this, supervisors should require IIFS the implementation of ICAAP. The ICAAP requirements can play significant role in capital planning according to the risk profile of the IIFS rather than keep CAR at regulatory requirements level.
- Another challenge would be the *selection of methodologies* for stress testing. While it is important to distinguish between sensitivity analysis and scenario analysis, there are circumstances where IIFS will have to use the combination of both approaches depending on their risk profile and strategic decisions. A less sophisticated IIFS may use sensitivity analysis to form a first approximation of the impact. Often a combination of both approaches may result in more resilience and diversification of the scope of analysis, by taking into account different severities and perspectives (para. 124 of IFSB-13).
- Development and execution of *reverse stress tests* (to complement the existing stress testing framework) may also appear challenging as it requires an IIFS to assess scenarios and circumstances *that would put its survival in jeopardy* (such as breaching regulatory capital ratios, or a liquidity crisis) and consider scenarios beyond its normal business settings and highlights potential events with contagion and systemic implications (para. 126 of IFSB-13). It should be understood that reverse stress testing is not expected to result in capital planning and capital add-ons. Instead, its use as a risk management tool is in identifying scenarios, and the underlying dynamism of risk drivers in those scenarios, that could cause an IIFS's business model to fail (para. 127 of IFSB-13).

6. Conclusion and moving forward

The paper attempted to provide insights on the *operationalization of the IFSB-13*, through simulating the stress scenarios for an IIFS under different conditions.

The Excel-based simulation provides kick-start for the IIFS and a start for developing a complex simulation.

Taking into consideration the *unique characteristics of IIFS* such as use of PSIA, which have the potential to impact how the CAR is calculated in IIFS and how the stress scenarios would have potential impact on the IIFS in terms of capital planning strategies. The results suggest the sensitivity of CAR for IIFS with respect to the changes in the values of "alpha" and composition of PSIA. The simulation also indicates that an IIFS operating above minimum CAR could easily be made vulnerable by mild to severe shocks, thus bringing the CAR below minimum regulatory requirements calling for appropriate remedial actions. There are two levels of stress testing, one identifies the vulnerability and second takes mitigating actions (both from IIFS and respective supervisory authority). Both of these stages are important in the accurate estimation of risk and in ensuring the going concern of the IIFS in financial distress situation under severe stress.

In the light of simulation, the objective of the stress tests should not be to "*pass the stress test*" rather finding could IIFS fail. In this respect, IIFS has to have a skeptical attitude and it should look for weaknesses within the IIFS, which could potentially threaten the viability of the IIFS in stress situations. For instance, one could clearly see from European Banking stress tests exercises that illuminated which banks were organized to fail. We have seen that some of the banks that passed the stress test subsequently went through financial distress. Therefore, it is important for stress testing to spot the weaknesses and then mitigate the risks involved through appropriate actions.

While IIFS can apply appropriate *stress testing methodology*, they should keep in mind that their supervisors can challenge the assumptions used in the stress tests in order to ensure IIFS does not underestimate the risk under certain defined scenarios. In the methodology, as per IFSB-13, it is worth mentioning that a less sophisticated or a smaller IIFS may place greater emphasis on the qualitative elements of its stress testing program and hence may use *sensitivity analyses* to form a first approximation of the impact. Whereas a large and sophisticated IIFS would be expected to run complex models, which would be complemented by appropriate qualitative oversight and supported by combination of approaches (i.e. *sensitivity analyses and scenario analyses*). The level of stress shock is going to vary from one IIFS to another IIFS.

The stress testing has become part of the regulatory and supervisory authorities within the financial stability analysis. In the beginning, the stress test may not appear a simple task for the IIFS. However, a proper consideration to the challenges identified in the paper would certainly tend to improve the overall effectiveness and credibility of the stress testing programs. The stress testing itself is not that complex, rather the relationships that need to be understood require *sufficient knowledge* (including mathematical, economics, statistical, and accounting and financial skills) of financial data and translation of economic behaviors into financial impacts. This raises capacity building issues that need to be given due consideration in developing an appropriate stress testing regime.

Finally, it is also important to recognize the *limitations of the data* used in the simulation which are well known. It is also important to comprehend that the simulation conducted in the paper provides a preliminary discussion. However, more aspects of solvency can be considered in further research with plausible severe shocks according to the business profile of the IIFS. Also more sophisticated analysis can be expanded depending upon the accurate granularity of data.

Moving forward, generally, the stress testing for risk management at IIFS seems to be an underdeveloped area where much work at all levels, including by supervisory authorities and market players, is required. In this context, it is hoped that the paper makes contribution in the literature and simulation results provides preliminary discussion on developing a *comprehensive toolkit* for the IIFS similar to what is developed by the IMF FSAP programme.

Notes

1. The term "IIFS mused in the paper also referred as to "Islamic banks" and both these terminologies are used interchangeably in the paper. It is important to note that the term "IIFS" has been used by the IFSB.
2. The IFSB issued its *Capital Adequacy Standard* (also referred to as IFSB-2) for IIFS in December 2005. However, in the light of financial crisis, and global developments with respect to capital framework, the IFSB issued the Exposure Draft (ED) of Revised IFSB *Capital Adequacy Standard* (ED-15), in November 2012, which is scheduled to be finalised in December 2013. The capital adequacy formulas in ED have not been changed and thus will not affect this simulation results. Please refer to Section 4 for more details.
3. The jurists state that the primary sources of Islamic finance laws are the *Holy Qur'an* and the *Sunnah* (the traditions of the Prophet Muhammad (pbuh). These two sources are classified as sources being agreed upon among the majority of jurists. Some of the other sources are agreed upon by the majority of the schools are *Ijma'* (consensus) and *Qiyas* (analogy). The secondary sources are techniques of legal reasoning that the mujtahid employs during his *Ijtihad*. The secondary sources include Juristic preference (*al-istihsan*), Consideration of public interest (*al-istislah*) *Maslahah Mursalah*, Presumption of continuity (*al-istishab*), *Saad Al-dariah* (Blocking the lawful means to an unlawful end), Companion's opinion (*qawl al-sahabi*), *Shar' Man Qablana* (earlier scriptures and general customary practices (*al-'adah*).
4. IFSB-1(Guiding Principles on Risk Management), Dec 2005.
5. IFSB-3 (Guiding Principles on Corporate Governance), Dec 2006.
6. IFSB-10 (Guiding Principles on *Sharī'ah* Governance Systems), Dec 2009.
7. Fiduciary risk is the risk that arises from IIFSs' failure to perform in accordance with explicit and implicit standards applicable to their fiduciary responsibilities (see IFSB-1 for detail).
8. It refers to the possible impact on the net income of the IIFS arising from the impact of changes in the market rates and relevant benchmark rates on the return on assets and on the returns payable on funding. Rate of

return risk differs from interest rate risk in that IIFS are concerned with the returns on their investment activities at the end of the investment holding period and with the impact on net income after the sharing of returns with IAH. The rate of return risk leads to Displaced Commercial Risk (see IFSB-1 for detail).

9. DCR is the consequence of the rate of return risk. It refers to the magnitude of risks that are transferred to shareholders in order to cushion the IAH from bearing some or all of the risks to which they are contractually exposed in *Muḍārabah* funding contracts (see IFSB-1 for detail).
10. Alpha (α) refers to the proportion assets funded by unrestricted PSIA which is to be determined by the supervisory authorities. The value of α would therefore vary based on supervisory authorities' discretion on a case-by-case basis. If "alpha" is 0, then all RWA corresponding to the unrestricted IAH funds are excluded from the denominator. If "alpha" is 1, then traditional CAR applies, with CAR applying to all on-balance sheet assets. Please see Section 4 more detail.
11. The amount appropriated by the institution offering Islamic financial services out of the *Mudārabah* profits, before allocating the *Mudārib*'s share of profit, in order to maintain a certain level of return on investment for investment account holder and to increase owners' equity.
12. The amount appropriated by the institutions offering Islamic financial services out of the profit of investment account holders, after allocating the *Mudārib*'s share of profit, in order to cushion against future investment losses for investment account holders.
13. IFSB-7 (Capital Adequacy Requirements for Sukuk, Securitisations and Real Estate Investment), Jan 2009.
14. See Committee for Global Financial System (CGFS), A Survey of Stress Tests and Current Practice at Major Financial Institutions, BIS, April 2001.
15. Benchmark rates include market-based reference interest rates such as LIBOR (London Interbank Offer Rate), EIBOR (Emirates Interbank Offer Rate), etc.
16. According to Rushdi (2009), right after the global financial crisis (2008), Islamic financial institutions have indeed captured negative headlines. These examples showcase the impact of Gulf-based Islamic financial institutions, notwithstanding the crisis started in US, and from the conventional financial industry. The Kuwait-based Islamic firm "Investment Dar" business model based on Commodity Murabahah Transactions and acquiring the car manufacturer Aston Martin and recently defaulting on US $100 million Islamic debt issue and went through restructuring; Dubai's two Islamic mortgage offering entities "Amlak and Tamweel" suspended operations; Government of Qatar purchased strategic interests in banks, including Islamic, in Qatar; Bahrain-based Gulf Finance House received a negative outlook by S&P in early 2009 because of excessive leverage and worsening operating environment for 2009; Dubai Islamic Bank first quarter profit (2009) plunged 33% to AED 370 million (US$ 101 million) following provision for bad financing.
17. The rationale is explained as follows. When IAHs provide funds to the IIFS on the basis of profit-sharing and loss-bearing *Muḍārabah* contracts, or on the basis of agency for an agreed upon fee, instead of debt-based deposits, i.e. lending money to the IIFS, would mean that the IAH would share in the profits of a successful operation, but could also lose all or part of their investments. The liability of the IAH is exclusively limited to the provided capital and the potential loss of the IIFS is restricted solely to the value of its work. However, if negligence, mismanagement, fraud or breach of contract conditions can be proven, the IIFS will be financially liable for the capital of the IAH. Therefore, credit and market risks of the investment made by the IAH shall normally be borne by themselves, while the operational risk is borne solely by the IIFS. This implies that assets funded by either unrestricted or restricted PSIA would be excluded from the calculation of the denominator of the capital ratio.
18. For more details on the smoothing payout, please see IFSB GN-3 (*Guidance Note on the Practice of Smoothing the Profits Payout to IAH, December 2010*).
19. Total RWA include those financed by both restricted and unrestricted PSIA.
20. Credit and market risks for on- and off-balance sheet exposures.
21. Where the funds are commingled, the RWA funded by PSIA are calculated based on their pro-rata share of the relevant assets. PSIA balances include PER and IRR, or equivalent reserves.
22. In jurisdictions where the IIFS practice the type of income smoothing for IAH (mainly unrestricted IAH) that gives rise to DCR, the supervisory authority have to require regulatory capital to cater for DCR. In this approach, commercial risks of assets financed by unrestricted IAH are considered to be borne proportionately by both the unrestricted IAH and the IIFS. Hence, a proportion of the RWA funded by unrestricted IAH, denoted by "alpha", is required to be included in the denominator of the CAR, the permissible value of alpha being subject to supervisory discretion. A supervisory authority may also decide to extend this treatment to restricted PSIA/IAH. Such risk-sharing between PSIA and IIFS gives rise to a *supervisory discretion formula* that is, applicable in jurisdictions where the supervisory authority takes the view that, in order to mitigate withdrawal risk and the attendant systemic risk, IIFS in the jurisdiction are permitted (or in some jurisdictions required) to smooth income to the IAH.
23. The relevant proportion of risk-weighted assets funded by the PSIA's share of PER and by IRR is deducted from the denominator. The PER has the effect of reducing the displaced commercial risk, and the IRR has the effect of reducing any future losses on the investment financed by the PSIA.
24. For more details, please see IFSB GN-1 (*Guidance Note in Connection with the Capital Adequacy Standard: Recognition of Ratings by External Assessment Institutions (ECAIs) on Shariah-compliant Financial Instruments, March 2008*).
25. The *historical scenario* involves the reconstruction of historical events and involves less judgement as it reflects the actual stressed market conditions. Since *historical scenarios* are backward looking, they may not be the worst that can happen and may lose relevance over time due to market and structural changes.
26. *Hypothetical scenarios* involve simulating the shocks caused by events that have not yet happened or which have no historical precedent. Key areas of focus in a

hypothetical scenario include market volatility, trading liquidity and risk linkages. *Hypothetical scenarios* can be more relevant, flexible and forward looking, but they involve more judgement and management support. In addition, at times *hypothetical scenarios* are very difficult to analyse and may generate confusing outcomes, so it is important to take care in crafting hypothetical analysis.

27. The *foundation IRB approach* refers to a set of credit risk measurement techniques proposed under the Basel II capital adequacy rules for banking institutions under which the banks are allowed to develop their own empirical model to estimate the probability of default (PD) for individual clients or groups of clients. Under this approach banks are required to use the regulator's prescribed Loss Given Default (LGD) and other parameters required for calculating the risk weighted assets (RWA). Then total required capital is calculated as a fixed percentage of the estimated RWA. Under the *advanced IRB approach*, the banks are allowed to develop their own quantitative models to estimate PD, LGD, and Exposure at Default (EAD) and other parameters required for calculating the RWA.

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Appendices

Appendix A: Simulation, calculations, results

Table A1. Calculation of total eligible capital.

Amounts in local currency

		Scenarios		
		BAU	Moderate*	Severe*
A. Total Eligible Capital (EC)** =	Tier-1 + Tier-2	Pre-shock	Post-shock	
		4,550,100.00	4,095,090.00	3,276,072.00

*For the respective scenario shocks for EC, please see Table 4.1.

Both Tier 1 and Tier 2 are subject to individual IIFS's capital structure. However, generally Tier 1 capital components include: (i) issued and fully paid ordinary shares/common stock; (ii) disclosed reserves (such as legal/statutory reserves, share premium); (iii) retained profit; and (iv) non-controlling interest in consolidated subsidiaries. On the other hand, Tier 2 capital components include (i) undisclosed reserves; (ii) asset revaluation reserve; (iii) general provisions (general loan-loss reserves); (iv) hybrid debt capital instruments. There are IIFS who consider PER and IRR as part of the Tier-2, however, the **IFSB ED-15, has made it clear that they should not be part of capital of IIFS as IRR and a portion of the PER belong to the equity of IAHs/PSIA, and thus are not part of the capital of the IIFS.

Table A2. Calculation of total CRWA.

Amounts in local currency

			Scenarios		
			BAU	Moderate*	Severe*
B. Total Credit Risk Weighted Assets (CRWA):			Pre-shock	Post-shock	
Category	RWA	CAR	CRWA	CRWA	CRWA
1	2	3	4(2 × 3)	5(2 × 3)	6(2 × 3)
RWA of individual claims based on external credit assessment (i.e., rating agency) **	245,350,650.00	8%	19,628,052.00	23,553,662.40	27,479,272.80
RWA for short-term exposures	47,520,620.00	8%	3,801,649.60	3,801,649.60	3,801,649.60
RWA for exposures under profit sharing mode	50,650,100.00	8%	4,052,008.00	4,052,008.00	4,052,008.00
RWA for exposures with preferential risk weights **	25,500,600.00	8%	2,040,048.00	2,448,057.60	2,856,067.20
RWA for past due receivables	10,512,500.00	8%	841,000.00	841,000.00	841,000.00
RWA for off-balance sheet exposures	5,850,750.00	8%	468,060.00	468,060.00	468,060.00
Total	**385,385,220.00**		**30,830,817.60**	**35,164,437.60**	**39,498,057.60**

*For the respective scenario shocks for items 1 and 4 in column 1, please see Table 4.1. Other categories are kept constant.

**According to IFSB-2, under this category, the assignment of RW shall take into consideration, among others, the following: (i) the credit risk rating of a debtor, counterparty, or other obligor, or a security, based on external credit assessment-the IIFS to refer to their supervisory authorities for eligible external credit assessment institutions (ECAI) that are to be used in assigning credit ratings for the purpose of calculating credit RW; (ii) credit risk mitigation techniques adopted by the IIFS; (iii) types of the underlying assets that are sold and collateralised or leased by the IIFS; and (iv) amount of specific provisions made for the overdue portion of accounts receivable or lease payments receivable.

Note: The exposures presented in column 1 reflect the net exposures after incorporating appropriate risk weights and credit risk mitigation techniques (i.e., appropriate eligible collateral adjustments, guarantees, applicable haircuts, applicable margin requirements).

Table A3. Calculation of total MRWA.

Amounts in local currency

			Scenarios		
			BAU	Moderate*	Severe*
C. Total Market Risk Weighted Assets (MRWA):			**Pre-shock**	**Post-shock**	
Category	**Capital requirements**	**CF****	**MRWA**	**MRWA**	**MRWA**
1	**2**	**3**	**4**	**4 (2 × 3)**	**5 (2 × 3)**
Total equity (liquid and diversified stocks) risk capital charge***	195,261.00	**12.50**	2,440,762.50	2,806,876.88	3,417,067.50
Total specific risk capital charge for *Sukuk* positions	200,000.00	**12.50**	2,500,000.00	2,875,000.00	3,500,000.00
Total general risk capital charge for *Sukuk* and off-balance sheet financial instruments	50,000.00	**12.50**	625,000.00	625,000.00	625,000.00
Total foreign exchange capital charge****	213,000.00	**12.50**	2,662,500.00	3,061,875.00	3,727,500.00
Total commodity risk capital charge	75,000.00	**12.50**	937,500.00	625,000.00	625,000.00
Total inventory risk capital charge	525,500.00	**12.50**	6,568,750.00	7,554,062.50	9,196,250.00
	1,258,761.00		**15,734,512.50**	**17,547,814.38**	**21,090,817.50**

*For the respective scenario shocks for items 1, 2 and 4 in column 1, please see Table 4.1. Other categories are kept constant.
**Conversion factor (CF) converts the market risk capital charges into equivalents of risk weighted assets. CF is actually reciprocal of minimum capital adequacy ratio (i.e. 1/8%) = 12.5. If a national supervisor decides to impose a minimum capital requirement different from (e.g., higher than) 8%, the CF should be changed accordingly. For instance, if the minimum capital requirement is 10% CAR in the jurisdiction, then the CF will be 10. This will affect the computation of MRWA.
***This reflects "equity position in trading book," whereas "equity position in banking book" is presented under CRWA. Separate calculations have to be performed for each individual national market where the IIFS has equity positions (e.g., Qatar Market, Malaysian Market, Bahrain Market, etc.), such that capital charges for those individual national market equities risk is provided.
****The process requires converting net position in each foreign currency and in gold/silver into the reporting currency using spot rates and then aggregating the sum of converted net short/long positions. After the calculations, the greater sum of net short or long positions is added to the net position of gold/silver before applying capital charge.

Table A4. Calculation of total ORWA.

Amounts in local currency

		Scenarios		
		BAU	Moderate*	Severe*
D. Total Operational Risk Weighted Assets (ORWA)**		**Pre-shock**	**Post-shock**	
Taking Average of previous 3 Years	**X**	3,565,002.00	2,495,501.40	2,139,001.20
Assigned Capital Charge	**15%**			
Capital Charge for Operational Risk (X * 15%)	**Y**	534,750.30	374,325.21	320,850.18
Operational Risk (Y × 12.5*)	**12.5**	**6,684,378.75**	**4,679,065.13**	**4,010,627.25**

* For the respective scenario shocks for operation risk, please see Table 4.1.
**Measurement of capital charge for operational risk in IIFS may be based on either the basic indicator approach or the standardized approach as set out in IFSB-2. The former approach is considered, which requires the annual average gross income for the last 3 years to be multiplied by a capital charge factor of 15%. For the detail on the gross income, please see IFSB-2.

Table A5. CAR using IFSB standard formula under defined scenarios.

Amounts in local currency

E (i) CAR using IFSB standard formula under defined scenarios	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
I) Capital			
(A) Total eligible regulatory capital which is used as the numerator for CAR	**4,550,100.00**	**4,095,090.0**	**3,276,072.00**
II) Risk-weighted assets			
(B) Total RWA for credit risk	30,830,817.60	35,164,437.6	39,498,057.60
(C) Total RWA for market risk	15,734,512.50	17,547,814.4	21,090,817.50
(D) Total RWA for operational risk	6,684,378.75	4,679,065.1	4,010,627.25
(E) Total RWA	**53,249,708.85**	**57,391,317.10**	**64,599,502.35**
(F) RWA (CR & MR) funded by unrestricted PSIA/IAH holders *(50% of Total Credit RWA and Market RWA under BAU, 30% under moderate and 20% under severe)*	23,282,665.05	15,813,675.59	12,117,775.02
(G) (E) – (F)	**29,967,043.80**	**41,577,641.51**	**52,481,727.33**
CAR (A)/(G)	**15.18%**	**9.85%**	**6.24%**

Note: Please see Table A1 for (A) and Tables A2 to A4 for (B), (C), and (D).

Table A6(i). CAR using IFSB supervisory discretion formula under defined scenarios.

Amounts in local currency

F (i) CAR using IFSB supervisory discretion formula, when $\alpha = 0.30$	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
I) Capital			
(A) Total eligible regulatory capital which is used as the numerator for CAR	**4,550,100.00**	**4,095,090.0**	**3,276,072.00**
II) Risk-weighted assets			
(B) Total RWA for credit risk	30,830,817.60	35,164,437.6	39,498,057.60
(C) Total RWA for market risk	15,734,512.50	17,547,814.4	21,090,817.50
(D) Total RWA for operational risk	6,684,378.75	4,679,065.1	4,010,627.25
(E) Total RWA	**53,249,708.85**	**57,391,317.10**	**64,599,502.35**
(F) RWA (CR & MR) funded by unrestricted PSIA/IAH holders *(50% of Total Credit RWA and Market RWA under BAU, 30% under moderate and 20% under severe)*	23,282,665.05	15,813,675.59	12,117,775.02
(G) *$(1 - \alpha)$ [RWA funded by unrestricted PSIA/IAH (CR + MR)]*	16,297,865.54	11,069,572.91	8,482,442.51
(H) *RWA (CR & MR) funded by restricted IAH*	–	–	–

(*Continued*)

Table A6(i) - *Continued*

Amounts in local currency

F (i) CAR using IFSB supervisory discretion formula, when α = 0.30	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
(I) *RWA funded by PER and IRR (CR + MR) [10% of unrestricted PSIA/IAH)]*	2,328,266.51	1,581,367.56	1,211,777.50
(J) *α [RWA funded by PER and IRR of unrestricted PSIA (CR + MR)]*	698,479.95	474,410.27	363,533.25
(K) (E) – (G) – (J)	**36,253,363.36**	**45,847,333.92**	**55,753,526.59**
CAR (A)/(K)	**12.55%**	**8.93%**	**5.88%**

Note: Please see Table A1 for (A) and Tables A2 to A4 for (B), (C), and (D) calculations.

Table A6(ii). CAR using IFSB supervisory discretion formula under defined scenarios.

Amounts in local currency

F (ii) CAR using IFSB supervisory discretion formula, when α = 0.50	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
I) Capital			
(A) Total eligible regulatory capital which is used as the numerator for CAR	**4,550,100.00**	**4,095,090.0**	**3,276,072.00**
II) Risk-weighted assets			
(B) Total RWA for credit risk	30,830,817.60	35,164,437.6	39,498,057.60
(C) Total RWA for market risk	15,734,512.50	17,547,814.4	21,090,817.50
(D) Total RWA for operational risk	6,684,378.75	4,679,065.1	4,010,627.25
(E) Total RWA	**53,249,708.85**	**57,391,317.10**	**64,599,502.35**
(F) RWA (CR & MR) funded by unrestricted PSIA/IAH holders *(50% of Total Credit RWA and Market RWA under BAU, 30% under moderate and 20% under severe)*	23,282,665.05	15,813,675.59	12,117,775.02
(G) *(1 – α) [RWA funded by unrestricted PSIA/IAH (CR + MR)]*	11,641,332.53	7,906,837.80	6,058,887.51
(H) *RWA (CR & MR) funded by restricted IAH*	–	–	–
(I) *RWA funded by PER and IRR (CR + MR) [10% of unrestricted PSIA/IAH)]*	2,328,266.51	1,581,367.56	1,211,777.50
(J) *α [RWA funded by PER and IRR of unrestricted PSIA (CR + MR)]*	1,164,133.25	790,683.78	605,888.75
(K) (E) – (G) – (J)	**40,444,243.07**	**48,693,795.52**	**57,934,726.09**
CAR (A)/(K)	**11.25%**	**8.41%**	**5.65%**

Table A6(iii). CAR using IFSB supervisory discretion formula under defined scenarios.

Amounts in local currency

F (iii) CAR using IFSB supervisory discretion formula, when α = 0	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
I) Capital			
(A) Total eligible regulatory capital which is used as the numerator for CAR	**4,550,100.00**	**4,095,090.0**	**3,276,072.00**
II) Risk-weighted assets			
(B) Total RWA for credit risk	30,830,817.60	35,164,437.6	39,498,057.60
(C) Total RWA for market risk	15,734,512.50	17,547,814.4	21,090,817.50
(D) Total RWA for operational risk	6,684,378.75	4,679,065.1	4,010,627.25
(E) Total RWA	**53,249,708.85**	**57,391,317.10**	**64,599,502.35**
(F) RWA (CR & MR) funded by unrestricted PSIA/IAH holders *(50% of Total Credit RWA and Market RWA under BAU, 30% under moderate and 20% under severe)*	23,282,665.05	15,813,675.59	12,117,775.02
(G) *(1 – α) [RWA funded by unrestricted PSIA/IAH (CR + MR)]*	23,282,665.05	15,813,675.59	12,117,775.02
(H) *RWA (CR & MR) funded by restricted IAH*	–	–	–
(I) *RWA funded by PER and IRR (CR + MR) [10% of unrestricted PSIA/IAH)]*	2,328,266.51	1,581,367.56	1,211,777.50
(J) *α [RWA funded by PER and IRR of unrestricted PSIA (CR + MR)]*	–	–	–
(K) (E) – (G) – (J)	**29,967,043.80**	**41,577,641.51**	**52,481,727.33**
CAR (A)/(K)	**15.18%**	**9.85%**	**6.24%**

Table A6(iv). CAR using IFSB supervisory discretion formula under defined scenarios.

Amounts in local currency

F (iv) CAR using IFSB supervisory discretion formula, when α = 1	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
I) Capital			
(A) Total eligible regulatory capital which is used as the numerator for CAR	**4,550,100.00**	**4,095,090.0**	**3,276,072.00**
II) Risk-weighted assets			
(B) Total RWA for credit risk	30,830,817.60	35,164,437.6	39,498,057.60
(C) Total RWA for market risk	15,734,512.50	17,547,814.4	21,090,817.50
(D) Total RWA for operational risk	6,684,378.75	4,679,065.1	4,010,627.25
(E) Total RWA	**53,249,708.85**	**57,391,317.10**	**64,599,502.35**

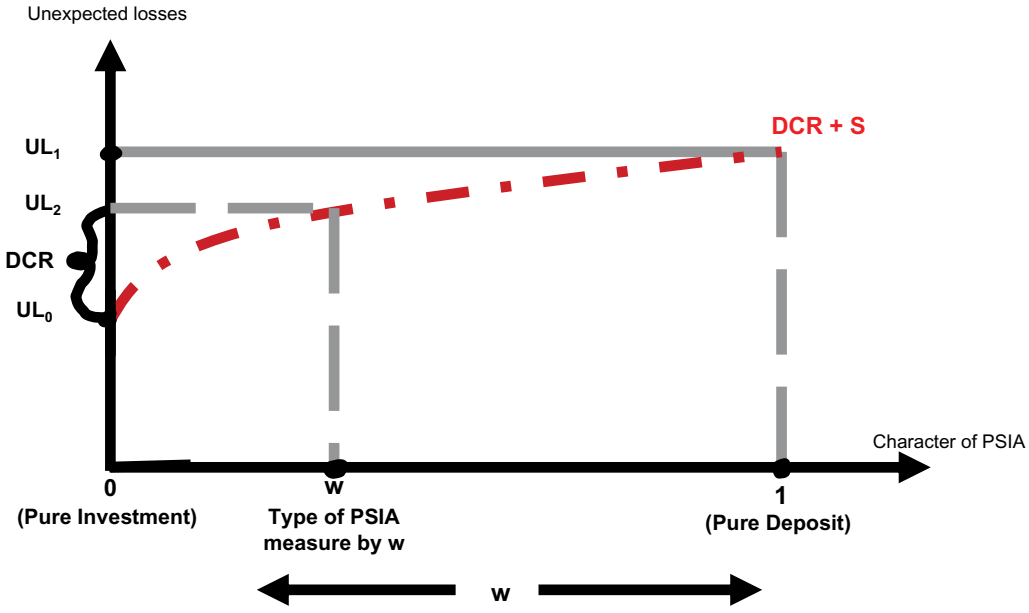
(*Continued*)

Table A6(iv) - *Continued*

Amounts in local currency

F (iv) CAR using IFSB supervisory discretion formula, when α = 1	Scenarios		
	BAU	Moderate	Severe
	Pre-shock	Post-shock	
(F) RWA (CR & MR) funded by unrestricted PSIA/IAH holders *(50% of Total Credit RWA and Market RWA under BAU, 30% under moderate and 20% under severe)*	23,282,665.05	15,813,675.59	12,117,775.02
(G) *(1 – α) [RWA funded by unrestricted PSIA/IAH (CR + MR)]*	–	–	–
(H) *RWA (CR & MR) funded by restricted IAH*	–	–	–
(I) *RWA funded by PER and IRR (CR + MR) [10% of unrestricted PSIA/IAH)]*	2,328,266.51	1,581,367.56	1,211,777.50
(J) *α [RWA funded by PER and IRR of unrestricted PSIA (CR + MR)]*	2,328,266.51	1,581,367.56	1,211,777.50
(K) (E) – (G) – (J)	**50,921,442.35**	**55,809,949.54**	**63,387,724.85**
CAR (A)/(K)	**8.94%**	**7.34%**	**5.17%**

Appendix B: The relationship between unexpected losses to IIFS' shareholders and the character of PSIA



This figure shows the relationship between the character of PSIA expressed in "w" and unexpected losses to IIFS' shareholders.

As "w" moves from zero to 1, the character of PSIA changes from being a pure investment-like product to a pure deposit-like product. (Since DCR exists only in cases of smoothing returns, the "S" factor, given above, is by assumption to cater for the guaranteed principal of *Muḍārabah* capital so that PSIA assimilate pure deposits.) In such a case, it is required to increase the amount of shareholders' funds.

The additional capital requirement – that is, the increase in unexpected losses as "w" shifts from zero (a pure *Muḍārabah* **outcome) to** its actual level "w" – is given by $(UL_2 – UL_0)$**,** which is the measure of displaced commercial risk (DCR).

The maximum possible value of DCR is given by $(UL_1 – UL_0)$**.** The value of alpha in the capital adequacy formula is given by the ratio of actual size of DCR to its maximum value.

Source: IFSB GN-4, March 2010.

Currency-banking crises and economic downturns: A comparison between Islamic and conventional banks

Meriem Djennas[1], Mohamed Benbouziane[2], Mustapha Djennas[3]
[1]Faculty of Economics, University of Amiens, France, meriemdjennas@gmail.com
[2]Faculty of Economics, University of Tlemcen, Algeria, mbenbouziane@yahoo.fr
[3]Faculty of Economics, University of Tlemcen, Algeria, djennasm@yahoo.fr

Abstract - This paper examines the effects of currency and the banking crises on economic downturns in North Africa and GCC countries based on a Financial Stress Index (FSI). The paper identifies episodes of financial turmoil according to FSI values and proposes an analytical framework to assess the impact of financial stress – in particular the effect of Islamic banks distress and conventional banks distress – on the economic downturn. It concludes that financial turmoil characterized by banking distress is more likely to be associated with severe and protracted downturns than stress mainly in securities or foreign exchange markets. Furthermore, the contribution of Islamic banks in the FSI is – against all odds – no less important compared to conventional banks in the financial system mainly during the last world financial crisis.

Keywords: Banking crisis, Early warning Indicators, Financial Stress, Economic downturns

1. Introduction

The last round of global financial turmoil has prompted policy makers and economists around the world to pay closer attention to the linkages between financial system risks and economic activity. Against this situation, many countries have developed some Financial Stress Indexes to monitor the risks in the financial systems and to gain a deeper understanding of the causes and consequences of these risks. Hence, the recent financial crisis and the associated decline in economic activity have raised some important questions about economic dynamics and links to the financial sector.

This paper studies the relationship between currency and banking crises and economic downturns in the region of North Africa and GCC countries by introducing a synthetic index of financial stress to monitor the financial vulnerabilities and crisis and shows how stress interacts with economic activity. We examine a variety of questions including mainly the implications of financial stress for the economic dynamics in the considered regions and the implications of shocks to the economic dynamics for financial stress. The analyses encompass two classes of banks – Islamic banks and conventional banks – in order to give an answer to the following question: are Islamic banks more resistant to financial crisis?

Also, we specifically estimate a parameterized multivariate and a time-varying transition probability Markov-switching model in order to evaluate the probability of observing a future crisis given the information contained in the set of financial variables.

We extend the existing literature on studying financial shocks and vulnerabilities in the following ways: First, we identify past systemic events by using a synthetic financial stress index measuring the level of systemic tensions in the financial system of a country. Second, in predicting the identified systemic events, we evaluate the joint role of Islamic and conventional banks. This strategy encompasses traditional approaches that look only at the role of banking sector and its influence on financial instability.

By doing so, this paper tries to clear up the following main questions: Do banking crises and economic downturns have symmetric effects? Do financial vulnerabilities have an impact on the economic activity in the North Africa countries and GCC countries? Does monetary policy have the same effect on the economic dynamics in the low financial stress regime and in the high financial stress regime? Could we consider the financial stress index as an efficient approach to predict the financial crises?

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This paper is organized as follows: in the first section, a literature review of currency and banking crisis diagnostics based on a financial stress index is presented. The second section describes main differences between Islamic banking and conventional banking. Section 3 deals with Islamic banking in MENA countries and its evolution. Sections 4 and 5 are devoted to Financial Stress Index descriptions and economic downturns. The time-varying transition probability Markov-Switching model used in financial stress estimation is presented in sections 6 and 7. Some principal results and policy implications are discussed in sections 8 and 9.

2. Literature on currency-banking crises and financial stress

Many empirical studies of financial stability focus on selecting early warning systems of crises, but most use simple definitions of the crises themselves. Typically, crises are identified with binary variables based on extreme values of a dummy financial variable. This section describes briefly the variables used in the literature to define a crisis.

Banking crises

Because of the lack of suitable data and institutional differences across countries, it can be challenging to define a banking crisis; the analysis relies mostly on qualitative information. Many studies avoid defining banking crises and rely on judgment. For example, Kaminsky and Reinhart (1996) and Logan (2000) define banking crises on an ad-hoc basis as a combination of country-specific events. But a few studies have addressed the issue directly. Examples include Bordo (2000), who defines a banking crisis as a situation where actual or incipient bank runs or failures lead banks to suspend the internal convertibility of their liabilities. Caprio and Kilingebiel (1996) define a systemic banking crisis as an instance in which bank failures or suspensions lead to the exhaustion of much or all bank capital.

More recent papers combine this qualitative approach with a limited number of quantitative criteria. For example, Demirgug-Kunt and Detragiache (1998) define a banking crisis as a situation where at least one of the following conditions holds: (i) the ratio of non-performing assets to total assets is greater than 10 per cent, (ii) the cost of the rescue operation is at least two per cent of GDP, (iii) banking problems result in the large-scale nationalization of banks, and (iv) extensive bank runs leading to emergency measures.

Certainly, a more quantitative method of identifying a banking crisis involves the use of aggregate balance sheet data. The literature frequently uses three measures to identify bank balance-sheet problems: (i) the stock of non-performing loans as a percentage of total assets (Corsetti, Pesenti, and Roubini, 1998; Gonzalez-Hermosillo, 1999), (ii) bank deposits as a percentage of GDP (Hardy and Pazarbasioglu, 1998), and (iii) lending as a percentage of GDP (Hardy and Pazarbasioglu, 1998; Sachs, Tornell, and Velasco, 1996).

Currency crises

Currency or foreign exchange crises are usually defined as significant devaluations, losses in reserves, and/or defensive interest rate increases. Frankel and Rose (1996) define a currency crisis as a nominal depreciation of at least 25 per cent that exceeds the previous year's change by a margin of at least 10 percentage points. To take into account the possibility of government intervention in case of a speculative attack, Kaminsky, Lizondo, and Reinhart (1998) and Caramazza, Ricci, and Salgado (2000) take a weighted average of exchange rate changes and reserve losses, then the crisis threshold is defined in terms of standard deviations from the mean. Corsetti, Pesenti, and Roubini (1998) use a similar measure, but employ multiple thresholds to achieve a graded index. Eichengreen, Rose, and Wyplosz (1995) and Hawkins and Klau (2000) include hikes in interest rates to reflect government intervention intended to avert a crisis.

These approaches, which essentially connect stress with volatility measures, have been criticized because they ignore potentially important information about the stochastic process that generates exchange rates (Sauer and Bohara, 2001). The proposed solution has been to use autoregressive conditional heteroscedastic (ARCH) or general ARCH (GARCH) models, in the Engle (1982) and Bollerslev (1986) traditions, respectively, to analyze exchange rate volatility, because those models can take into account skewed distributions.

3. Islamic banking and conventional banking

Like conventional banks, Islamic banks are intermediaries and trustees of the money of other people; the difference is that they share profit and loss with their depositors. This difference is introduced in Islamic banking: depositors are customers with some ownership rights (Dar and Presley, 2000).

As shown in Table 1, Islamic banking and conventional banking differs in that while conventional banking follows conventional interest-based principle, Islamic banking is based on interest-free principles and principles of profit-and-loss (PLS) sharing in performing their businesses as intermediaries (Bashir, 2000). The rationale behind prohibition of interest and the importance of PLS in Islamic banking has been discussed in many Islamic economics studies. Moreover, Islamic PLS principle creates the relationship of financial trust and partnership between borrower, lender, and intermediary (Yudistira, 2003).

According to Bashir (2000), Islamic banks compared with non-Islamic banks seek a just and equitable distribution of resources. Islamic banks are based on Islamic *faith* and their operations must be within the boundaries of Islamic Law or *Shariah*. There are four rules that govern investment behavior (Suleiman 2001):

1. Absence of interest-based (Riba) transactions
2. Avoidance of economic activities involving speculation (Gharar)
3. Introduction of an Islamic tax (Zakat)
4. Discouragement of the production of goods and services, which contradict the value pattern of Islam (Haram)

Table 1. Major differences between conventional banks and Islamic banks.

Characteristics	Islamic banking system	Conventional banking system
Business Framework	Based on Shariah laws – Shariah scholars ensure adherence to Islamic laws and provide guidance.	Not based on religious laws or guidelines – only secular banking laws.
Balance Between Moral and Material Requirement	The requirement to finance physical assets which banks usually take ownership of before resale reduces over extension of credit.	Excessive use of credit and debt financing can lead to financial problems.
Equity Financing with Risk to Capital	Available. Enables several parties, including the Islamic Bank, to provide equity capital to a project or venture. Losses are shared on the basis of equity participation while profits are shared on a pre–agreed ratio. Management of the enterprise can be in one of several forms depending on whether the financing is through Mudaraba, Musharaka, etc.	Not generally available through commercial banks, but through venture capital companies and investment banks, which typically take equity stakes and management control of an enterprise for providing start–up finance.
Penalty/Late Payment	Penalties on late payments are prohibited. If penalties are levied, they must be re–channeled to charities.	Fees are typically charged for late payments.
Ethical Transaction	Transactions and activities that involve engagement with unlawful business sectors such as gambling and brewery are not allowed.	Besides money laundering and the financing of criminal activities, how customers utilized borrowed funds is typically unrestricted.

Source: Blominvest Bank http://www.blominvestbank.com/

4. Islamic banking in the Mena region

GCC countries

Islamic Banking has been growing worldwide significantly in the past three decades and is developing remarkably in Southeast Asia, the Middle East, and even in Europe and North America. GCC countries have dual banking system where Islamic and conventional banks are operating side by side (Figures 1, 2).

Bahrain has eased entry barriers for new Islamic banks. Currently, there are 6 Islamic retail banks and 20 Islamic wholesale banks in the country, resulting in the highest concentration of Islamic financial institutions in the Middle East. The regulatory framework is well-developed and reasonably transparent. The Prudential Information and Regulatory Framework is the first framework especially designed for Islamic finance and provides a good platform for overall governance (Rodney W, 2009).

In Kuwait, the number of Islamic banks that can operate in the country is limited. Currently, there are three licensed institutions, all of which used to be public. Islamic windows run by conventional banks are not allowed. Thus, new entries into the market seem unlikely unless there is a change in regulations. In addition to that, Kuwait is not granting any new licenses. Therefore, the conversion of the Commercial Bank of Kuwait into a fully Islamic bank, announced in early 2008, is still not complete.

Oman does not have an Islamic banking sector as it does not allow Shariah-compliant financial institutions, and the situation doesn't appear to be changing in the near future. The idea behind this trend is that all banks should be international and not deal with specific operations and regulations (Blominvest Bank Annual Report, 2009).

Qatar opted for an initial period of license restriction to test the Islamic banking concept with only two banks allowed until 2006. Since then however, as restrictions have been eased, the market has developed manifold and today almost 10 banks offer Shariah-compliant products. In 2005, the government established the Qatar Financial Center (QFC) to attract financial institutions and capital into the country. QFC regulations are liberal and allow a relatively quick and easy establishment of Islamic wholesale financial institutions.

Development of Islamic banking in Saudi Arabia is hampered by the lack of clear laws, and technically

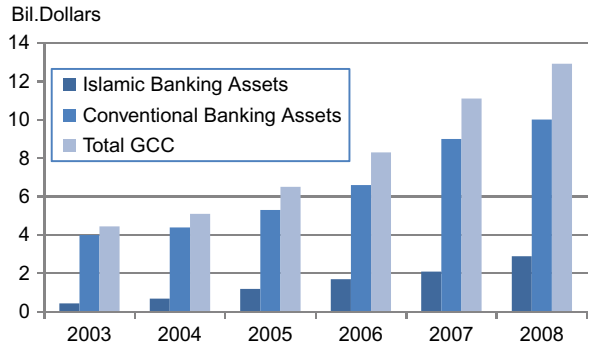

Figure 1. Breakdown of banking assets in GCC. *Source*: Annual review of Islamic banking and finance (2010).

Shariah-compliant finance is against the constitution. In practice however, Islamic finance institutions are present in the market, but they operate in a challenging environment with many discretionary licensing conditions and are subject to strong government influence. This directly reflects on the fact that only 4 out of 14 banks have been opened since 2000. Nevertheless, Saudi Arabia remains one of the GCC countries where Islamic finance is increasing constantly.

The UAE market is relatively competitive, with a large number of banks serving a limited population. Additionally, in 2004, the Dubai International Financial Center (DIFC) was established with the objective of making UAE one of the major global onshore financial hubs. To this end, a lot of incentives were introduced, most importantly a much more liberal business environment than in the rest of the country, especially in terms of foreign ownership. In spite of retail banking being excluded from DIFC regulations, a number of international institutions (such as HSBC Amanah or Citibank) have established operations there.

North African countries and Turkey[1]

After years of watching from the sidelines, North Africa has begun to embrace Islamic finance as banking develops and governments try to channel more Arab countries into an investment-starved region. But growth could be far slower than in the GCC countries given resistance from some political and business elites (Blominvest Bank Annual Report, 2009).

In Tunisia, there is only one Islamic bank, the Bank BEST (Beit Ettamouil Essaoudi Ettounsi Bank). It was created in 1983, but remains restricted to local institutional as well as large investors, especially those in the Gulf. The Tunisian authorities have indeed avoided, until now, making Islamic products accessible to ordinary citizens, presumably for political reasons.

In Morocco, the Islamic banking products (officially called alternative) have entered the capital market on first October, with the approval of the ruling Justice and Development Party (PJD, a moderate Islamist party). The government hopes to bring in the banks of many Moroccans who settle their transactions in cash. Only 20% of the population uses a bank account. Attracting capital from investors in the Gulf is another issue. Morocco now allows conventional banks to offer Ijara leasing products, Murabaha contracts to buy and re-sell an underlying goods and Musharaka co-ownership financing structures.

Neither Algeria nor Libya has fully authorized Islamic finance, but Algeria already permits two players. Saudi-controlled Banque Albaraka d'Algerie has become one of the country's most successful private banks by offering more sophisticated products and better customer service than bigger public sector lenders.

In Egypt, out of 7 banks with Islamic operations, only one has been established since 2000, reflecting the reluctance of institutions to enter this market. While Islamic windows are operational in 5 banks, a lack of adequate regulation impedes the overall growth of Shariah-compliant finance.

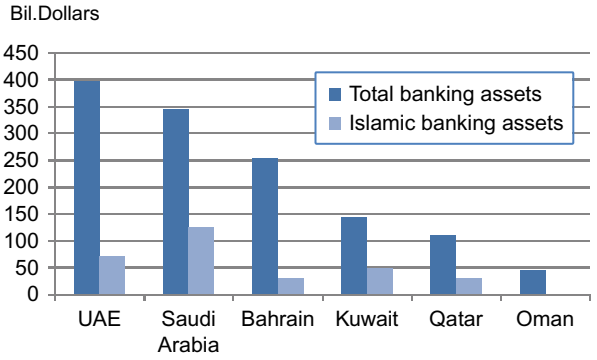

Figure 2. Market penetration of Islamic banking in GCC. *Source*: Annual review of Islamic banking and finance (2010).

The Islamic financial institutions market (Participation Banks) has grown considerably, especially since 2001 (when Turkey experienced its last economic crisis), at an average annual rate of 40% in terms of asset size, 53% in terms of funds placed and 40% in terms of funds raised (Islamic Finance News Guide, 2010). Four participation banks are currently operational in Turkey: al Baraka, Bank Asya, Kuveyt Türk, and Türkiye Finans. Like mainstream financial institutions, these banks offer a wide range of services, including savings and checking accounts, house and automobile financing, and even Islamic bonds, or *Sukuk*.

5. Measuring financial stress

Conceptualizing the financial stress index

In this paper, the FSI for each country is constructed as a variance-weighted average of three sub-indices, which can be thought of as being associated with the banking, securities, and foreign exchange markets (Balakrishnan *et al*., 2009). There are many other potential candidates for inclusion in the FSI, but given the cross-country nature of this study, one objective was to use a uniform set of time series across all 10 countries. Another objective was to use a minimum set of time series that would signal financial stress episodes. Adding tends to be restricted owing to data availability, both across time and country dimensions. It could also potentially contaminate the FSI with noisy indicators (Cardarelli *et al.,* 2010).

The advantage of utilizing such an index is its ability to identify the beginning and peaks of financial stress episodes more precisely, that is, the specific quarter of a year when an episode can be said to have begun, and its duration. Moreover, constructing such an index facilitates the identification of four fundamental characteristics of financial stress events: the exchange market pressure index, sovereign debt spreads, beta banking sector, stock market returns and, finally, stock volatility. Looking at these sub-components can help identify which types of financial stress (banking related, securities market related, currency related, or a combination of these) have been associated with larger output consequences (Cardarelli *et al.,* 2010).

This section follows Balakrishnan *et al*. (2009) work in describing the components and methodology used to

construct the FSI for considered countries. Each component is de-meaned and normalized by its standard deviation, and then added together to construct the index. Normalizing each component by its standard deviation is necessary to ensure that the overall index is not dominated by large fluctuations in one component. The additive feature of the index allows for a straightforward decomposition into contributions of each component (Moriyama, 2010; Cardarelli *et al.,* 2010).

Episodes of financial stress are identified as those periods when the index for a country is more than one standard deviation above its trend. The FSI is given by the sum of the five components: the EMPI, sovereign spreads, the beta-banking sector, stock returns, and time-varying stock return volatility:

$$FSI = EMPI + Sovereign\ spreads + \beta\text{-}banking\ sector + Stock\ returns + Stock\ volatility \quad (1)$$

Variables description:

An ***EMPI*** increases as exchange rate depreciates or as international reserves decline, where the *EMPI* for month *t* is given by the following formula:

$$EMPI_t = \frac{\Delta e_t - \mu_{\Delta e}}{\sigma_{\Delta e}} - \frac{(\Delta RES_t - \mu_{\Delta RES})}{\sigma_{\Delta RES}} \quad (2)$$

Δe and ΔRES are the month-over-month percent changes in the nominal exchange rate vis-à-vis an anchor currency (for example, US dollar or Euro) and total reserves minus gold, respectively. μ and σ denote the mean and standard deviation of the relevant series, respectively, over the sample period.

Sovereign spreads indicates increased (external) default risk of a country defined as the bond yield minus the 10-year United States Treasury yield using JP Morgan EMBI Global spreads.[2] When EMBI data were not available, five-year credit default swap spreads were used.

The ***β-banking sector*** is derived from the standard capital asset pricing model (CAPM[3]):

$$\beta_t = \frac{Cov(r_t^M, r_t^B)}{\sigma_M^2} \quad (3)$$

r represents the year-over-year banking or market returns, computed over a 12-month rolling window. If $\beta > 1$ then banking sector stocks are moving more than proportionately with the overall stock market suggesting that the banking sector is relatively risky and is associated with a higher likelihood of a banking crisis.

Stock returns are a proxy to capture that falling equity prices that correspond to increased market stress, where the returns are the month-over-month real change in the stock index multiplied by –1, so that a decline in equity prices corresponds to increased securities market related stress.

Stock volatility represents financial uncertainty. Higher volatility captures heightened uncertainty in an economy, derived from a GARCH specification, using month-over-month real returns modeled as an autoregressive process with 12 lags (Moriyama, 2010; Balakrishnan *et al*. 2009).

Given the availability of data, we consider quarterly data from 2001 to 2010. This period includes years of financial crises in late 2000 and early 2001 (Turkish currency crisis) as well as the 2007/2008 subprime crisis. The FSI results are shown in figures 3 and 4 for North African countries, Turkey and GCC countries, respectively.

On the whole, it seems that the GCC countries were more resistant to currency and banking crisis than North African countries and Turkey, especially during the last world financial crisis. More presented data about GDP growth in the next sections confirm this result.

Episodes of financial stress

By considering episodes of financial stress, we are trying to decompose the sample data into two sets: periods leading to a crisis (crisis), and periods characterized by relative financial stability (tranquil times) in terms of the degree of fragility of the economy.

Using the five sub-components described above, the FSI is constructed for each of the 10 countries in the sample. Episodes of financial stress are identified as those periods when the index for a country is more than one standard deviation above its trend (Cardarelli *et al.,* 2010). These episodes signal that one or more of the banking, securities,

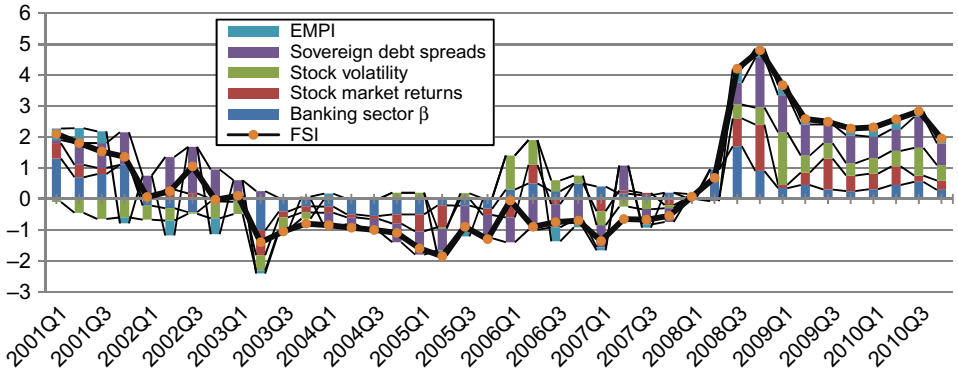

Figure 3. Financial stress in NA-T countries.

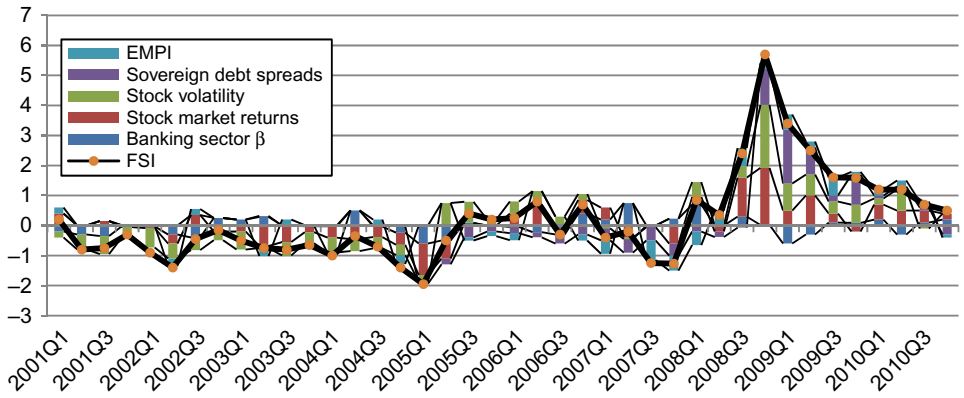

Figure 4. Financial stress in GCC countries.

and/or foreign exchange market sub-components has shifted abruptly. Also, episodes with more than 1.5 standard deviations above its trend are considered high financial stress episodes.

Looking at the overall sample data, we have identified 23 financial stress episodes for North Africa countries and Turkey (NA-T) and only 14 financial stress episodes for the GCC countries (Table 2). Of these episodes, 22 were considered financial crises with a high FSI (15 for NA-T and 7 for the GCC). Most of the financial stress episodes are driven by stress in the banking sector (the banking variables accounted for the majority of the increases of the FSI during these episodes).

For the global financial crisis, the FSI indicates that the financial crisis has a significant global dimension, affecting virtually all countries in the sample (Figure 3 and Figure 4). In addition, the FSI has accurately determined the 2000–2001Turkish crisis. Overall, the index appears to capture extreme financial episodes accurately.

The FSI also accurately captures the fact that while the origins of the current episode were in the banking sector, by early 2008 the crises had become much more broad based, affecting banking, securities and foreign exchange markets at the same time (Figure 3 and 4).

Overall, these results suggest that the FSI can be considered a comprehensive indicator that successfully identifies the main episodes of financial stress for the sample of countries under consideration and can provide the basis for an examination of the macroeconomic consequences of such stress.

6. Financial stress and economic downturns

Economic downturn cycles

Having identified episodes of financial stress, a first question of interest is: How many of these episodes were followed by an economic downturn? Were economic downturns preceded by episodes of financial stress different from those that were not?

To answer these questions we have used the following definitions of economic downturns: *An episode of financial stress is followed by an economic slowdown if the level of real GDP falls below trend (identified using the Hodrick-Prescott filter for Trend-Cycle Decompositions) within six quarters of the onset of the financial stress episode (Hodrick and Prescott, 1997)*.

Hodrick-Prescott filter

Trend-cycle decompositions are routine in modern macroeconomics. The basic idea is to decompose the economic series of interest (for example the log of GDP) into the sum of a slowly-evolving secular trend and a transitory deviation from it which is classified as *cycle*:

Table 2. Financial stress episodes.

	North Africa countries and Turkey	Gulf cooperation council countries	Total
Banking Crisis	18	10	28
Foreign Exchange	5	4	9
High FSI	15	7	22
Low FSI	8	7	15
Total Financial Stress Episodes	**23**	**14**	**37**

Table 3. Financial stress episodes and economic downturns.*

	North Africa countries and Turkey	Gulf cooperation council countries	Total
FSI Followed by Economic Downturn	8	4	12
FSI Not-Followed by Economic Downturn	15	10	25
Total Financial Stress Episodes	**23**	**14**	**37**

*Downturn: number of quarters where GDP is below the Hodrick-Prescott trend.

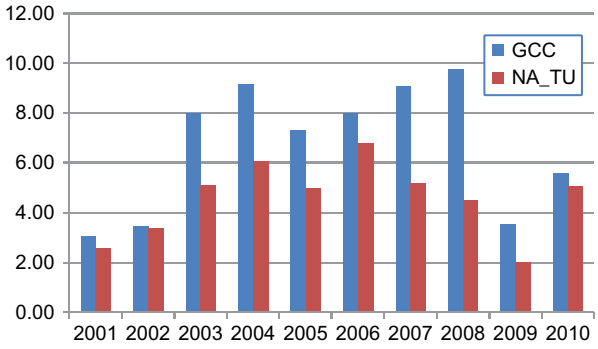

Figure 5. GDP growth rate in NA-TU & GCC (Annual %).

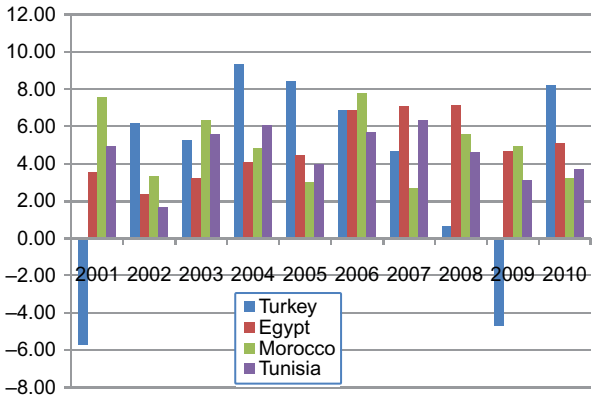

Figure 8. GDP growth rate in NA-T countries (Annual %).

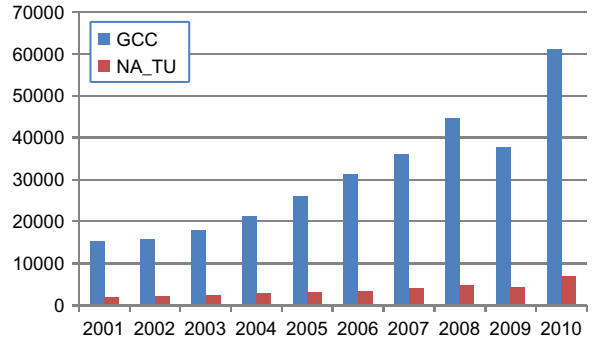

Figure 6. GDP per capita in NA-TU & GCC countries (USD).

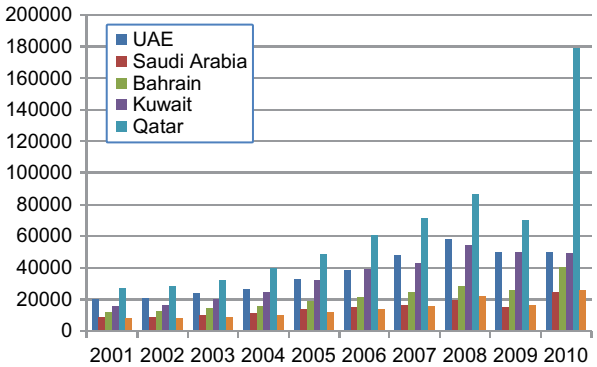

Figure 9. GDP per capita in GCC countries (USD).

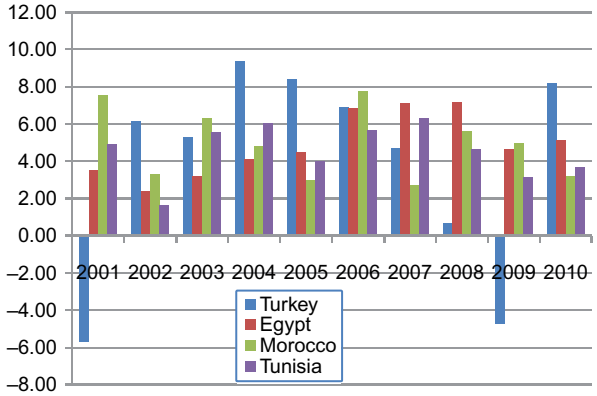

Figure 7. GDP growth rate in GCC countries (Annual %).

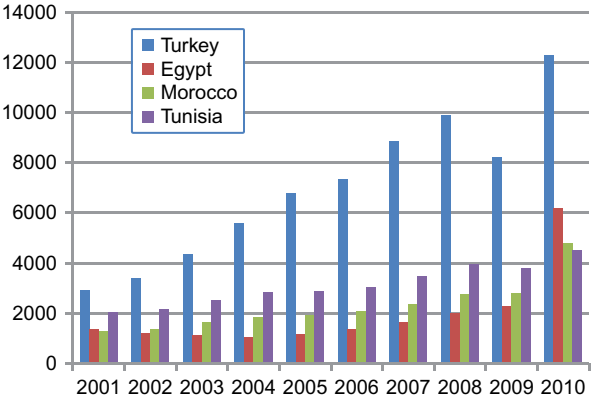

Figure 10. GDP per capita in NA-T countries (USD).

Source: World bank, OCED satistics & CIA World Factbook.

$$x_t = \tau_t + \xi_t$$
$$Observed\,Series = Permanent\,Trend + Cycle \qquad (4)$$

However, as these constituent parts (trend and cycle) are not readily observed, any decomposition must necessarily be built on a conceptual artifact. Thus, any trending method, must start out by somehow arbitrarily defining what shall be counted as *trend* and as *cycle,* before these elements can be estimated from the data.

The most common method used to extract the trend from a time series is the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997). The HP filter extracts the trend τ_t by solving the following standard-penalty program:

$$\min_{\{\tau_t\}} \sum_{t=1}^{T} (x_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} \left[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}) \right]^2 \qquad (5)$$

- $\min_{\tau_t} \sum_{t=1}^{T} (x_t - \tau_t)^2$ is the Goodness of Fit
- $\lambda \sum_{t=2}^{T-1} \left[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}) \right]^2$ is the Penalty for Roughness

Where the smoothing parameter λ controls the smoothness of the adjusted trend series, $\hat{\tau}_t$, as $\lambda \to 0$, the trend approximates the actual series, x_t, while as $\lambda \to \infty$ the trend becomes linear.

While Hodrick and Prescott (1997) suggest values for λ, Marcet and Ravn (2003) recast the formula (5) as a constrained minimization program to determine the value of λ endogenously. For annual data, λ should be between 6 and 7, (Ravn and Uhlig, 2002; Maravall, 2004). Note that the HP formula (5) can be written more succinctly as[4]:

$$\min_{\{\tau_t\}} \sum_{t=1}^{T} \xi_t^2 + \lambda \sum_{t=3}^{T} \left(\nabla^2 \tau_t \right)^2 \qquad (6)$$

Which indicates that the HP filter attempts to maximize the fit of the trend to the series (i.e., minimize the cycle component in (4)) while minimizing the changes in the trend's slope.

Based upon these definitions, of the 37 financial stress episodes, 12 (8 + 4) were followed by an economic downturn. The remaining 25 financial stress episodes were not followed by an economic downturn. (Table 3, Figures 5 & 6). The eight FSI episodes followed by an economic downturn correspond to the periods: 2001Q1, 2001Q2, 2001Q3, 2005Q1, 2005Q2, 2008Q4, 2009Q1 and 2009Q2. For the GCC countries, the four periods corresponding to economic downturns are: 2008Q3, 2008Q4, 2009Q1 and 2009Q2. On the whole, all these downturn periods are recorded in the peak periods of the last world financial turmoil, mainly for the GCC countries; the difference for North Africa countries and Turkey remain fundamentally characterized by the Turkish financial crisis (2000–2001). Because of the sharp decline in oil prices since mid-2008, GCC countries have experienced a significantly lower economic growth in 2009 than the previous year, with the exception of Qatar.

In particular, when preceded by financial stress, economic slowdowns tend to be characterized by a flattening in consumption growth. More detailed conclusions are presented in the discussion section.

7. Markov-switching time-varying transition probabilities

We consider a two-state Markov switching autoregressive model for the FSI. Both states, also called regimes, are intended to discriminate between periods of *low financial stress* and *high financial stress*. The regimes are not pre-selected (as would be the case if we were using a 0–1 dummy variable). Instead, we let the model say whether at a given time *t* the FSI index is considered to evolve in a low financial stress or high financial stress regime, owing to the fact that the likelihood of being in either regime is governed by a latent unobservable two-state Markov chain variable. The formalization below follows Filardo and Gordon (1998), Laton and Smith (2007) and Kim *et al.* (2010).

Suppose that y_t is the FSI index observed at time t = 1, 2, ..., *T*. Its dynamics is given by the following equation:

$$y_t = \mu(s_t) + \varnothing(s_t)\, y_{t-1} + \sigma\varepsilon_t \qquad \varepsilon_t \sim N(0,1) \qquad (7)$$

$s_t = \{0,1\}$ is a latent variable and: $\mu(s_t) = \mu_1 + \mu_2 s_t$, with $\varnothing(s_t) = \varnothing_1 + \varnothing_2 s_t$, $\mu(s_t)$ and $\varnothing(s_t)$ indicate that the average value of FSI and its autoregressive dynamics is regime-dependent. Equation (7) can be generalized in order to include higher lags and a state-dependent residual standard error.

Since s_t is assumed to follow a Markov-chain, the realization of each state is assigned a probability and the transition probability matrix is written as follows:

$$P(s_t = i / s_{t-1} = j, L_t) = \begin{bmatrix} p(L_t) & 1 - p(L_t) \\ 1 - q(L_t) & q(L_t) \end{bmatrix}, \quad i, j = 1, 2 \qquad (8)$$

Where $L_t = \{L_t, L_{t-1}, \ldots\}$ is the history of the leading indicator of the Financial Stress Index (currency and/or banking crisis). This formalization assumes that a country's currency and/or banking crisis is informative with regard to the likelihood of a higher or a lower financial stress.

The functional form of the functions $p(L)$ and $q(L)$ is assumed to be sigmoid and to map the leading indicator values into the [0,1] interval (logistic, Gaussian, Cauchy distributions). We assume here a logistic function, as is common wisdom in the empirical literature using this class of models:

$$p(L_t) = \frac{\exp(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m})}{1 + \exp(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m})},$$
$$q(L_t) = \frac{\exp(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m})}{1 + \exp(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m})} \qquad (9)$$

Assume that the two states correspond respectively to a lower financial stress (state 0) and a higher financial stress (state 1). Then, we might have the following situations:

1. $\sum_{m=1}^{M} \theta_m^p L_{t-m}$ and $\sum_{m=1}^{M} \theta_m^q L_{t-m}$:
   The currency and/or banking crisis is not informative about a forthcoming lower or higher financial stress. The model is a Hamilton (1991) model (if $(L_t) \neq 0$ and/or $q(L_t) \neq 0$) in the sense that the FSI index evolves in two regimes, but there are other variables explaining this. In the case $p(L_t) = q(L_t) = 0$, the dynamics of the FSI index is governed by a linear AR model and is not regime-dependent.
2. $\sum_{m=1}^{M} \theta_m^p L_{t-m} > 0$ (< 0):
   A positive change in the leading indicator increases (resp. reduces) the likelihood of a low financial stress regime m quarters later.
3. $\sum_{m=1}^{M} \theta_m^q L_{t-m} > 0$ (< 0):
   A positive change in the leading indicator increases (resp. reduces) the likelihood of a high financial stress regime m quarters later.
4. $\sum_{m=1}^{M} \theta_m^p L_{t-m} = 0$ and $\sum_{m=1}^{M} \theta_m^q L_{t-m} > 0$:
   The leading indicator is uninformative regarding the transition dynamics during the shifting from a low financial stress regime to a high financial stress regime. A positive shift in the leading indicator helps predicting whether there is an increased or reduced likelihood of observing a high financial stress regime m periods later only when the economy is already in a financial stress regime.
5. Symmetrical situation of case 4 when $\sum_{m=1}^{M} \theta_m^p L_{t-m} > 0$ (< 0) and $\sum_{m=1}^{M} \theta_m^q L_{t-m} = 0$: One can predict the likelihood of a lower stress regime only if the economy is already in that regime.

The last two cases illustrate situations in which it may be impossible (using the information contained in the financial variable) to say whether one can expect escape from a financial stress situation or go back to a low financial stress situation. Hence, the transition probability matrix can be presented also as follows:

The parameters of equations (7) through (9) are estimated jointly using a maximum likelihood (ML) estimator for mixtures of Gaussian distributions. As shown by Kiefer (1978), if the errors are normally distributed, then the ML yields consistent and asymptotically efficient estimates. Further, the inverse of the matrix of second partial derivatives of the likelihood function computed at the true parameter values is a consistent estimate of the asymptotic variance-covariance matrix of the parameter values.

As illustrated below, the results show that the North Africa countries and Turkey were influenced by the negative effects of the crisis from the advanced economies (mainly USA and Europe) more quickly than the GCC countries.

Once again, the GCC countries confirm their position as oil exporters with large financial capacity and relatively small populations. This group was in the best position to absorb the economic shocks. They entered the crisis in exceptionally strong position. This gave them a significant cushion against the initial impact of the global financial crisis. Although their stock markets were hard hit in the second half of 2008, their governments were able to respond by relaxing monetary policy, by providing capital, and guaranteeing deposits in national financial institutions.

Regarding North African countries and Turkey, their economies are diversified with strong trade and tourism linkages with Europe and OECD. This group of countries felt the impact of the crisis on their real economy as early as the last quarter of 2008, as recession spread across Europe and other export markets (Figure 11). For this reason, the impact of the crisis was immediate in comparison with GCC countries.

$$P(s_t = i / s_{t-1} = j, L_t) = \begin{bmatrix} p(L_t) = \dfrac{\exp\left(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m}\right)}{1 + \exp\left(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m}\right)} & 1 - p(L_t) = 1 - \dfrac{\exp\left(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m}\right)}{1 + \exp\left(\theta_0^p + \sum_{m=1}^{M} \theta_m^p L_{t-m}\right)} \\ 1 - q(L_t) = 1 - \dfrac{\exp\left(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m}\right)}{1 + \exp\left(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m}\right)} & q(L_t) = \dfrac{\exp\left(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m}\right)}{1 + \exp\left(\theta_0^q + \sum_{m=1}^{M} \theta_m^q L_{t-m}\right)} \end{bmatrix}$$

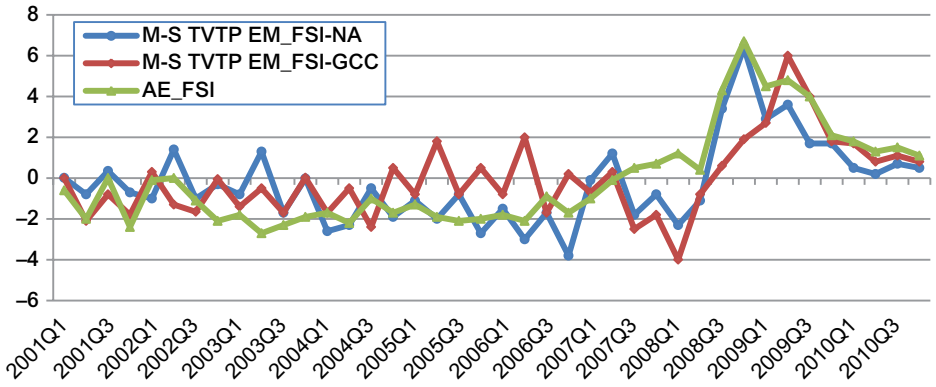

Figure 11. Markov-Switching time varying transition probability for EM_FSI to NA_FSI and GCC_FSI.

Table 4. Financial stress index decomposition.

	NA countries and Turkey					GCC countries				
	FSI CB cont	**FSI IB cont**	**FSI_Global**	**FSI% CB**	**FSI% IB**	**FSI CB cont**	**FSI IB cont**	**FSI_Global**	**FSI% CB**	**FSI% IB**
2001Q1	0,24	0,36	**0,6**	40,00%	60,00%	0,15	0,05	**0,2**	75,00%	25,00%
2001Q2	0,14	0,13	**0,27**	51,85%	48,15%	–0,52	–0,28	**–0,8**	65,00%	35,00%
2001Q3	0,3	0,38	**0,68**	44,12%	55,88%	–0,41	–0,34	**–0,75**	54,67%	45,33%
2001Q4	0,0045	0,0055	**0,01**	45,00%	55,00%	–0,2	–0,1	**–0,3**	66,67%	33,33%
2002Q1	0,023	0,037	**0,06**	38,33%	61,67%	–0,4	–0,5	**–0,9**	44,44%	55,56%
2002Q2	0,125	0,125	**0,25**	50,00%	50,00%	–0,8	–0,6	**–1,4**	57,14%	42,86%
2002Q3	0,42	0,63	**1,05**	40,00%	60,00%	–0,21	–0,24	**–0,45**	46,67%	53,33%
2002Q4	–0,01	–0,016	**–0,026**	38,46%	61,54%	–0,078	–0,072	**–0,15**	52,00%	48,00%
2003Q1	0,027	0,073	**0,1**	27,00%	73,00%	–0,27	–0,23	**–0,5**	54,00%	46,00%
2003Q2	–0,78	–0,62	**–1,4**	55,71%	44,29%	–0,31	–0,44	**–0,75**	41,33%	58,67%
2003Q3	–0,32	–0,73	**–1,05**	30,48%	69,52%	–0,5	–0,3	**–0,8**	62,50%	37,50%
2003Q4	–0,57	–0,23	**–0,8**	71,25%	28,75%	–0,41	–0,24	**–0,65**	63,08%	36,92%
2004Q1	–0,47	–0,38	**–0,85**	55,29%	44,71%	–0,7	–0,3	**–1**	70,00%	30,00%
2004Q2	–0,58	–0,35	**–0,93**	62,37%	37,63%	–0,2	–0,15	**–0,35**	57,14%	42,86%
2004Q3	–0,38	–0,62	**–1**	38,00%	62,00%	–0,45	–0,25	**–0,7**	64,29%	35,71%
2004Q4	–0,21	–0,89	**–1,1**	19,09%	80,91%	–0,9	–0,5	**–1,4**	64,29%	35,71%
2005Q1	–0,9	–0,7	**–1,6**	56,25%	43,75%	–1	–0,95	**–1,95**	51,28%	48,72%
2005Q2	–1	–0,85	**–1,85**	54,05%	45,95%	–0,31	–0,19	**–0,5**	62,00%	38,00%
2005Q3	–0,45	–0,45	**–0,9**	50,00%	50,00%	0,29	0,11	**0,4**	72,50%	27,50%
2005Q4	–0,65	–0,65	**–1,3**	50,00%	50,00%	0,12	0,08	**0,2**	60,00%	40,00%
2006Q1	–0,028	–0,022	**–0,05**	56,00%	44,00%	0,11	0,14	**0,25**	44,00%	56,00%
2006Q2	–0,6	–0,3	**–0,9**	66,67%	33,33%	0,45	0,35	**0,8**	56,25%	43,75%
2006Q3	–0,32	–0,43	**–0,75**	42,67%	57,33%	–0,18	–0,12	**–0,3**	60,00%	40,00%
2006Q4	–0,41	–0,29	**–0,7**	58,57%	41,43%	0,35	0,35	**0,7**	50,00%	50,00%
2007Q1	–0,95	–0,41	**–1,36**	69,85%	30,15%	–0,33	–0,07	**–0,4**	82,50%	17,50%
2007Q2	–0,45	–0,2	**–0,65**	69,23%	30,77%	–0,14	–0,06	**–0,2**	70,00%	30,00%
2007Q3	–0,3	–0,37	**–0,67**	44,78%	55,22%	–0,78	–0,47	**–1,25**	62,40%	37,60%
2007Q4	–0,3	–0,25	**–0,55**	54,55%	45,45%	–0,9	–0,37	**–1,27**	70,87%	29,13%
2008Q1	0,04	0,03	**0,07**	57,14%	42,86%	0,6	0,25	**0,85**	70,59%	29,41%
2008Q2	0,4	0,28	**0,68**	58,82%	41,18%	0,2	0,15	**0,35**	57,14%	42,86%
2008Q3	2	1,8	**3,8**	52,63%	47,37%	1,8	0,6	**2,4**	75,00%	25,00%
2008Q4	2,5	2,3	**4,8**	52,08%	47,92%	3,5	2,2	**5,7**	61,40%	38,60%
2009Q1	1,5	1,75	**3,25**	46,15%	53,85%	2	1,4	**3,4**	58,82%	41,18%
2009Q2	0,8	0,9	**1,7**	47,06%	52,94%	2	1	**3**	66,67%	33,33%
2009Q3	1	0,8	**1,8**	55,56%	44,44%	1,32	1,18	**2,5**	52,80%	47,20%
2009Q4	1	0,4	**1,4**	71,43%	28,57%	1,3	0,9	**2,2**	59,09%	40,91%
2010Q1	0,6	0,5	**1,1**	54,55%	45,45%	0,9	0,8	**1,7**	52,94%	47,06%
2010Q2	0,78	0,62	**1,4**	55,71%	44,29%	1,1	0,7	**1,8**	61,11%	38,89%
2010Q3	0,4	0,5	**0,9**	44,44%	55,56%	0,8	0,4	**1,2**	66,67%	33,33%
2010Q4	0,35	0,35	**0,7**	50,00%	50,00%	0,3	0,2	**0,5**	60,00%	40,00%

CB cont: Conventionnal banks contribution, **IB cont:** Islamic banks contribution

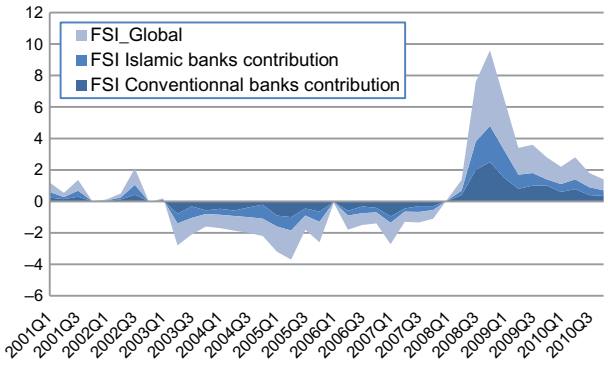

Figure 12. FSI decomposition for NA-TU countries.

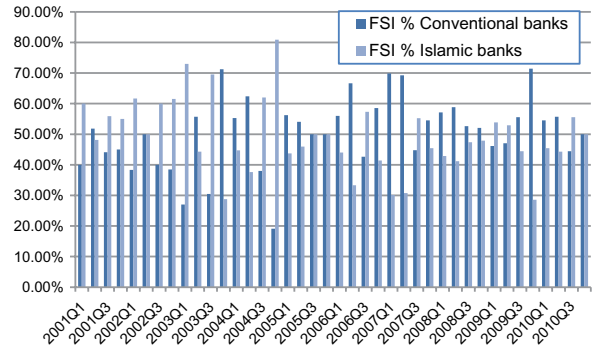

Figure 13. FSI decomposition for NA-TU countries.

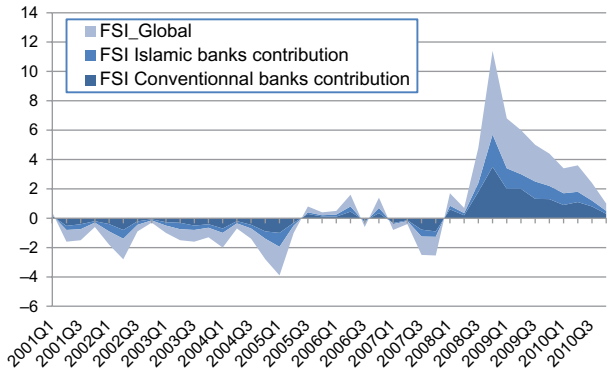

Figure 14. FSI decomposition for GCC countries.

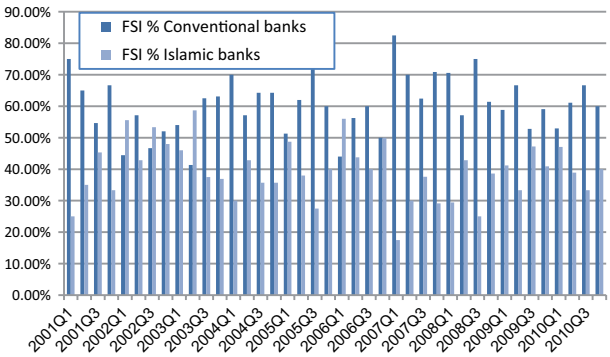

Figure 15. FSI decomposition for GCC countries.

8. Financial stress index decomposition

Table 4 summarizes the estimated decomposition of financial stress derived from the estimated time-varying transition probability with Markov-switching model, comparing the contribution of conventional banks and Islamic banks. The table shows that financial stress in NA countries and Turkey is on the whole fairly divided between conventional banks and Islamic banks and that the situation does not deeply differ for the GCC countries. This means that the Islamic banks are not more competitive against conventional banks in the crises situations. Most of financial stress episodes have a negative effect on both conventional and Islamic banks in critical distress warning signal mainly due to increased financial stress in advanced economies countries.

9. Results discussion

The previous sections have shown that only about third of the episodes of financial stress identified in this paper were followed by economic slowdown. So, we could say that not all financial stress episodes are going to be followed by economic downturns, only the most episodes with high FSI can lead to severe and prolonged downturns.

Banking-related financial stress and economic downturns

An analysis of the episodes suggests that banking system stress tends to be associated with larger output consequences than episodes of pure securities or foreign exchange market stresses, where the banking system remains largely unaffected. Around 75 percent of the episodes of financial stress are banking-related. Moreover all severe economic downturns are preceded by a high banking-related financial stress episodes compared with other types of financial stress episodes. In fact, the difference between banking-related and non-banking-related episodes is significant. Consequently, downturns preceded by banking related stress tend to last longer and are associated with larger average GDP losses than those preceded by different types of financial stress, or indeed no financial stress at all.

Why Islamic banks seem to be vulnerable in some crisis situations identical to conventional banks according to the obtained results?

Islamic hedging products, derivatives, liquidity and risk-management tools are all in their early stages of development. Derivatives are viewed positively given their application to risk mitigation. Moreover, practitioners and

scholars are becoming increasingly open to more aggressive hedging structures.

The last financial crisis has hit banks worldwide, and has driven the industry to diversify their strategies to include key segments such as Islamic bonds, or Sukuk. Sukuk issuance in 2008 dropped 60% from 2007 due to debates over the Shariah-compliance of some types of Sukuk.

Several smaller Islamic financial institutions have reported losses as early as the fourth quarter of 2008. There were a number of reasons for these losses. For one, many banks suffered liquidity shortages, especially Islamic investment banks, which were highly dependent on funding from other banks rather than customer deposits. Moreover, the quality of the financing and investment portfolios declined, leading to write-downs and increased loan provisions.

Since the global financial crisis primarily originated from the sub-prime mortgage portfolio which was spun off into securitized instruments subsequently offered as investments, an immediate assessment of the impact of the crisis on Islamic banks was that they were not affected because Islamic finance is based on and reinforces a close link between financial and productive flows. However, the protracted duration of the crisis have started to impact the functioning of Islamic banks under some financial conditions. Yet despite their strong showing, some analysts warn that Islamic banking, like so many of the financial vehicles that enjoyed soaring popularity over the past decade, is attracting investors with false impressions of lower risk.

With a downturn in the economy in most advanced countries, and an impending global recession, property markets have seen a decline in a number of countries where Islamic financial institutions constitute a significant presence. This carries negative implications for these institutions as a large number of Islamic finance contracts are backed by real estate and property as collateral.

Notwithstanding, the region is expected to suffer less than the more advanced economies in which recession has already set in. The outlook for Islamic finance remains strong, given that, in the face of the turmoil, most conventional financial institutions are also in the process of establishing Islamic windows and Shariah-compliant products to protect their loan portfolio.

10. Conclusions and policy implications

This paper introduces a Financial Stress Index for the MENA region and analyzes how financial stress is framed by both currency crises and banking crises. Furthermore, the FSI offers a wide range of possibilities to separate the impact of banking crises from conventional banks and banking crises from Islamic banks.

Also, the analysis explains some spillover effects and reveals that crises are transmitted mainly from advanced economies to emerging economies. In line with this pattern, the unprecedented spike in financial stress in advanced economies in the third quarter of 2008 had a major effect on emerging economies.

Using the FSI, this paper has empirically investigated a currency-banking crisis and the economic downturns in some MENA countries. Results indicate that the majority of increased financial stress in these countries is attributable to the banking crisis. In addition, results show that the considered North Africa countries and Turkey were less robust and more influenced in comparison with GCC countries in episodes of financial stress and downturns in economic activity in advanced economies.

Estimates of the FSI index are useful in that they can help policymakers determine corrective countercyclical policy measures required for maintaining macroeconomic stability and sustaining economic activity.

Contrary to North Africa countries, the moderate impact of the global financial crisis on the GCC banking sectors has generally demonstrated the soundness of these systems. Notwithstanding the general soundness of GCC banks, our analysis indicates some weaknesses associated with the operational aspects of GCC banks and the characteristics of the GCC economies. These would need to be evaluated and addressed by GCC policy makers.

Notes

1. Turkey is introduced with North African countries in order to supply the sample data with more crises events (mainly 2000–2001 Turkish currency crisis).
2. http://www.bloomberg.com/
3. The capital asset pricing model (CAPM) is used to determine a theoretically appropriate required rate of return of an asset, if that asset is to be added to an already well-diversified portfolio, given that asset's non-diversifiable risk. The model takes into account the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), often represented by the quantity beta (β) in the financial industry, as well as the expected return of the market and the expected return of a theoretical risk-free asset.
4. Where $\nabla = (1 - B)$ is the standard differencing operator and B is the standard backshift (lag) operator, such that $B^{j}_{x_t} = x_{t-j}$, and $\nabla_{x_t} = x_t - x_{t-1}$. Also define the forward shifting operators: $F = B^{-1}$ and $\Delta = (1 - F)$.

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The stability comparison between Islamic banks and conventional banks: Evidence in Indonesia

Gamaginta[1], Rofikoh Rokhim[2]

[1]Graduate School of Banking and Finance, Department of Management, Faculty of Economics, Universitas Indonesia
[2]Lecturer in Banking & Finance, Head of the Management Research Center, Department of Management, Faculty of Economics, Universitas Indonesia

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Abstract - This study aims to determine the stability of Islamic banking as compared with conventional banking in Indonesia. In this case, the level of bank stability is measured individually using an accounting-based bank soundness measurement called the Z-score indicator. Using the parametric statistical t-test, the study shows that the level of stability in Islamic banks versus conventional banks is significantly different. This research uses the sample data of 12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004–2009. The results show that the Islamic banks in general have a lower degree of stability compared to the conventional ones. Some exclusions include the tendency for small Islamic banks to have relatively the same degree of stability as small conventional banks. During the crisis period of 2008–2009, Islamic banks and conventional banks tended to have the same relative degree of stability. Interestingly, the stability of full-fledged Islamic banks (BUS) is lower than Islamic business units (UUS).

Keywords: Islamic Bank, Conventional Bank, Stability, Z-Score, *t-test*

1. Introduction

Islamic banking has grown rapidly both in size and number in many countries around the world (Sundararajan and Errico, 2002). Although the total assets of Islamic banks internationally are still very small compared to the whole world's total banking assets, its growth rate is phenomenal, especially in the Middle East and Southeast Asia (Karwowski, 2009). In some countries, Islamic banking and other forms of Islamic finance have become systemically important, and in many cases they are considered as "too big to be ignored" (Hasan and Dridi, 2010).

In Indonesia, the development of Islamic banking also indicates an impressive growth trend. As an illustration, the data from Bank Indonesia (BI) shows that the total assets held by the national Islamic banking industry had increased by almost 37 times from Rp 1.79 trillion in 2000 to Rp 66.1 trillion by the end of 2009. Asset growth rate recorded 34.2% per year (average annual growth in 2005–2009). For the period of 2007–2008, average growth reached 36.2%, higher than the average growth of regional Islamic banking assets (Southeast Asia), which were only around 30% for the same period (Bank Indonesia, 2009a). For the record, the average annual growth in total assets held by the banking industry was recorded at 14.8% per year, where growth in 2009 only reached 9.7%, which is the lowest growth rate over the last five years.

Along with this strong growth, a broad view of Islamic banking resilience has arisen. Islamic banking is considered as an alternative to banking institutions that are resistant to shocks in macroeconomic conditions or financial market. Based on the data from Bank Indonesia (2002), after the monetary crisis period of 1997–1998, it was claimed that the Islamic banks in Indonesia had a relatively better recovery compared to conventional banking institutions as indicated by the relatively low non-performing financing (NPF) ratio, and there was no occurrence of negative spread in their operations. The data also indicates that Islamic banks were relatively more capable of channeling funds to the production sector with the financing to deposit ratio (FDR) returning to a level over 100%, while conventional banks' loan to deposit ratio (LDR) dropped below 50%.

Throughout the recent global financial crisis, the Islamic banking industry in Indonesia has also demonstrated resilience, evidenced by relatively high growth performance of this industry and a fairly stable level of NPF. However, there are two factors considered "shielding" the Islamic banks from the direct impact of shocks in the global financial

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Table 1. The growth of Islamic banking in Indonesia.

Descriptions	2005		2006		2007		2008		2009		Average growth
	Total	Growth	Total	Growth	Total	Growth	Total	Growth	Total	Growth	
Asset (Rp trillion)	20.9	37.4%	26.7	28.0%	36.5	36.7%	49.6	35.6%	66.1	33.4%	34.2%
Financing (Rp trillion)	15.2	34.8%	20.4	34.2%	27.9	36.7%	38.2	36.7%	46.9	22.8%	33.0%
Third Party Funds (Rp trillion)	15.6	33.2%	20.7	32.6%	28.0	35.5%	36.9	31.6%	52.3	41.8%	35.0%
Profit/Loss (Rp billion)	282	68.9%	389	37.9%	595	53.0%	528	–11.3%	904	71.2%	43.9%
FDR (%)	97.8		98.9		99.8		103.7		89.7		
NPF (%)	2.8		4.8		4.1		4.0		4.0		

Source: Bank Indonesia.

system, i.e., the exposure of Islamic banking financing was still more geared to the domestic economy and, therefore, the level of integration with the global financial system and the sophistication level of transaction was considered low (Bank Indonesia, 2009b).

Despite its severe impact, the global financial crisis has triggered increasing attention, bringing into question the resilience of Islamic banks and their relationship with financial stability. Hasan and Dridi (2010) mentioned that some industry specialists and academics have argued a similar statement as above, but there are others who have argued that some Islamic banks, as well as conventional banks, have relied on leverage and have taken significant risks that make them still vulnerable to the second round effects of the global crisis, for example as happened in highly leveraged countries like the UAE (Dubai) and Qatar.

These arguments reflect a need to better understand the specific characteristics of Islamic banking. Many studies have been developed regarding the inherent risk in Islamic banks but generally discussed from a theoretical point of view (Boumediene and Caby, 2009). Moreover, existing theoretical studies have not provided clear views on whether and how banking aspects of Islamic banks, including their stability, differ from conventional banks (Beck et al., 2010). On the other hand, empirical studies have not been developed as well as theoretical studies.

The first empirical study discussing the topic of Islamic banking stability was performed by Čihák and Hesse (2008), in which the stability of Islamic banks were measured with an insolvency-risk indicator and compared to those of conventional banks. This work becomes an important reference used in many other empirical studies, such as Boumediene and Caby (2009), Hasan and Dridi (2010), Imam and Kpodar (2010), and Beck et al. (2010). It also provides an inspiring framework of how the variables of Islamic banks can be compared with conventional banks.

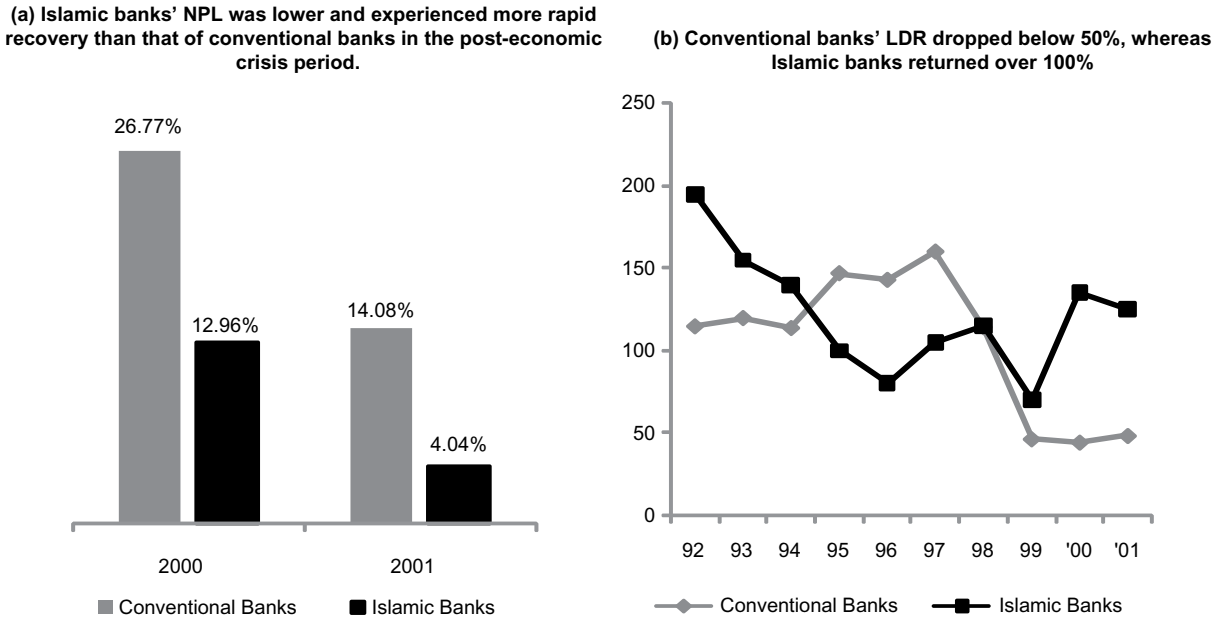


Figure 1. Islamic banking performance in Indonesia 2000–2001.
Source: Bank Indonesia.

Those papers were conducted using cross-country data observation. Some important things should be taken into account related to this methodology. Specifically, cross-country data should have been treated more carefully since every country has its own regional and developmental backgrounds resulting in different definitions of banks (Karwowski, 2009) and different characteristics of the localized banking industry. Moreover, different financial systems that encourage or limit the operation of Islamic banks will also make the data of each country more difficult to compare. Therefore, it is suggested that a cross-country analysis should take appropriate control for heterogeneity across countries to gain reliable conclusions about financial stability and the resilience of the Islamic banking sector (Hasan and Dridi, 2010).

This paper aims to explore the stability of Islamic banks and their comparison with conventional banks in Indonesia. Different from the cross-country studies, this study will focus on the country-level data of Indonesia's banking industry. With this paper, we hope it can be a useful comparison for the existing cross-country studies on Islamic bank stability, and generally, to provide additional insights to the emerging literature of Islamic banking.

The level of bank stability is measured individually using the Z-score indicator, an accounting-based bank soundness measurement. We use the Z-score indicator because the only available data of Islamic banks are in the form of financial statement as no Islamic banks are listed on the stock market. Furthermore, to determine whether the level of stability comparison between Islamic banks and conventional banks is significantly different or not, the parametric statistical *t-test* is applied.

The sample data used in this study covers 12 Islamic banks and 71 conventional banks in Indonesia during the period of 2004–2009. The results show that the Islamic banks in general have a lower degree of stability compared to that of the conventional ones. Some exclusion includes the tendency that small Islamic banks relatively have the same degree of stability with small conventional banks. During the crisis in 2008–2009, Islamic banks and conventional banks tended to have the same relative degree of stability.

While the empirical study conducted by Čihák and Hesse (2008) only focused on full-fledged Islamic banks' financial data, this paper makes an attempt to examine the stability of Islamic business units opened by conventional banks. The result suggests that the stability of full-fledged Islamic banks (BUS) is lower than that of Islamic bank business units (UUS). However, some notes should be considered and will be discussed later in Section IV and V.

The rest of the paper will be structured as follows: Section II provides a review of the literatures related to the topic of Islamic bank characteristics and their relationship with bank stability. Section III and IV presents the evaluation methodology and the data used in this paper, respectively. Section V explains the findings resulting from the evaluation, and section VI contains the conclusions, as well as some suggestions for further studies.

2. Literature review

After the period of global financial crisis, the issue of monitoring to the overall soundness and stability of the financial system becomes more prominent, not least also to the Islamic banking industry. With the existence of several characteristics that are different from conventional banking, understanding the behavior of Islamic banks, especially related to the stability of the banking system, should be given more attention.

One basic difference in the operation is that the conventional bank intermediation is generally based on debt and allow the "transfer of risk", while Islamic banks are more likely asset-based and focused on "risk sharing" (Hasan and Dridi, 2010), or widely known as "profit and loss sharing principle." In addition, Islamic law also prohibits Islamic banking from practicing transactions that are speculative, including such instruments that have triggered the recent global financial crisis.

The principle of profit and loss sharing in the literature of Islamic law and economics is seen as the most ideal base from the entire financial transaction. But in practice, the evidence indicates that most financing transactions provided by Islamic banks are not in the form of profit and loss sharing principles (see eg., Aggarwal and Yousef, 2000; Chong and Liu, 2009; Dar and Presley, 2000; Kaleem and Isa, 2003). The results of empirical studies by Beck et al. (2010) also conclude that the differences between Islamic and conventional banks are smaller than often assumed, but there are certain regulatory and supervisory challenges for countries facing the increasing entry of Islamic banks.

According to Solé (2007), understanding the Islamic banking from the perspective of financial stability is important, at least for two reasons. First, Islamic banks may become systemically relevant as they grow and increasingly interact with conventional banks that are systemically important. Second, the lack of Islamic instruments for hedging results in this concentration presents risks in a small number of institutions. In many articles, it has been widely argued that Islamic banking has special characteristics that must be recognized and disclosed for the implementation of effective banking supervision (Errico and Farahbakh, 1998), and to develop an optimal operation of Islamic banking in accordance with their characteristics (Bank Indonesia, 2002).

Studies that directly examine the behavior of Islamic banks from the perspective of the banking system stability were pioneered by Čihák and Hesse (2008). They measured the stability of Islamic banks compared to conventional banks in 18 countries with significant Islamic banking industries over the period of 1993–2004. In this study, Čihák and Hesse (2008) found that small Islamic banks tend to be more stable than small conventional banks. On the contrary, large conventional banks tend to be more stable than large Islamic banks, and small Islamic banks are more stable than large Islamic banks, reflecting the greater credit risk management challenges in large Islamic banks. It is also found that the increasing market share of Islamic banks does not have a significant influence on the stability of other banks.

Another study on this topic was conducted by Boumediene and Caby (2009), observing the stock return of Islamic banks and conventional ones during the subprime crisis in 2007. The results showed that in the period of crisis, the return volatility of Islamic banks is relatively lower than that of the conventional banks, indicating that Islamic banks are more resistant than conventional banks. This does not conclude that Islamic banks are protected from various risks, but does show different risk characteristics than conventional banks necessitating a better understanding and more precise risk management.

Hasan and Dridi (2010) conducted a study to determine the impact of the global financial crisis on the performance of Islamic banks compared with the conventional banks. By using the banking data in Bahrain, Jordan, Kuwait, Malaysia, Qatar, Saudi Arabia, Turkey, and the UAE, the results show that Islamic banks experienced a significant decline in profitability during the global financial crisis period, although on average still relatively similar to conventional bank profitability. In terms of assets and loans, Islamic banks showed much higher growth in the times of crisis and the assessment of external rating agencies indicates relatively stable ratings for Islamic banks.

Associated with the global market competition, Turk-Ariss (2010a) found that Islamic banking is less competitive compared to conventional banking, and while the bank profitability increases significantly in the presence of market power, this does not guarantee a higher level of profitability for Islamic banks. The data observation of this study also indicates that the Islamic banks allocate a larger share of their assets to financing compared to conventional banks, along with their capital ratios. Beck et al. (2010) concludes the same result – that conventional banks operating in countries with a higher market share of Islamic banks are more cost-effective but less stable. They also found consistent evidence that higher capitalization of Islamic banks plus higher liquidity reserves explain the relatively better performance of Islamic banks during the recent crisis.

According to Imam and Kpodar (2010), the finding of Čihák and Hesse (2008), which states that Islamic banks tend to be less stable when operating at large scale, shows that under certain conditions, the growing Islamic banking sector may not be beneficial for economic growth because it can weaken financial stability, especially in countries with lack of prudential regulations. Moreover, Imam and Kpodar (2010) argue that Islamic banking is considered more of a complement to the existing conventional banking, and thereby helpful in diversifying systemic risk.

From the above description, the understanding of whether and how the stability of Islamic banks differs from conventional banks has still not resulted in convergent views. Turk-Ariss (2010a) suggested that further studies are needed to examine whether Islamic banks have a role in contributing to overall financial stability. This becomes an interesting phenomenon to observe and also provides opportunities for future research. It is also important to explore the differences that may exist between full-fledged Islamic banks and Islamic business units in the Islamic banking industry.

Evaluation methodology

According to Borio and Drehmann (2009), the measurement of stability has a distinctive role in the operational framework of the financial system stability to help ensure the accountability of the authorities in charge and to support the implementation of the chosen strategy to achieve the goal in real-time.

Measurements as an instrument of monitoring vary both in methods and indicators being used. Related to the measurement of individual financial institution stability, the existing literature generally classifies financial institutions based on the level of bank soundness, using various financial ratios and other indicators (Čihák, 2007). Banking soundness is a major concern in systemic stability, considering that the banking sector is still the root of the financial services industry in many countries and financial centers because of the large financial transactions through this sector (Sundararajan and Errico, 2002).

In this study, the level of bank stability is measured using the indicator of individual bank soundness, called the Z-score. In the literature of Islamic banking, this indicator is first used empirically by Čihák and Hesse (2008) but also had been discussed theoretically in a study by Mirakhor (1987). The main consideration in the use of this indicator is due to the data of Islamic banks in Indonesia, which are available only in the form of accounting data from bank financial statements. The Islamic banking market data are not available, since there is no Islamic bank whose stocks are publicly traded.[1] In addition, up to this time, the Z-score as an indicator of the bank stability is widely used in studies, among others, such as De Nicolo et al. (2003), Boyd et al. (2006), Yeyati and Micco (2007), Hesse and Čihák (2007), Čihák and Hesse (2008), Berger et al. (2008), Uhde and Heimeshoff (2009), Demirgüç-Kunt and Detragiache (2009), Čihák et al. (2009), Turk-Ariss (2010b), Beck et al. (2010), etc.

In many articles, the use of the Z-score indicator for the purpose of measuring the bank stability refers to Boyd and Runkle (1993) (see eg. Hesse and Čihák, 2007; Čihák and Hesse, 2008; Demirgüç-Kunt and Detragiache, 2009). It was also raised in the study of Boyd and Graham (1986) and rooted to the article by Roy (1952). The measurement of Z-score is used to indicate the probability of bank failure (Berger et al., 2008) or more specifically to represent the bank insolvency risk, which is defined as the probability that losses (negative profits) exceed equity (De Nicolo, 2000) that forces banks to default (Yeyati and Micco, 2007). The definition of Z-score (refers to Yeyati and Micco, 2007) and is as follows:

$$P\left(\mathrm{ROA}_{it} \le -\frac{\mathrm{EQ}_{it}}{\mathrm{A}_{it}}\right) \le \frac{\sigma^2_{\mathrm{ROA}\,it}}{\left(\mu_{\mathrm{ROA}\,it} + \frac{\mathrm{EQ}_{it}}{\mathrm{A}_{it}}\right)^2} \equiv \frac{1}{\mathrm{Z}^2_{it}} \qquad (1)$$

The value of Z in the above equation corresponds with the upper bound of insolvency risk (De Nicolo, 2000). With the assumption that the ROA_{it} is normally distributed, Boyd and Graham (1986) define Z-Score as an indicator of the probability of bank default. But even if ROA_{it} is not normally distributed, Z is the lower bound on the probability of default

(by Chebyshev's inequality) so that a higher value of Z-score implies a lower probability of insolvency (Čihák, 2007).

Based on the above explanation, the Z-score Z_{it} is calculated with the following equation:

$$Z_{it} = \frac{\mu_{ROA\,it} + EQ_{it}/A_{it}}{\sigma_{ROA\,it}} \quad (2)$$

where Z_{it} is a proxy variable for the probability of insolvency of the bank i at time t, ROA_{it} is the ratio of return on assets of bank i at time t. EQ_{it}/A_{it} is the amount of equity to assets ratio of bank i at time t, and μ_{ROAit} is the rate of return on assets of of bank i at time t, and σ_{ROAit} is the estimated standard deviation of the rate of return on assets as a proxy for return volatility, which are all calculated based on accounting data (Boyd et al., 2006). According to Yeyati and Micco (2007), a smaller Z-score (a greater risk exposure) can be associated with narrower returns (for example, because of larger inefficiencies or reduced market power), a larger return volatility (due to poorer diversification or a less conservative investment option), or a higher level of leverage (due to lower capitalization).

In the cross-sectional analysis, the use of Z-score measurement can be directly implemented. However, if the analysis also includes the time-varying behavior, then μ_{ROAit} and σ_{ROAit} are the moments of the ROA_{it} distribution, which must be estimated in the Z-score calculation. The first alternative, μ_{ROAit} and σ_{ROAit} are estimated from the total available sample data, and the second alternative, the two moments are estimated using rolling windows $[t - n, t]$ with n as a certain time period. The second alternative is the approach widely used in many studies (see eg. Yeyati and Micco, 2007; Demirgüç-Kunt and Detragiache, 2009).

The use of rolling windows $[t - n, t]$ is generally tailored to the availability of existing data. For example, Yeyati and Micco (2007) used a three-year period of rolling windows with a frequency of 12 quarterly data, whereas Demirgüç-Kunt and Detragiache (2009) used rolling windows $[t - 4, t]$ with annual frequency sample data. However, the determination of the optimal rolling windows period for the Z-score measurement so far has not been concluded.

In this study, we chose the period of rolling the windows at one last year or four quarters prior to period t is $[t - 4, t]$ with the following consideration:

1. Banking revenues in Indonesia are generally dominated by the expansion of lending activity and also influenced by the loan quality. It is assumed that in the maximum period of one year, the bank has determined steps towards the settlement of non-performing loans, whether to restructure or write-off (if the reserve is adequate) causing distress on bank earnings that can affect the level of individual bank stability significantly.
2. The bank financial report is published quarterly with each reporting being compared to that achieved in the same period of the previous year.

Another factor that may affect the measurement of Z-score is the calculation reference for ROA_{it}. For the consistency of the measurement, ROA_{it} is defined as annualized earnings before tax divided by average total assets. This refers to the calculation used in the Indonesian Banking Statistics published by Bank Indonesia.

$$ROA_{it}\ on\ year\ k = \frac{Profit\ of\ Bank\ i\ at\ month\ n \times 12/n}{Total\ Asset\ Average\ of\ Bank\ i\ [1\ \&\ n]} \quad (3)$$

The calculation of leverage ratio EQ_{it}/A_{it} is presented in the following equation:

$$EQ_{it}/A_{it}\ on\ year\ k = \frac{Equity\ of\ Bank\ i\ at\ month - n}{Total\ Asset\ of\ Bank\ i\ at\ month - n} \quad (4)$$

where $k = 2004, 2005, ..., 2009$
$n = 1, 2, ..., 12$ on year k

In general, the stages of Z-score measurement are presented in Figure 2.

According to Čihák (2007), the Z-score as an accounting-based indicator has some limitations, as this indicator is highly dependent on the quality of accounting and auditing frameworks that underly it. In addition, the Z-score has not covered the factor of contagion among institutions within the system and is considered backward-looking.

However, Čihák (2007) also states that this indicator has the advantage that it can be used for institutions where more sophisticated market data are not available. With the Z-score, the risk of default in different groups of institutions can also be compared. Demirgüç-Kunt and Detragiache

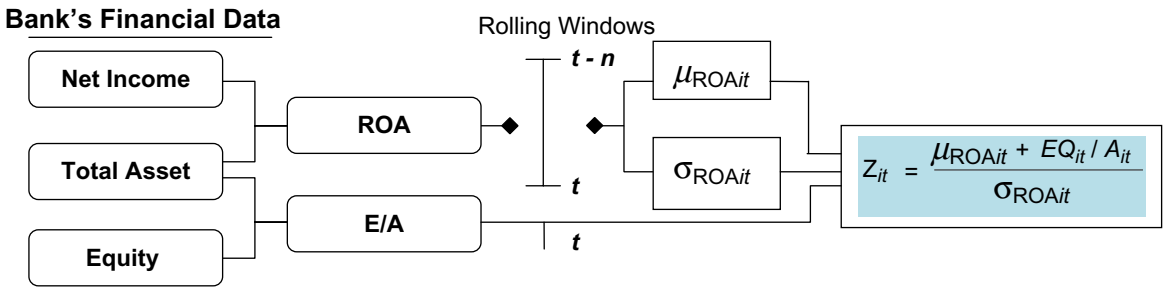


Figure 2. The measurement stages of Z-score.

Table 2. The number of banks in Indonesia.

Bank groups	Dec 2004	Dec 2005	Dec 2006	Dec 2007	Dec 2008	Dec 2009
Commercial (all) Banks	133	131	130	130	124	121
Conventional Banks	130	128	127	127	119	115
Full-Fledged Islamic Banks (BUS)	3	3	3	3	5	6
Islamic Business Unit (UUS)	15	19	20	26	27	25

Source: Bank Indonesia.

(2009) argue that this measure is the improvement of the measures used in the previous studies, such as the ratio of NPL, loan spread, interest margin, and capital adequacy, especially for cross-country studies because each country has different reporting requirements and other specific factors such as market structure, differences in risk-free interest rates and operating expenses, as well as regulatory capital. Other advantages of using this indicator to present the level of bank stability were listed in Čihák et al. (2009).

3. Data

This study focuses on the banking industry in Indonesia within the observation period of 2004–2009. The number of commercial banks as of December 2009 was 121 commercial banks, including 6 full-fledged Islamic banks (BUS) and 25 Islamic business units (UUS), which are treated equally as individual banks separated from their holding. This is a development from the study by Čihák and Hesse (2008), which focuses only on the data of fully operated Islamic banks.

However, not all groups of banks are included in the analysis. The regional development banks (BPD) are removed from the observation given the BPD operations are more regional (province) oriented. This observation is also limited only to banks with the total asset greater than Rp 1 trillion[2] in the position as of December 2009. This is intended to conform to the minimum capital requirements of BUS and the significance with the total banking assets in Indonesia (an asset value of Rp 1 trillion is equivalent with 0.4% of the total banking assets).

The sample period of 2004–2009 is intended to cover some of the condition of distress; those are the mini crisis in 2005 due to an increase in fuel prices and the global financial crisis in 2008. There are also changes in bank population (see Appendix 1). The observation period begins from 2004 to consider the market share of Islamic banking that has surpassed 1% of the total banking assets in Indonesia.

The financial data used in this study are obtained from the unaudited quarterly financial reports of banks available on Bank Indonesia's official website, the financial statements published on the bank's official websites and the Indonesia Stock Exchange (IDX), as well as from the research data collected by Dwitamia (2009).

Čihák and Hesse (2008) found that with the bank size (total assets) increasing, the level of stability tends to increase in the group of large banks (with assets of over US$ 1 billion), but the level of stability will tend to decrease in the group of small banks (with assets below US$ 1 billion). Therefore, to determine the effect of bank size more specifically, the data of banks will be grouped into two groups – small banks with total assets less than Rp 10 trillion and large banks with total assets more than Rp 10 trillion. As of December 2009, there are only two BUS (Bank Syariah Mandiri and Bank Muamalat Indonesia) whose assets are more than Rp 10 trillion. Their combined assets reached Rp 38.10 trillion, or 57.65% of the total assets of Islamic banking, so this is considered adequately to represent the comparison between groups of large banks and small banks.

With the predetermined restrictions, as many as 83 samples are obtained, including 71 conventional banks and 12 Islamic banks, which consist of 5 BUS and 7 UUS. Based on the total assets, the availability of conventional commercial banks sample data reaches an average of 85.78% of the total assets of commercial banks in the observation period, while the availability of Islamic banks sample data covers an average of 93.11% of the total assets of Islamic banks during the observation period (see Appendix 2).

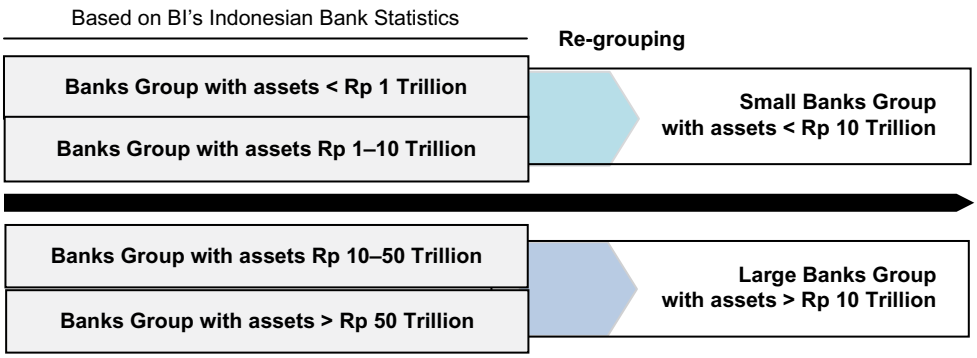


Figure 3. Bank grouping based on total assets.

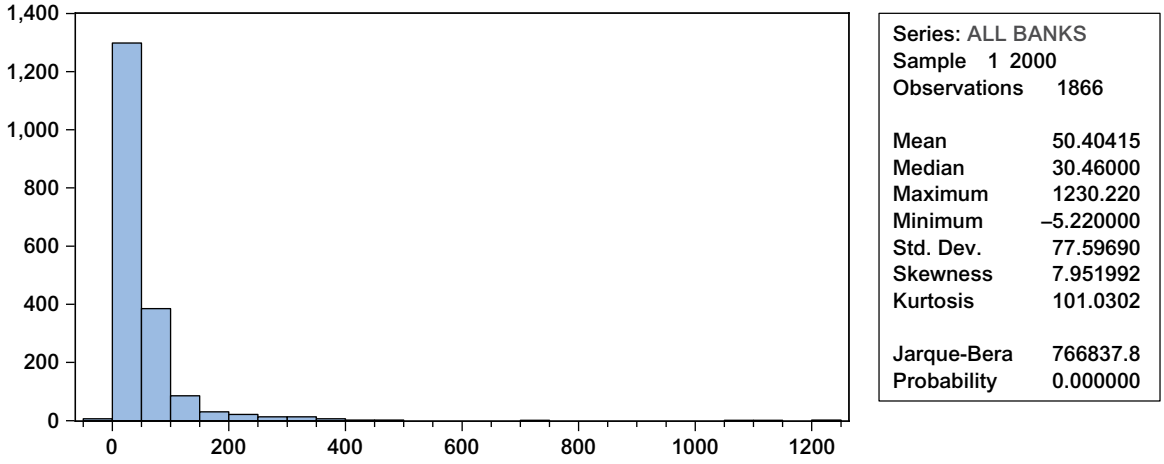


Figure 4. The descriptive statistic of the Z-score measurement (all sample).
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

Regarding the equity portion of UUS, Bank Indonesia regulation states that the share capital of UUS is not an authorized paid-in capital but only the working capital that the holding conventional banks must set aside in the form of cash and maintain at a minimum of Rp 100 billion. But for this study, this working capital will be calculated as a part of UUS's equity besides the current earnings.

4. Findings

The results of Z-score measurement of the overall sample of individual banks within the group of Islamic banks and conventional banks for the observation period of 2004–2009 are presented in the following Figure 4.

The Z-scores of the overall observation data show a high level of variability ranging from –5.22 to 1230.22. Large standard deviation and the median higher than the mean of the sample indicate that there are some data with relatively extreme values of Z-scores. The results of Z-score measurements for each group of banks can be found in Table 3.

It can be seen that in the sample of all banks, the Z-score of Islamic banks tends to be lower than the Z-score value of conventional banks, in terms of mean and median. This also applies to groups of large banks and small banks. If the measurement results between groups are compared, the large Islamic banks show a mean Z-score that tends to be lower than the small Islamic banks, while the median is larger.

On the other side, the large conventional banks show the Z-score value that tends to be higher than the small conventional banks in terms of mean and median, where the maximum value of Z-score is more extreme in the group of large conventional banks and the minimum value of Z-score is more extreme in the group of small conventional banks. Overall, the large conventional banks show the highest mean value of Z-score, while that of the large Islamic banks is the lowest.

Table 3. The descriptive statistics of the Z-score measurement (between bank groups).

	All banks		Large banks		Small banks	
Bank sample	**Islamic**	**Conv.**	**Islamic**	**Conv.**	**Islamic**	**Conv.**
Mean	39.213	51.877	33.288	57.341	40.897	47.472
Median	22.160	31.830	22.214	32.489	21.933	30.869
Maximum	317.430	1230.220	133.655	1230.218	317.429	712.044
Minimum	0.170	–5.220	6.456	1.192	0.166	–5.219
Std. Dev.	51.321	80.313	29.115	101.218	56.004	57.926
Skewness	2.930	7.984	2.122	7.810	2.752	4.420
Kurtosis	12.802	98.822	6.781	81.940	11.179	33.235
Jarque-Bera	1179.21	648385.7	64.63272	198581	684.4575	37749.13
Probability	0	0	0	0	0	0
Sum	8509.32	85544.83	1597.811	42202.93	6911.513	43341.85
Sum Sq. Dev.	568916.4	10630018	39840.06	7530202	526917.4	3060127
Observations	217	1649	48	736	169	913

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

The measurement of Z-score is formed by the components of profitability ratios ROA as the proxy of the bank return, equity (leverage) ratio E/A as the proxy of the financial buffer and standard deviation of ROA to indicate the return volatility. This is shown in Table 4 below. It can be seen that in the sample of all banks, although a relatively lower return of Islamic banks can be covered with a higher level of equity compared with the conventional banks, the return of Islamic banks is more volatile. This results in the Z-score value of the Islamic banks that is lower than that of the conventional banks. The same trend can be seen in the group of small banks. While in the group of large banks, the lower Z-score of Islamic banks compared to that of the conventional banks is mainly due to the return and the equity of Islamic banks that are lower than those of conventional banks, although the Islamic banks show a better return volatility.

Table 4 also shows that ROA has skewed and extremely heavy-tailed distribution of the observed data so it cannot be considered as normally distributed. But, as we have discussed before in Section 3, even if ROA_{it} is not normally distributed, Z is the lower bound on the probability of default so that a higher value Z-score represents a lower probability of insolvency (Čihák, 2007) and can be used as comparison between groups of data. For other purposes of study, such as econometrical study, the data should be transformed into other forms, such as logarithm, square root or inverse (please see page 25).

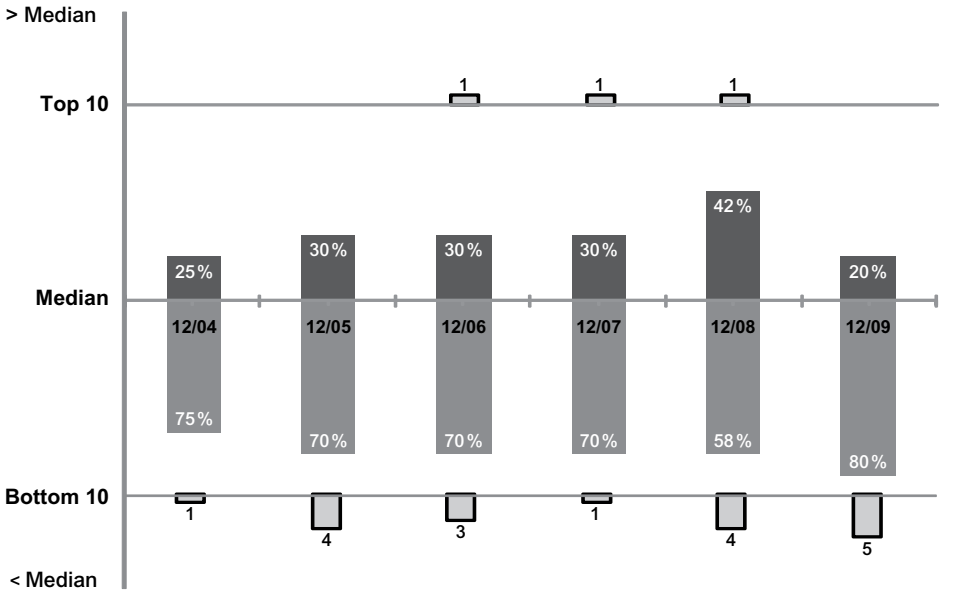
By using the bank data sample, the position of the stability of each Islamic bank compared to that of conventional banks in each period can be obtained, as shown in Figure 5 below. It can be seen that in each period, the majority of Islamic banks in the observation have a value of Z-score below the median of the overall sample. In the period of 2005–2006 and the period of 2008–2009, there are many Islamic banks located in the bottom 10 groups based on the Z-score value. Conversely, there is only one Islamic bank positioned in the top 10 groups, and only in the period of 2006–2008. Given the mini-crisis in 2005 and the global financial crisis in 2008, the results obtained show several trends suitability. But whether or not there is a tendency that the financial distress may impact on the decreasing level of stability of Islamic banks in Indonesia, this needs further study. The details of the position of each bank in the sample based on the level of stability can be seen in Appendix 3.

In general, the results of Z-score measurement in the sample groups of conventional banks and Islamic banks are presented on the trends graph of the average Z-score in Figure 6. It is shown that in general the stability of conventional banks and Islamic banks as shown by the Z-score indicators shows similar trends. At each time point in the observation period, the stability of Islamic banks is generally lower than that of conventional banks, except at some point – i.e., the first and second quarters of 2006, the third quarter of 2008, and the first and second quarters of 2009. When compared with economic conditions and trends as shown by the Financial Stability Index measured by Bank Indonesia (see Appendix 4), the trend of the average value of Z-score is quite appropriate. In the period of a mini crisis in 2005 the Z-score shows a relatively low value, indicating that the level of bank stability decreases.

Table 4. The descriptive statistic of the Z-score components.

		All banks		Large banks		Small banks	
Data sample		**Islamic**	**Conv.**	**Islamic**	**Conv.**	**Islamic**	**Conv.**
ROA	Mean	0.004	0.024	0.021	0.028	–0.002	0.022
	Median	0.014	0.020	0.021	0.024	0.010	0.016
	Maximum	0.074	0.222	0.033	0.222	0.074	0.192
	Minimum	–0.447	–0.619	0.005	–0.069	–0.447	–0.619
	Std. Dev.	0.055	0.033	0.007	0.021	0.061	0.040
	Skewness	–4.986	–5.531	–0.679	2.663	–4.396	–5.901
	Kurtosis	31.123	108.140	0.083	18.593	24.061	89.083
E/A	Mean	0.264	0.168	0.082	0.136	0.316	0.194
	Median	0.228	0.121	0.079	0.112	0.278	0.137
	Maximum	0.895	1.079	0.120	0.689	0.895	1.079
	Minimum	0.003	–0.745	0.056	0.036	0.003	–0.745
	Std. Dev.	0.197	0.138	0.015	0.085	0.194	0.165
	Skewness	1.166	2.549	0.797	2.877	0.984	2.048
	Kurtosis	0.854	10.745	0.175	10.968	0.540	7.207
STDEV	Mean	0.022	0.010	0.005	0.008	0.027	0.011
ROA	Median	0.008	0.005	0.005	0.005	0.010	0.005
	Maximum	0.204	0.297	0.011	0.094	0.204	0.297
	Minimum	0.001	0.000	0.001	0.000	0.001	0.000
	Std. Dev.	0.037	0.021	0.002	0.012	0.040	0.026
	Skewness	2.891	8.617	0.638	4.260	2.475	7.754
	Kurtosis	7.995	99.302	0.635	21.744	5.480	73.498

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.



DATA OBSERVATION	12/04	12/05	12/06	12/07	12/08	12/09
TOTAL BANKS	79	80	78	79	78	76
ISLAMIC BANKS	8	10	10	10	12	10

Figure 5. The Islamic bank position of stability (based on median of all samples).
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

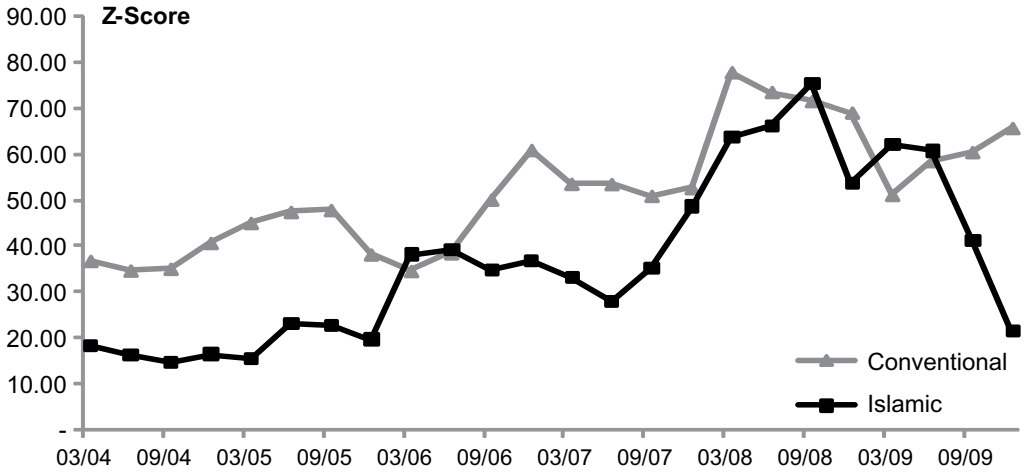


Figure 6. The average Z-score of the conventional banks and Islamic banks, 2004–2009.
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

In the subsequent period, the Z-score shows an increasing trend. This indicates a steady improvement of stability until a peak in the year 2008, when the global financial crisis emerged. The Z-scores tend to decrease. Figure 6 also shows that the average value of Z-score in the crisis period of 2008–2009 is still higher than that in the mini-crisis period of 2005. This indicates that banks in Indonesia have a better level of resilience facing the distress conditions.

The average trend of rate of return (ROA) and the bank's equity (E/A) as the Z-score components is presented in the graph in Figure 7 below. The trend in the average return of Islamic banks shows a generally lower value than those of conventional banks, while the average equity ratio of Islamic banks is higher (except in the fourth quarter of 2009). This is consistent with the results from the descriptive statistics in Table 5.

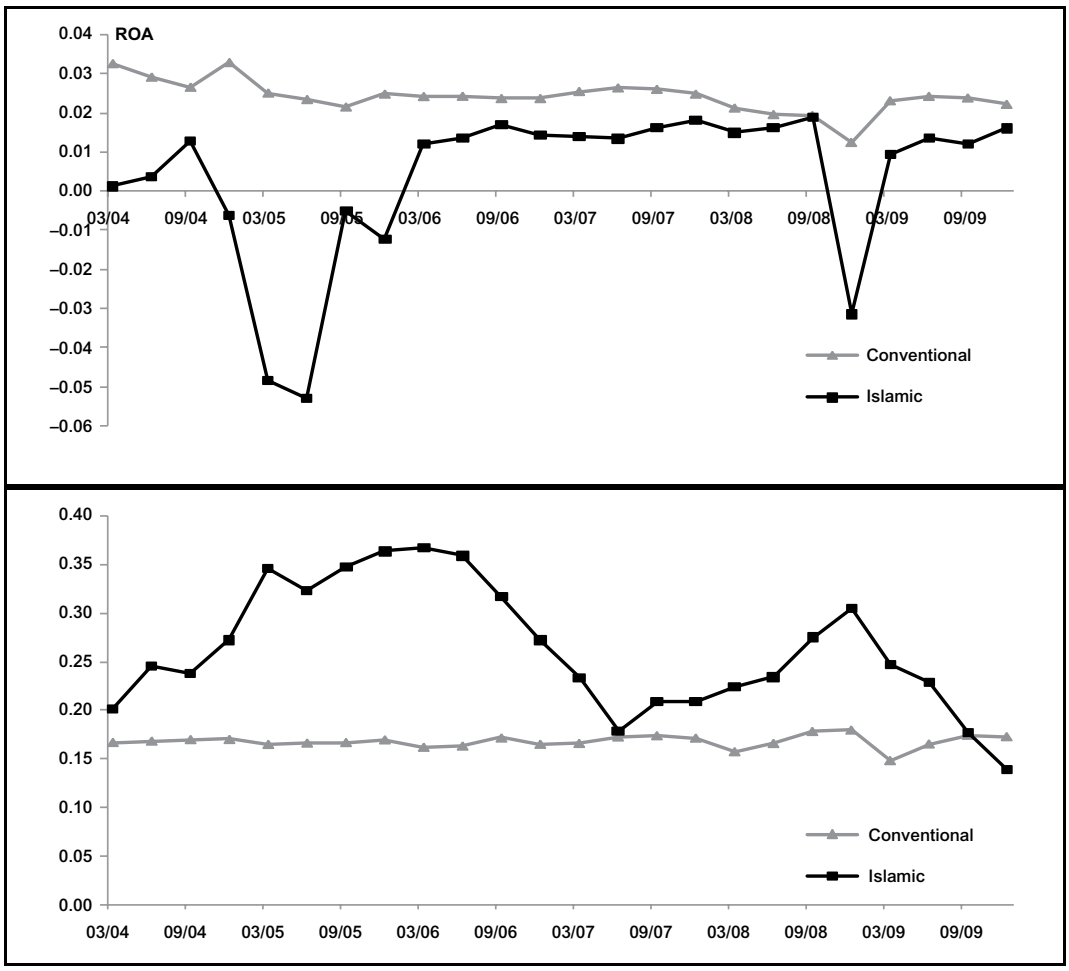


Figure 7. The average ROA and E/A of the conventional banks and Islamic banks, 2004–2009.
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

In addition, the trend of the ROA of Islamic banks shows relatively higher volatility. Even in the fourth quarter of 2004 until the fourth quarter of 2005 and in the fourth quarter of 2008 Islamic banks show a negative value of ROA. In the period of 2004–2005, there were several newly established Islamic banks, such as UUS, BTN, UUS, Bank Niaga, and UUS Bank Permata, whose income levels had not been able to accommodate the bank costs incurred. In 2008, some Islamic banks experienced the organizational changes. For example UUS, BRI, and UUS Bukopin spinned-off from their holdings int BUS – thereafter UUS Bank Niaga and UUS Bank Permata were established. In the process of changes, some problems that previously existed, such as non-performing loans, were solved with the imposition of loan losses. These things impact the achievement level of the return of Islamic banks as a whole.

Another thing shown in Figure 7 is that in facing the fluctuations of the level of return, Islamic banks seem to take a strategy to strengthen the capital equity as a financial buffer when the level of return is under pressure. On the contrary, at the time of relatively stable condition, Islamic banks loosen its equity level. Meanwhile, the average ROA trend of conventional banks tends to be stable, where the level of equity is also kept stable, except at the end of 2008, there is a slight decrease.

As a development from the study of Čihák and Hesse (2008), we also conducted measurements to guauge the level of stability within the Islamic banking industry, comparing it to the stability of BUS and UUS. In general, BUS has a different capital structure compared to UUS. Based on the regulation of Bank Indonesia, the minimum share capital of BUS establishment is Rp 1 trillion. Meanwhile, UUS capital is not formed by an authorized paid-in capital – only the working capital that the holding conventional banks must set aside in the form of cash, maintaining a minimum of Rp 100 billion so that the overall financial position and activities of UUS are consolidated in the holding. But in this study, a UUS is positioned as a commercial bank with a separate activity from its holding.

The Z-score measurement results of a sample of BUS and UUS are presented in Table 5. It can be seen that in the sample of Islamic banks, the Z-score of BUS tends to be

Table 5. The descriptive statistic of the Z-score measurement (Islamic bank group sample).

	Z-score		ROA		E/A		STDEV ROA	
Islamic bank sample	**BUS**	**UUS**	**BUS**	**UUS**	**BUS**	**UUS**	**BUS**	**UUS**
Mean	24.119	48.028	0.019	–0.005	0.110	0.354	0.012	0.028
Median	17.125	26.390	0.021	0.009	0.081	0.309	0.006	0.010
Maximum	133.650	317.430	0.056	0.074	0.895	0.883	0.103	0.204
Minimum	2.450	0.170	–0.099	–0.447	0.056	0.003	0.001	0.001
Std. Dev.	25.485	59.947	0.021	0.066	0.100	0.184	0.017	0.044
Skewness	2.645	2.449	–2.762	–4.214	6.380	0.877	3.619	2.333
Kurtosis	10.223	9.258	13.816	21.164	48.355	0.335	14.420	4.529
Jarque-Bera	267.1647	360.559						
Probability	0	0						
Sum	1929.49	6579.83						
Sum Sq. Dev.	51310.73	488733.1						
Observations	80	137	80	137	80	137	80	137

Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

lower than the Z-score of UUS, both in terms of mean and median, where higher variability of the data contained in the UUS sample with the minimum and maximum values is more extreme. This relatively lower Z-score of BUS is contributed to mainly by the E/A of BUS, which is smaller than that of UUS, although the ROA of BUS tends to be larger and has better volatility compared to that of UUS. However, it should be noted that the level of UUS equity is larger because the measurement of E/A ratio includes the other liability account in the balance sheet of UUS as an equity component in addition to current profits.

The mean of ROA is small and even negative for UUS. As noted previously, this is because in the observation period, several Islamic banks have experienced organizational dynamics such as the conversion type of business or the business activity is in the early stage of operations, where the bank cost is still not covered by the level of income earned. This has led to a pressure on the profitability of Islamic banks.

Figure 8 shows that in the period of 2004–2005, the average Z-score trend of BUS demonstrates values and movements that are relatively similar to those of UUS. But subsequently, the average Z-score of UUS continued to increase significantly until 2008 and then declined drastically in 2009. Although the average Z-score of BUS is generally lower in the whole period, the variability shows a more stable trend. This is in accordance with the relatively lower Z-score standard deviation of BUS compared with those of UUS as shown in Table 6.

While the trend of the average of ROA and E/A ratio of Islamic banks is plotted in Figure 9. It can be seen that the trend of the ROA and E/A average ratio of UUS is more volatile than those of BUS. In general, the ROA of UUS tends to be lower but the E/A ratio is higher. This trend of ROA and E/A average ratio of Islamic banks confirms the results of the descriptive statistics and the previous explanations.

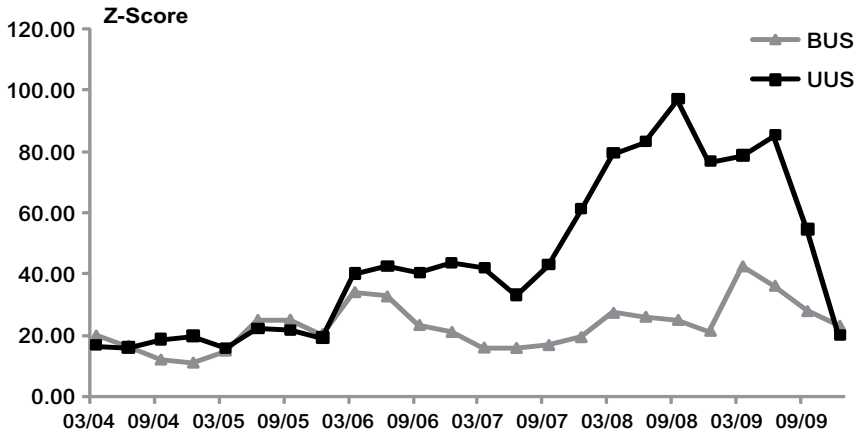


Figure 8. The average Z-score of BUS and UUS, 2004–2009.
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

Table 6. The statistical *t-test* result summary, 2004–2009.
(The average of all data based on the grouping)

	All banks			Large banks			Small banks		
Indicators	**μConvn.**	**μSyariah**	**σ^2**	**μConvn.**	**μSyariah**	**σ^2**	**μConvn.**	**μSyariah**	**σ^2**
Z-Score	51,878	39,213*	=	57,341	33,288*	≠	47,472	40,896	=
ROA	0,024	0,004*	≠	0,028	0,021*	≠	0,022	0,001*	≠
E/A	0,168	0,264*	≠	0,136	0,082*	≠	0,194	0,316*	≠
STDEV ROA	0,010	0,022*	≠	0,008	0,005*	≠	0,011	0,027*	≠
Z-Score, 1–99 pctl #	46,819	36,995*	=	48,954	33,288*	≠	44,085	38,067	=
Z-Score, 2004–2005	40,790	18,840*	≠						
Z-Score, 2006–2007	49,384	36,792*	=						
Z-Score, 2008–2009	66,206	55,668	=						

Notes:
* Significant at $\alpha = 5\%$.
σ^2 Variance between groups is the same (=) or not the same (≠).
As an effort to reduce the influence of any outliers, the sample data which is under the 1st percentile and above the 99th percentile are removed from the observation, such as conducted by Čihák and Hesse (2008).
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

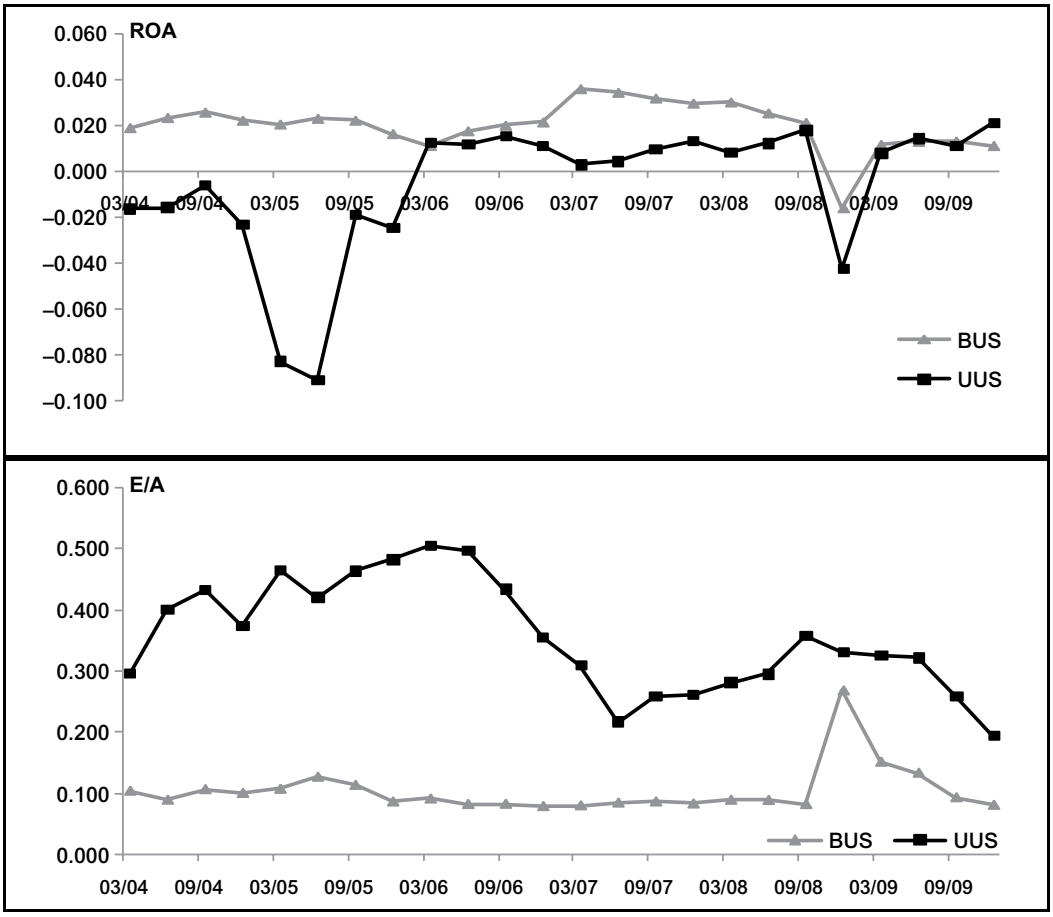


Figure 9. The average ROA and E/A of BUS and UUS, 2004–2009.
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

Furthermore, to determine whether the Z-score measurement results and their components have significant differences, the parametric statistical *t-tests* will be conducted with the consideration that the data are in the form of ratio and the number of samples (total of 1866 data) is large enough ($n_{syariah}$ and $n_{konvensional} > 30$). From Figure 4 it can be seen that the data are not normally distributed, but as the explanation from Dowdy et al. shows (2004), based on the central limit theorem, the mean sampling distribution approaches a normal distribution as sample size n increases so that the normal distribution as the basic assumption of the parametric statistical tests can be used to approximate the probability of the non-normal distribution on a large number of samples ($n \geq 30$) as conducted in this study.

Related to this problem, in order to better fulfil the requirements of parametric statistical tests, the data can be transformed into other forms – such as logarithm, square roots and inverses – as long as the overall data are treated consistently. However, in this study the statistical tests remain to be done at the data level to determine the significance of the differences between groups of data in its basic form.[3]

The result summary of the *t-test* with two independent samples for the Z-score data is presented in Table 6 as follows.

In the data sample of all banks, the Z-score mean of Islamic banks and conventional banks show a significant difference with the level of data variability in both samples tending to be similar. This result also applies to the group of large banks, but the level of variability tends to be different. While in the group of small banks, it turns out that the difference of the mean of Z-score between small Islamic banks and conventional banks is not significant with a relatively similar level of variability. This indicates that the small Islamic banks and the small conventional banks in Indonesia have a relatively same level of stability in the period of 2004–2009.

On the examination of the Z-score components, there are significant mean differences in all groups of observation with different levels of data variability. Meanwhile, to see the trend of differences in the level of stability within the period of observation, the *t-test* is also conducted by dividing the observation period into three zones: the period of 2004–2005 (the period around the mini-crisis 2005), 2006–2007 (recovery period) and 2008–2009 (the period around the global financial crisis of 2008). The result shows that in the periods of 2004–2005 and 2006–2007, the Z-score of Islamic banks and conventional banks on average are significantly different, whereas in the period of 2004–2005 the level of variability is different, but in the period of 2006–2007 the level of variability is the same. A different result is obtained for the observation period of 2008–2009, in which the difference in the Z-score of Islamic banks and conventional banks is not significant. These show that throughout the distress conditions caused by the global financial crisis, both Islamic banks and conventional banks in Indonesia have a relatively same level of resistance.

Furthermore, the result summary of the statistical test for the observation data on the Islamic banking industry is presented in Table 7 below.

Table 7. The statistical *t-test* result summary, 2004–2009.
(The average of Islamic banks data sample based on the group type)

Islamic bank indicators	Full-fledged	Business unit	
	μBUS	μUUS	σ^2
Z-Score	24,119	48,028*	≠
ROA	0,019	–0,005*	≠
E/A	0,110	0,354*	≠
STDEV ROA	0,012	0,028*	≠

Notes:
* Significant at $\alpha = 5\%$.
σ^2 Variance between groups is the same (=) or not the same (≠).
Source: Bank Indonesia, Bank's quarterly financial report, and author's calculation.

The Z-score mean of BUS and UUS is significantly different with the level of data variability in both samples tending to be the same. This confirms the descriptive statistics in Table 6 and the trend of Z-score average of Islamic banks in Figure 8 above. On the examination of the Z-score components, there is a significant difference in the value of all components with different levels of data variability. Although the ROA of BUS in terms of mean is higher than the ROA of UUS and the volatility tends to be lower, the mean E/A ratio of BUS shows a lower value than that of UUS, thus resulting in lower Z-score of BUS. However, it should be noted that the equity ratio of UUS is higher because in this study its measurement includes the other liability account in the balance sheet of UUS as an equity component in addition to current profits.

Summarizing, Islamic banks in Indonesia have a generally lower level of stability compared with the conventional banks in the period of 2004–2009. This difference in the level of stability is significant for the data sample of all banks and large banks. In the group of small banks, the difference is not significant, indicating that small Islamic banks and conventional banks in Indonesia have a relatively same level of stability. Particularly in the crisis period of 2008–2009, the stability of Islamic banks was also relatively lower but the difference is not significant. Therefore, both Islamic banks and conventional banks in Indonesia have relatively the same level of resilience throughout that condition of financial distress.

The relatively lower stability of Islamic banks is mainly contributed by the lower return of Islamic banks than that of conventional banks, although the equity level is higher (except for large Islamic banks). This is because most of the Islamic banks in the observation period experience the dynamics of the organizational change required to resolve some carrying problems such as loss of productive assets, or, as in the case of infant industry (Turk-Ariss, 2010a), the bank earnings in the early operations has not been able to accommodate the costs incurred. These conditions impact on the achievement level of the return of Islamic banks as a whole.

In the measurement of the Islamic banking industry, we find that UUS maintained a level of stability better than

BUS. This is supported mainly by the relatively higher equity of UUS although the return is low. However, it should be noted that the equity measurement of UUS includes the operating funds from the holding conventional banks as a component of the equity besides the current profits. This indicates that the stability level of UUS still depends on financial support from the holding conventional banks. There is also a possibility that the Z-score measurement of UUS may be biased since UUS is known to have the problem of "fungibility," resulting in the challenges to examining it independently from the holding (Karwowski, 2009).

From the measurement applied to the data of individual banks, we also obtained the positioning of each Islamic bank in the banking industry in Indonesia based on its level of stability. The results show that, in the entire observation period, the position of the majority of Islamic banks is generally still below the industry average (based on median). This confirms the main finding that the stability of Islamic banks tends to be lower than conventional banks.

5. Conclusions

In this paper, we use the Z-score measurement as the indicator of individual bank stability. In the literature on Islamic banking, this indicator is used empirically by Čihák and Hesse (2008) and discussed theoretically by Mirakhor (1987). While there are many emerging cross-country studies on Islamic bank stability, the empirical analysis in this paper is based on the country-level data of the banking industry in Indonesia. We hope it can be used as a comparison to the existing cross-country studies on the topic so as to contribute additional insights to the emerging literature of Islamic banking.

The main result of this paper shows that, in general, Islamic banks in Indonesia tend to have significantly lower levels of stability compared to conventional banks, and this tendency is applied consistently to all groups of banks. This result is different from the cross-country study of Čihák and Hesse (2008), which concludes that the level of stability among groups of banks has a tendency to differ when compared. Our finding can be understood given that Islamic banking in Indonesia is still an infant industry with a relatively low return due to some financial pressure from the internal side. An exemption includes the insignificant difference of the stability between small Islamic banks and small conventional banks, indicating a relatively similar level of resilience among these groups.

The results also differ from another cross-country study by Boumediene and Caby (2009), which shows that Islamic banks indicate a better resilience compared with conventional banks throughout the global financial crisis. Furthermore, although in the post-crisis period of 2009 the level of stability is decreasing, in general it is still better than in the mini-crisis period of 2005. This shows that banks in Indonesia have a better level of stability given the financial distress conditions.

This study also compares the stability of full-fledged Islamic banks (BUS) and Islamic business unit of conventional banks (UUS). The results show that UUS has significantly higher levels of stability compared with BUS, but an important note is taken into account regarding the equity calculation of UUS that indicates a financial dependency from the holding conventional banks. Although there is a possibility that the Z-score measurement of UUS may be significantly biased, if we rank all samples of banks based on the level of stability, the result still confirms that Islamic banks display lower stability than that of conventional banks.

Other issues are considered as the limitations of this study that need to be explored for further studies in the topic of Islamic bank stability. First, Z-scores measured in this paper are used only for comparison, but the cut-off value of what is considered a "good" value of Z-score still has not been determined explicitly, nor has any probability that the outliers exist. Second, the development of Islamic banking is in the high growth but the financial data of Islamic banks, particularly the data of UUS, is still quite inadequate. For further study, the availability of observation data of Islamic banks is expected to be more complete and thorough. Third, this paper does not examine the factors that could affect the stability of Islamic banks. Therefore, studies on this topic can be developed by referring to the suggestion from the previous studies, such as related to the influence of the bank competition (Turk-Ariss, 2010a) and the influence of the profit-loss sharing-based financing (Čihák and Hesse, 2008).

Notes

1. Until this article to be written, the only Islamic bank in Indonesia which operates as a public company is Bank Muamalat Indonesia, but its shares are not traded on the stock exchanges.
2. With the average exchange rate of about Rp 9.000 per US$ 1, Rp 1 trillion is equivalent to about US$ 111 million.
3. One alternative data transformation is by using the function ln (1+Z-score), as suggested by Demirgüç-Kunt and Detragiache (2009). The lognormal function is intended for smoothing the high Z-score, and the value of 1 is added to avoid truncation at zero.

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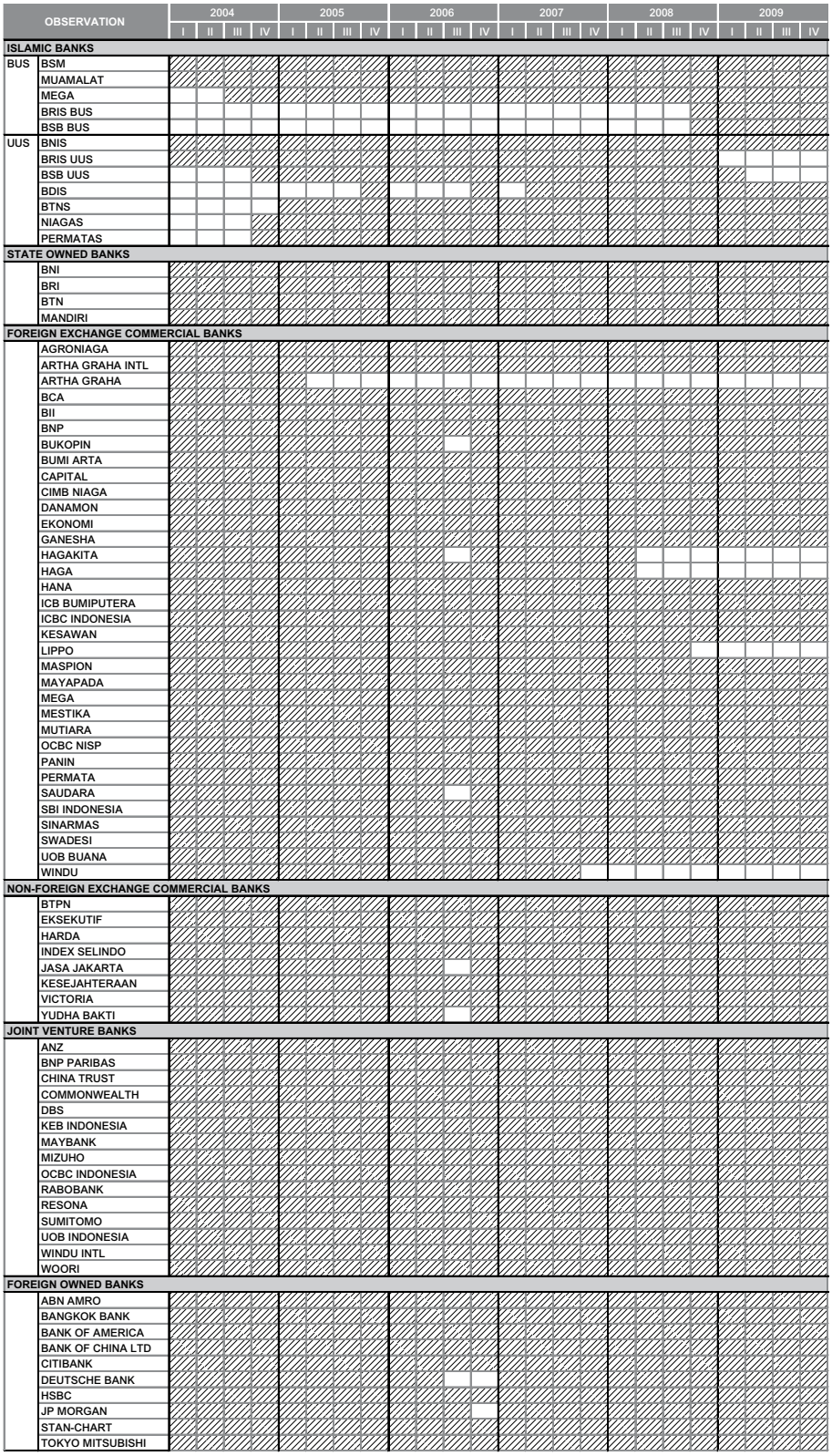
Appendix 1

The availability of the observation data, 2004–2009.



Appendix 2

The availability of data sample based on total assets.

Period	Total Sample Asset per period (Rp trillion)		Total Banking Asset per period (Rp trillion)		Data Availability based on Total Banking Asset	
	Islamic	Conventional	Islamic	Conventional	Islamic	Conventional
Mar 2004	8.94	996.51	9.50	1,141.98	94.16%	87.26%
Jun 2004	10.50	1,031.09	11.02	1,176.33	95.22%	87.65%
Sep 2004	12.04	1,051.47	12.72	1,202.35	94.64%	87.45%
Dec 2004	14.64	1,098.75	15.04	1,259.57	97.38%	87.23%
Mar 2005	15.18	1,105.77	16.36	1,267.33	92.81%	87.25%
Jun 2005	16.16	1,152.72	17.74	1,330.64	91.10%	86.63%
Sep 2005	17.22	1,221.17	18.45	1,404.05	93.31%	86.97%
Dec 2005	20.08	1,261.03	20.88	1,452.72	96.17%	86.81%
Mar 2006	19.57	1,245.11	20.55	1,448.87	95.24%	85.94%
Jun 2006	21.08	1,275.88	22.70	1,501.19	92.88%	84.99%
Sep 2006	22.95	1,264.54	24.31	1,558.82	94.40%	81.12%
Dec 2006	25.27	1,414.30	26.72	1,672.70	94.58%	84.55%
Mar 2007	26.79	1,421.53	28.45	1,682.05	94.19%	84.51%
Jun 2007	27.48	1,480.27	29.21	1,748.07	94.06%	84.68%
Sep 2007	29.77	1,541.50	31.80	1,825.79	93.61%	84.43%
Dec 2007	33.73	1,677.34	36.54	1,959.22	92.31%	85.61%
Mar 2008	35.31	1,640.34	38.34	1,916.16	92.08%	85.61%
Jun 2008	39.45	1,719.91	42.98	2,009.60	91.79%	85.58%
Sep 2008	42.07	1,780.55	45.86	2,094.05	91.74%	85.03%
Dec 2008	44.90	1,916.38	49.56	2,276.52	90.61%	84.18%
Mar 2009	46.99	1,953.02	51.68	2,315.45	90.93%	84.35%
Jun 2009	50.26	1,997.65	55.24	2,313.60	90.99%	86.34%
Sep 2009	52.71	2,036.18	58.03	2,345.98	90.82%	86.79%
Dec 2009	59.19	2,184.28	66.09	2,486.09	89.56%	87.86%
Data Availability Average					**93.11%**	**85.78%**

Appendix 3

The bank ranking based on the level of stability.

No.	BANK	Dec 2004	No.	BANK	Dec 2005	No.	BANK	Dec 2006
1	CITIBANK	326.55	1	BCA	150.78	1	CITIBANK	326.84
2	MESTIKA	277.86	2	MESTIKA	143.63	2	OCBC NISP	322.69
3	ICBC INDONESIA	206.00	3	BANK OF CHINA LTD	134.62	3	ICB BUMIPUTERA	255.45
4	BANGKOK BANK	190.51	4	CITIBANK	118.22	4	PERMATA	237.25
5	SWADESI	123.24	5	BANGKOK BANK	111.67	5	PANIN	202.53
6	HAGAKITA	94.13	6	TOKYO MITSUBISHI	99.50	6	BUMI ARTA	143.88
7	HANA	77.49	7	MAYAPADA	90.82	7	BNIS	125.53
8	BTPN	74.05	8	WOORI	85.00	8	BUKOPIN	115.75
9	SINARMAS	73.97	9	ICBC INDONESIA	82.77	9	MASPION	104.34
10	AGRONIAGA	65.50	10	HAGAKITA	72.27	10	BANK OF CHINA LTD	98.98
11	ICB BUMIPUTERA	50.18	11	INDEX SELINDO	69.52	11	UOB INDONESIA	97.14
12	ANZ	50.03	12	OCBC INDONESIA	68.42	12	WOORI	96.35
13	BUKOPIN	49.96	13	BSB UUS	63.24	13	BII	95.06
14	BNP	48.45	14	SWADESI	63.03	14	BCA	89.23
15	BUMI ARTA	48.04	15	EKONOMI	62.48	15	CIMB NIAGA	84.99
16	UOB BUANA	46.37	16	HANA	57.31	16	MESTIKA	84.19
17	KESEJAHTERAAN	45.72	17	MIZUHO	55.11	17	BRIS UUS	82.10
18	INDEX SELINDO	45.40	18	ANZ	54.06	18	ICBC INDONESIA	76.69
19	BRIS UUS	42.98	19	AGRONIAGA	48.13	19	EKONOMI	72.67
20	OCBC NISP	42.41	20	BUKOPIN	45.20	20	SWADESI	69.67
21	MIZUHO	42.24	21	SBI INDONESIA	45.03	21	UOB BUANA	63.74
22	CHINA TRUST	40.86	22	HAGA	42.81	22	VICTORIA	63.41
23	BCA	39.89	23	BII	42.32	23	SUMITOMO	60.29
24	TOKYO MITSUBISHI	37.36	24	SINARMAS	38.64	24	KEB INDONESIA	59.14
25	WOORI	37.09	25	HSBC	38.26	25	ARTHA GRAHA INTL	57.38
26	EKONOMI	36.91	26	KESEJAHTERAAN	36.28	26	TOKYO MITSUBISHI	57.29
27	UOB INDONESIA	34.72	27	BUMI ARTA	35.27	27	OCBC INDONESIA	54.64
28	PANIN	33.65	28	UOB BUANA	33.89	28	MIZUHO	53.89
29	OCBC INDONESIA	32.12	29	MASPION	33.75	29	ANZ	52.72
30	JASA JAKARTA	31.18	30	CIMB NIAGA	33.57	30	MUTIARA	50.08
31	MANDIRI	28.60	31	BTN	31.01	31	BTNS	48.61
32	RESONA	28.29	32	MUAMALAT	30.57	32	STAN-CHART	48.45
33	HSBC	26.96	33	KEB INDONESIA	30.04	33	INDEX SELINDO	46.90
34	BANK OF CHINA LTD	26.66	34	BNIS	29.92	34	SBI INDONESIA	44.09
35	BNIS	24.98	35	UOB INDONESIA	27.86	35	MAYBANK	40.51
36	SUMITOMO	24.44	36	KESAWAN	27.05	36	MANDIRI	38.62
37	KEB INDONESIA	24.37	37	BNI	26.59	37	KESEJAHTERAAN	38.27
38	MASPION	23.96	38	CHINA TRUST	26.22	38	SINARMAS	37.39
39	VICTORIA	22.43	39	BRI	24.66	39	LIPPO	37.02
40	BRI	22.10	40	RABOBANK	24.46	40	BANGKOK BANK	36.97
41	BSB UUS	19.96	41	DANAMON	24.07	41	MUAMALAT	36.33
42	MAYAPADA	19.77	42	BANK OF AMERICA	23.64	42	KESAWAN	36.10
43	STAN-CHART	18.62	43	BNP	22.87	43	RESONA	34.83
44	GANESHA	17.77	44	SUMITOMO	22.77	44	ABN AMRO	31.24
45	MAYBANK	17.43	45	BRIS UUS	22.46	45	MEGA	31.04
46	HAGA	16.80	46	RESONA	22.32	46	BNP	31.01
47	BII	16.41	47	YUDHA BAKTI	22.21	47	DBS	29.88
48	YUDHA BAKTI	16.04	48	VICTORIA	21.99	48	BRI	27.31
49	MEGA	15.72	49	JASA JAKARTA	21.46	49	MAYAPADA	27.23
50	CIMB NIAGA	15.54	50	GANESHA	21.27	50	BTPN	26.23
51	BNI	14.54	51	MAYBANK	20.97	51	HAGAKITA	26.20
52	EKSEKUTIF	14.15	52	BSM	19.70	52	JASA JAKARTA	25.86
53	ARTHA GRAHA	14.09	53	LIPPO	19.11	53	BTN	25.36
54	SBI INDONESIA	13.74	54	ICB BUMIPUTERA	18.42	54	BNI	25.16
55	COMMONWEALTH	13.44	55	WINDU INTL	18.39	55	WINDU INTL	24.95
56	BANK OF AMERICA	13.38	56	SAUDARA	17.80	56	CHINA TRUST	24.39
57	DBS	12.89	57	OCBC NISP	17.79	57	BSB UUS	24.00
58	MUAMALAT	12.87	58	PANIN	16.59	58	SAUDARA	22.18
59	WINDU INTL	11.99	59	HARDA	15.87	59	HANA	22.12
60	BNP PARIBAS	11.57	60	PERMATA	15.61	60	BSM	21.77
61	HARDA	11.19	61	BTPN	13.39	61	HSBC	19.70
62	MEGAS	11.19	62	MEGAS	10.93	62	BNP PARIBAS	19.10
63	BTN	10.06	63	DBS	10.63	63	COMMONWEALTH	18.99
64	NIAGAS	9.93	64	MEGA	10.41	64	HAGA	18.70
65	BSM	9.07	65	WINDU	10.34	65	DANAMON	15.49
66	RABOBANK	8.49	66	MANDIRI	10.32	66	AGRONIAGA	12.70
67	SAUDARA	7.87	67	BNP PARIBAS	9.68	67	NIAGAS	12.16
68	KESAWAN	7.50	68	ABN AMRO	8.92	68	GANESHA	12.15
69	ARTHA GRAHA INTL	7.45	69	COMMONWEALTH	8.90	69	YUDHA BAKTI	10.36
70	DANAMON	7.23	70	STAN-CHART	6.52	70	BANK OF AMERICA	9.70
71	LIPPO	5.76	71	BDIS	5.54	71	HARDA	8.00
72	DEUTSCHE BANK	5.53	72	PERMATAS	5.32	72	PERMATAS	7.99
73	ABN AMRO	5.06	73	CAPITAL	4.83	73	WINDU	6.67
74	JP MORGAN	4.73	74	DEUTSCHE BANK	4.52	74	CAPITAL	5.42
75	CAPITAL	3.83	75	BTNS	4.46	75	MEGAS	5.21
76	PERMATA	3.69	76	NIAGAS	3.92	76	BDIS	4.99
77	MUTIARA	2.76	77	EKSEKUTIF	2.08	77	EKSEKUTIF	4.97
78	WINDU	0.84	78	JP MORGAN	1.91	78	RABOBANK	3.67
79	PERMATAS	0.56	79	MUTIARA	1.56	79	BRIS BUS	
80	BRIS BUS		80	ARTHA GRAHA INTL	1.19	80	BSB BUS	
81	BSB BUS		81	BRIS BUS		81	ARTHA GRAHA	
82	BDIS		82	BSB BUS		82	DEUTSCHE BANK	
83	BTNS		83	ARTHA GRAHA		83	JP MORGAN	
	MEAN	38.32		MEAN	35.93		MEAN	57.95
	MEDIAN	22.10		MEDIAN	24.26		MEDIAN	37.00

TOTAL OBSERVATION	79		TOTAL OBSERVATION	80		TOTAL OBSERVATION	78	
ISLAMIC BANKS OBS.	8		ISLAMIC BANKS OBS.	10		ISLAMIC BANKS OBS.	10	
BANK WITH Z > MEDIAN	2		BANK WITH Z > MEDIAN	3		BANK WITH Z > MEDIAN	3	
% Z ISLAMIC > MEDIAN	25.00%		% Z ISLAMIC > MEDIAN	30.00%		% Z ISLAMIC > MEDIAN	30.00%	
ISLAMIC : TOP 10	0		ISLAMIC : TOP 10	0		ISLAMIC : TOP 10	1	
ISLAMIC : BOTTOM 10	1		ISLAMIC : BOTTOM 10	4		ISLAMIC : BOTTOM 10	3	

Appendix 3 - *Continued*

No.	BANK	Dec 2007	No.	BANK	Dec 2008	No.	BANK	Dec 2009
1	CITIBANK	253.10	1	CITIBANK	1,230.22	1	CITIBANK	472.40
2	MASPION	187.11	2	BTNS	317.43	2	BCA	416.46
3	BTNS	173.03	3	BTN	252.01	3	MASPION	331.30
4	UOB BUANA	158.64	4	BANGKOK BANK	196.12	4	UOB INDONESIA	189.77
5	JASA JAKARTA	130.45	5	WOORI	132.19	5	KESAWAN	174.51
6	ARTHA GRAHA INTL	128.21	6	GANESHA	119.92	6	MIZUHO	127.60
7	MAYAPADA	127.05	7	BUKOPIN	97.72	7	BUKOPIN	115.96
8	MESTIKA	115.01	8	BCA	90.05	8	DANAMON	113.00
9	WINDU INTL	111.25	9	EKONOMI	85.63	9	BUMI ARTA	110.84
10	BRI	106.66	10	TOKYO MITSUBISHI	76.49	10	PERMATA	105.44
11	BNIS	104.99	11	OCBC NISP	73.50	11	BANGKOK BANK	97.04
12	UOB INDONESIA	98.33	12	BRI	73.22	12	BSM	92.02
13	BANGKOK BANK	97.79	13	ARTHA GRAHA INTL	72.87	13	MESTIKA	90.22
14	BUKOPIN	91.31	14	JASA JAKARTA	72.47	14	ARTHA GRAHA INTL	85.33
15	JP MORGAN	88.20	15	BUMI ARTA	72.14	15	TOKYO MITSUBISHI	81.19
16	KEB INDONESIA	79.32	16	KEB INDONESIA	69.20	16	MAYAPADA	78.65
17	OCBC NISP	78.46	17	MANDIRI	68.17	17	SBI INDONESIA	75.39
18	BCA	76.19	18	BNIS	66.13	18	MANDIRI	75.16
19	PANIN	74.82	19	SBI INDONESIA	65.64	19	WOORI	72.38
20	WOORI	74.39	20	SINARMAS	64.62	20	MAYBANK	69.65
21	EKONOMI	72.36	21	CAPITAL	63.95	21	BTN	65.42
22	TOKYO MITSUBISHI	71.68	22	MESTIKA	61.61	22	MEGA	62.82
23	BII	65.33	23	BSB UUS	59.67	23	KEB INDONESIA	61.36
24	BUMI ARTA	64.08	24	MEGA	58.11	24	PANIN	61.08
25	CIMB NIAGA	61.00	25	VICTORIA	58.09	25	EKONOMI	59.80
26	SWADESI	60.39	26	INDEX SELINDO	56.09	26	BANK OF AMERICA	54.44
27	BRIS UUS	51.67	27	KESAWAN	53.96	27	CAPITAL	53.05
28	OCBC INDONESIA	47.86	28	NIAGAS	51.95	28	UOB BUANA	51.89
29	MUTIARA	47.07	29	MAYAPADA	51.88	29	OCBC NISP	51.38
30	GANESHA	45.94	30	CHINA TRUST	50.51	30	BANK OF CHINA LTD	51.03
31	KESEJAHTERAAN	42.00	31	ICBC INDONESIA	46.90	31	SWADESI	50.12
32	BTN	40.85	32	UOB INDONESIA	46.43	32	BTNS	49.12
33	BNP	40.25	33	MIZUHO	45.53	33	JASA JAKARTA	47.87
34	PERMATA	39.84	34	SUMITOMO	45.19	34	DBS	47.25
35	HAGAKITA	38.16	35	SWADESI	43.83	35	BRI	44.57
36	INDEX SELINDO	37.96	36	PANIN	42.16	36	ICBC INDONESIA	44.19
37	CAPITAL	36.95	37	BNI	41.72	37	SUMITOMO	42.98
38	ANZ	35.88	38	BSM	40.76	38	WINDU INTL	39.35
39	BTPN	34.14	39	ICB BUMIPUTERA	40.16	39	INDEX SELINDO	38.19
40	SBI INDONESIA	33.28	40	AGRONIAGA	39.89	40	SINARMAS	33.87
41	NIAGAS	32.27	41	YUDHA BAKTI	39.75	41	BNI	32.01
42	BNP PARIBAS	32.08	42	BTPN	38.47	42	CHINA TRUST	31.83
43	DANAMON	31.83	43	KESEJAHTERAAN	38.39	43	HANA	29.80
44	BSB UUS	31.14	44	OCBC INDONESIA	37.91	44	VICTORIA	28.64
45	CHINA TRUST	29.03	45	DBS	37.67	45	OCBC INDONESIA	25.68
46	HANA	28.90	46	BNP	36.89	46	HARDA	24.03
47	MIZUHO	27.32	47	HSBC	36.81	47	GANESHA	22.88
48	HSBC	26.47	48	BANK OF CHINA LTD	36.75	48	BDIS	21.80
49	LIPPO	25.89	49	BANK OF AMERICA	36.59	49	ICB BUMIPUTERA	21.22
50	KESAWAN	25.16	50	MASPION	34.97	50	YUDHA BAKTI	20.80
51	BNI	25.10	51	WINDU INTL	33.39	51	RABOBANK	19.92
52	SUMITOMO	24.46	52	MUAMALAT	32.90	52	BNP PARIBAS	19.88
53	ICB BUMIPUTERA	23.29	53	UOB BUANA	31.78	53	KESEJAHTERAAN	19.56
54	SAUDARA	22.35	54	MAYBANK	31.61	54	HSBC	19.53
55	ICBC INDONESIA	21.81	55	ANZ	31.20	55	BNP	18.93
56	YUDHA BAKTI	21.79	56	HARDA	30.32	56	COMMONWEALTH	18.68
57	ABN AMRO	21.66	57	SAUDARA	30.15	57	STAN-CHART	16.76
58	MANDIRI	21.32	58	PERMATA	29.70	58	ABN AMRO	16.37
59	BSM	21.02	59	BDIS	29.61	59	BII	16.10
60	SINARMAS	20.45	60	BII	26.73	60	SAUDARA	15.92
61	DBS	20.41	61	JP MORGAN	26.50	61	RESONA	15.66
62	MUAMALAT	20.28	62	DANAMON	21.41	62	PERMATAS	14.41
63	AGRONIAGA	19.61	63	BRIS BUS	18.69	63	AGRONIAGA	14.06
64	VICTORIA	19.39	64	HANA	18.57	64	DEUTSCHE BANK	14.06
65	RESONA	19.22	65	COMMONWEALTH	18.27	65	BTPN	12.87
66	COMMONWEALTH	19.14	66	CIMB NIAGA	17.13	66	MEGAS	12.08
67	MAYBANK	19.12	67	STAN-CHART	16.11	67	NIAGAS	11.44
68	PERMATAS	17.77	68	RESONA	16.10	68	CIMB NIAGA	9.55
69	BDIS	17.52	69	ABN AMRO	12.60	69	JP MORGAN	8.13
70	MEGAS	16.92	70	BNP PARIBAS	11.79	70	ANZ	7.35
71	DEUTSCHE BANK	15.45	71	DEUTSCHE BANK	11.56	71	MUAMALAT	6.46
72	MEGA	14.97	72	RABOBANK	11.44	72	BNIS	3.54
73	BANK OF CHINA LTD	13.81	73	PERMATAS	11.21	73	BSB BUS	2.50
74	HAGA	13.57	74	EKSEKUTIF	9.84	74	BRIS BUS	2.45
75	STAN-CHART	13.20	75	BSB BUS	8.45	75	EKSEKUTIF	2.02
76	RABOBANK	12.31	76	MEGAS	6.56	76	MUTIARA	(0.04)
77	BANK OF AMERICA	8.58	77	BRIS UUS	1.83	77	BRIS UUS	
78	EKSEKUTIF	6.71	78	MUTIARA	(0.68)	78	BSB UUS	
79	HARDA	2.26	79	ARTHA GRAHA		79	ARTHA GRAHA	
80	BRIS BUS		80	HAGAKITA		80	HAGAKITA	
81	BSB BUS		81	HAGA		81	HAGA	
82	ARTHA GRAHA		82	LIPPO		82	LIPPO	
83	WINDU		83	WINDU		83	WINDU	
	MEAN	52.21		MEAN	66.83		MEAN	60.01
	MEDIAN	33.28		MEDIAN	40.02		MEDIAN	38.77
TOTAL OBSERVATION		79	TOTAL OBSERVATION		78	TOTAL OBSERVATION		76
ISLAMIC BANKS OBS.		10	ISLAMIC BANKS OBS.		12	ISLAMIC BANKS OBS.		10
BANK WITH Z > MEDIAN		3	BANK WITH Z > MEDIAN		5	BANK WITH Z > MEDIAN		2
% Z ISLAMIC > MEDIAN		30.00%	% Z ISLAMIC > MEDIAN		41.67%	% Z ISLAMIC > MEDIAN		20.00%
ISLAMIC : TOP 10		1	ISLAMIC : TOP 10		1	ISLAMIC : TOP 10		0
ISLAMIC : BOTTOM 10		1	ISLAMIC : BOTTOM 10		4	ISLAMIC : BOTTOM 10		5

Note:
The highlighted are the Islamic Banks.

Appendix 4

The Financial Stability Index (FSI).

In Indonesia, one of the indicators used by Bank Indonesia in assessing the resilience of the financial sector is called the Financial Stability Index (Bank Indonesia, 2010). The Financial Stability Index (FSI) is one example of a hybrid model that combines the measurement of the accounting data and the market data. The measurement of stability using FSI is more complex than the measurement of the Z-score and also more forward-looking oriented.

Figure A. The financial stability index of BUS and UUS, 1996–2010.
Source: Bank Indonesia (2010).

Investment deposits, risk-taking and capital decisions in Islamic banks

Hichem Hamza[1], **Zied Saadaoui**[2]
[1]École Supérieure de Commerce de Tunis, University of Manouba, Tunis, Tunisia
[2]Faculty of Economic Science, University of Sfax, Sfax, Tunisia

Abstract - This paper examines the relationship between the volume of investment deposits (profit sharing investment accounts–PSIA) and capitalization of Islamic commercial banks in a context of asymmetric information. Unlike current accounts holders, investment accounts holders may support part or all of the losses on assets value, which could be a source of moral hazard among bank managers and shareholders. To test these assumptions, we use the system generalized method of moments (System GMM) on a dynamic panel of 59 Islamic banks observed during the period 2005–2009. After controlling for a set of variables that may influence capital level, the results show a significant negative relationship between PSIA and regulatory capital ratio. This may indicates that the specific nature of PSIA can be a source of excessive risk –taking and higher leverage in order to maximize shareholders value. This behavior is likely to threaten the solvency of Islamic banks and shows that there may exist some deficiencies in their risk management and governance system. Following these results, we suggest some recommendations to better implement the principle of profit and loss sharing and to curb excessive risk-taking in Islamic banks.

Keywords: Islamic banks, profit and loss sharing, investment deposits, capital ratio, risk-taking, displaced commercial risk

JEL: C23, D74, G21, G32

1. Introduction

Today, Islamic finance is making progress and becoming more interesting for the international community because of its ethical dimension and its attachment to the real economy. The subprime financial crisis did not exert a significant impact on the performance of Islamic banks and their development around the world. These banks offer products in accordance with Islamic ethics and encourage productive investment. They also have to save their credibility by ensuring the compliance of their products, financial instruments, operations and their management process with the rules of Islamic law, i.e., Shariah.[1] The originality of Islamic banks consists in the principle of profit and loss sharing (PLS) between shareholders and their partners. This notion of equitable sharing is a key element in the concept of Islamic finance as it is supposed to reflect the values of Islam. Under the rules of Shariah, no one can claim any compensation without incurring some of *ex ante* investment risks (*al-ghounm bi al-ghourm*). From this rule emerged the principle of profits and loss sharing, according to which the parties of a financial transaction must share equally the risks and returns. The PLS is the central axis of Islamic banking intermediation, because of its effect on the two sides of bank: the balance sheet and the assets and liabilities, which are both subject to the condition of PLS between shareholders, entrepreneurs (borrowers) and depositors (Chong and Liu, 2009).

From the liabilities side, the principle of PLS is applied through profit sharing investment accounts (PSIA), which are specific to Islamic Banks. Unlike conventional banks' deposits, contractual relationship between Islamic banks and investment account holders (IAH), i.e., the PSIA holders—called *Mudaraba*—is based on the concept of PLS. In this scheme, IAH do not have the same rights as depositors or shareholders, but they are required to absorb any losses on assets, notwithstanding the cases of negligence or misconduct by the bank. Thus, as pointed out by Archer and Karim (2009), PSIA are not insured accounts, or capital certain, they are rather treated as investment products. The fact that IAH are considered as investors and do not enjoy the same guarantees as other depositors (current accounts

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and savings accounts holders), or as shareholders, raises a major problem of governance that could impact negatively Islamic banks creditworthiness, through bank managers' capital and risk decisions.

This paper aims to enhance the discussion about governance and prudential regulation of Islamic banks, by examining the impact that may exert the level of PSIA on banks behavior. This problem is interesting for three reasons. First, contrary to current accounts, PSIA can be a source of moral hazard, since the bank is not constrained, in case of bankruptcy, to repay IAH because they have to conform to the principle of PLS. Second, these accounts represent a large share of Islamic banks' liabilities. Consequently, through PSIA Islamic banks are able to invest in costly operations like *mudarabah* and *Musharakah*, which are riskier than commercial operations, but more profitable (Archer and Karim, 2009). Third, in a context of incomplete information and lack of transparency, IAH face the risk of mismanagement of *mudarabah* funds, because they are not able to monitor efficiently investment decisions done by the bank (Islamic Financial Services Board (IFSB, 2006)).

This paper draws on theoretical and empirical studies on leverage, moral hazard and their impact on bank capitalization (Merton, 1977; Marcus, 1983; Shrieves and Dahl, 1992; Berger et al. 1995; Ahmad et al. 2009). Particular attention is paid to the effect exerted by PSIA on Islamic banks capitalization. Moral hazard may, indeed, arise from the liabilities side, in the case where PSIA encourage banks to take greater risks and to operate with less capital (Visser, 2009).[2] Therefore, in a context of asymmetric information, increasing PSIA share in banks' liabilities is likely to boost leverage and give incentive to managers to undertake more risky investments decisions, which could negatively affect capitalization and increase insolvency risk. On the opposite side, increasing the share of PSIA can expose the bank to higher displaced commercial risk (DCR), i.e., rate of return risk, especially if this increase is associated with higher leverage and greater risk-taking. In this case the bank would be constrained to cover the DCR through issuing additional equity capital to be able to absorb losses immediately, as required by the guidelines of AAOIFI (1999) and IFSB (2005). Thus, one might also expect a positive relationship between the volume of PSIA and banks capitalization.

The second section of this paper presents the mechanism of PSIA. It addresses, in a first part, the concept of DCR arising from PSIA. After a brief analysis of the causes behind the DCR, we focus on its consequences on bank's capital decisions. In a second part, this section studies the influence of PSIA on Islamic bank risk-taking. This analysis is based on the assumption of asymmetric information between IAH and their banks, which can give rise to a problem of moral hazard, and excessive risk taking. Empirical methodology and results of the study are presented in the third section. The hypotheses are tested on a sample of 59 Islamic commercial banks from 17 countries. We use the dynamic panel technique and the system Generalized Method of Moments to try to highlight the central role of PSIA in Islamic banking and their impact on risk-taking and capitalization. Finally, the fourth section concludes the paper and proposes some recommendations.

2. Islamic banking intermediation and the risk-sharing principle

The principal characteristic that distinguishes commercial Islamic banks from conventional banks is the paradigm of PLS. In fact, the *mudarabah* contract allows Islamic banks to ensure a traditional intermediation function. Under this contract, the bank simultaneously plays the role of entrepreneur (*mudarib*) and capital provider (*Rab al mal*). On the liability side, as a *mudarib*, the bank manages the customer's deposit accounts. From the asset side, as a *Rab al Mal*, it should make the collected funds available to entrepreneurs (Jouini, 2008). *Mudaraba* allows the sharing of gains, while losses are borne only by the provider of capital.

In fact, Islamic assets are divided into two categories: commercial assets and profit and loss sharing assets. The first category includes mainly the instruments of *murabaha*, *istisna*, *salam* and *ijara*, through which the bank plays a commercial role rather than a traditional role of intermediation. These financing instruments are not based on the principle of PLS, but rather on a transfer of ownership of (underlying) assets from bank to customers.[3]

The two main types of investment contracts, or PLS assets, are *musharakah* and *mudarabah*. A *musharaka* contracts means that the bank and the customer form a partnership to finance a project or a transaction, in which they support the same risk in proportion to their participation. *Musharaka* contracts can be a source of regular income for Islamic banks, enabling them to provide an interesting rate of return to shareholders and depositors. Under a *mudarabah* contract, a partnership is required between the investor, the Islamic bank, which provides capital (*Rab al mal*) and an entrepreneur (*mudarib*), which provides expertise. The major feature of this operation is that *Rab al mal* bears the entire risk of loss, while the losses borne by the entrepreneur is limited to his efforts, except in case of negligence or misconduct on his part. Profit distribution between the two parties is fixed *ex-ante*, after paying management fees to the contractor (the bank). Thus, the advantage of *mudarabah* is that it requires the entrepreneur to manage more carefully the project in order to increase its earnings, which in turn depends directly on the performance of the project.

From the liabilities side, this study will focus exclusively on unrestricted PSIA, because restricted PSIA are off-balance sheet operations.[4] Therefore, the bank incurs no risk in this intermediation process, since the probability of default is totally born by the customer.[5] If depositors choose to hold the unrestricted form of PSIA, then their funds will be affected into a common fund in order to be used by the bank, which means that only the bank decide how to invest unrestricted PSIA. Through investment-deposits accounts, the *ex-ante* rate of return on investment (interest rate premium) in conventional banks is replaced by an uncertain *ex-post* rate of return that must follow the principle of PLS. In fact, the unrestricted PSIA holders are directly involved in the medium and long term assets funded by PSIA, but without receiving guarantees or voting rights as it is the case for shareholders and current account holders. In other words, under the *mudarabah* contract governing the relationship between Islamic banks and IAH, the profits are shared according to a predetermined rule, while losses on assets funded through PSIA are borne only

by the IAH, except in case of misconduct or negligence from the bank.[6] This depends, however, on the modality with which unrestricted PSIA funds are invested. Indeed, these accounts can be commingled with current accounts and shareholders' equities in order to finance assets. This operation is called a *mudaraba-musharaka* operation or bilateral *mudaraba*, in which the bank can invest its own capital to the project managed by the entrepreneur. In this case, the risk of loss will be suffered also by the bank (Archer and Karim, 2009).

Therefore, it is worth asking whether the PSIA based on the *mudaraba* or bilateral *mudarabah*, can lead to distortions in the attitude of Islamic banks' managers. Indeed, it is the IAH who, to some extent, support the major part of assets default risk. But, before examining this question, we begin by a brief presentation of the most emphasized risk by the literature and regulatory institutions in relation with PSIA, i.e., the displaced commercial risk.

PSIA: Competitive return and capitalization

PSIA were designed to achieve equitable sharing of risk, which is one of the principles of Islamic finance. These investment-deposits have also been created as an alternative to interest earning term deposits, because Shariah prohibits remuneration of capital. PSIA offer a remuneration that varies with profitability of bank assets, according to a set of criteria agreed in advance with the bank.[7] Thus, Islamic banks are constrained to conform to the principles of *Shariah* and, at the same time, to face hard competition from conventional banks. They are also forced to adjust their operations and strategies to a legal and institutional environment, which is often favorable to conventional financing activities. Moreover, Islamic banks often face a problem of liquidity management, given the narrowness of the interbank market through which they can lend or borrow short-term funds. Transactions on this market are very limited, which is a handicap for Islamic banks preventing them from placing liquidities in riskless securities, such as short-term government bonds or other money market instruments.

Furthermore, Islamic banks do not have the possibility to manage their liquid reserves through short-term money market instruments or through interest-free borrowing from the Central Bank. Besides, given the absence of a deposit insurance systems or a mechanism of lender on last resorts compatible with the *Shariah* principles, Islamic banks are required to bear a greater share of the risks they face and are constrained to deal with higher liquidity risks than conventional banks (Ahmad, 2008). Similarly, the absence of a large and deep secondary market for Islamic financial instruments reduces the ability of Islamic banks to effectively manage their assets and liquidities. Finally, Islamic banks also suffer from a quasi absence of risk-management techniques such as securitization, and from the underdeveloped of Islamic financial markets. All these factors are sufficient to aggravate liquidity problems for Islamic banks by preventing them from managing their cash items and improving risk diversification opportunities.

All these disadvantages make it more difficult for Islamic banks to predict and to stabilize the rate of return of PSIA, which depends mainly on the level of competition between banks. Therefore, it is more difficult for Islamic banks to maintain their market power and to compete with conventional banks. This could ultimately make investors lose their confidence and push them to withdraw their funds. The cost due to the loss of competitiveness, caused indirectly by PSIA, is called Displaced Commercial Risk (DCR).[8] Thus, DCR refers to unexpected losses that the bank is able to absorb to ensure that IAH are remunerated at a competitive rate (Toumi, 2010).

In order to overcome this risk, the IFSB (2005) recommended the use of Profit Equalization Reserves (PER) to smooth profit payout, and Investment Risk Reserves (IRR) to cover unexpected losses on PSIA returns. This income smoothing practice is proposed as a solution to attract IAH and to reduce the probability of bank runs. Indeed, if a bank uses unrestricted PSIA to finance *mudarabah*, *musharakah*, or other commercial assets, earning coming from these operations will be paid to IAH, only after withdrawing the sum of the PER, the shareholders' profit, the management fee and finally the IRR. Thus, during periods of economic expansion, higher profits enable Islamic banks to increase reserves in anticipation of higher DCR that could arise in period of economic recession and loss of competitiveness.

Moreover, the management fee is an important revenue source for Islamic banks, but also suffers from shortcomings that can affect profit sharing between shareholders and IAH. In fact, the two parts share the same probability of losses, but with management fees, shareholders get higher returns (Archer and Karim, 2009). Similarly, in case of loss of competitiveness, Islamic banks can use reserves to guarantee the same level of returns to IAH. If these reserves are insufficient to cover the DCR, then the bank is constrained to lose some or its overall management fees, in order to maintain the expected level of PSIA rate of return. If both of reserves accounts and management fees fail to cover DCR, then the bank will turn to increase its equity-capital in order to preserve the confidence of IAH and avoid a massive withdrawal of investment-deposits. Reciprocally, higher volume of PSIA indicate good competitive situations and higher expected profits that should be followed by a strengthening of regulatory capital in order to cover DCR in the future. Consequently, DCR may have a direct impact on capital investment in Islamic banks (Archer and Rifaat, 2009; Grais and Kulathunga, 2007).

From a regulatory point of view, some Islamic banks are obliged to respect a minimum level of regulatory capital to cover DCR, as it is the case in Bahrain or in the United Arab Emirates. The IFSB (2005) and the AAOIFI (1999) propose to take into account the DCR in the calculation of regulatory capital ratio (Turk Ariss and Safieddine, 2007).[9] Regulatory capital should absorb the losses on assets funded by unrestricted PSIA for three main reasons: first, these accounts share some features of equity-capital and thus must be adequately protected. Then, PSIA must be adequately covered because they are not perpetual instruments like equity shares, so they can be repaid at any time before maturity. Finally, IAH have no governance right, like voting rights, to control investment decisions or to have good access to information, this is why they need protection.

But, in addition to these issues related to DCR, the specific nature of PSIA raises further questions about

their influence on Islamic banks behavior, especially on capital and risk-taking decisions. This question will be discussed in the next section.

PSIA, risk-taking and capital decisions

Unlike current accounts, Islamic banks do not have to provide liquidity insurance to IAH. In the case where the bank plays the double function of capital provider (through the allocation of unrestricted PSIA) and entrepreneur, it does not support the losses on assets financed by these accounts, unless it participates in the project through a *musharakah-mudarabah* operation. This means that, somehow, the PSIA can be compared to fully guaranteed deposit accounts in conventional banking. In other words, shareholders of Islamic banks are aware that in case of bankruptcy, they will not have to support the losses and to repay the IAH. This suggests that a bank seeking to maximize shareholders' value will try to (excessively) boost leverage by increasing the volume of PSIA. Thus, it is interesting to analyze more deeply the impact of PSIA on bank capital and insolvency risk, in a context of asymmetric information and moral hazard, where an agency problem could arise between shareholders and bank managers, on the one hand, and IAH on the other hand. As pointed out by Merton (1977), Kareken and Wallace (1978), Gennotte and Pyle (1991) and Shrieves and Dahl (1992), this situation is able to subsidize conventional banks by allowing them to transfer risk from shareholders to depositors. It is possible to transpose this case to Islamic banks, which can be more exposed to moral hazard in a context of asymmetric information. In fact, along with an increase of PSIA share in total liabilities, shareholders' wealth will be less threatened by a risk of losses on assets value. When assets become more risky, it will be more profitable for the bank to increase the share of PSIA, reducing simultaneously its capital ratio, in order to maximize returns on equity at the detriment of its solvency.

Therefore, the nature of intermediation and the composition of liabilities in Islamic banks have important implications on the level of regulatory capital ratio (Grais and Kulathunga, 2007). Playing the role of *mudareb*, the bank does not assume the loss, but shares the profits with IAH. This may encourage them to maximize investments funded by PSIA and to attract more IAH, which can lead to riskier investment decisions in a context of asymmetric information and moral hazard that negatively affects bank capitalization (Visser, 2009; Van Greuning and Iqbal, 2008). Meanwhile, this risky behavior can lead to higher DCR, which in turn requires more capital investment.

Furthermore, by practicing income smoothing, Islamic banks have the discretion in disclosing information about the real return on assets funded by PSIA. This is another problem that can arise in a context of asymmetric information, since in this case the rate of return on PSIA will not adequately reflects the creditworthiness of the bank. This could generate also a risk of misconduct by managers (IFSB, 2005). More precisely, IRR are designed to cover the risk of a decrease in IAH earnings and to absorb losses. These reserves are deducted directly from the share of profit promised to IAH, they affect neither stock returns, nor management fees that accrue to the bank. Thus, they may originate a moral hazard problem by giving incentive to managers to engage in risky activities, to be less vigilant or to misallocate PSIA, leading ultimately to a high level of risk and undercapitalization of banks (IFSB, 2010, § 44).

Thus, as synthesized by the diagram 1, PSIA may lead to an increase of insolvency risk *via* a negative effect on capital ratio in a context of asymmetric information. But this negative effect on capitalization could be offset if the risk-taking and the competitive situation of the bank requires it to allocate more capital to cover DCR. However, these two types of risk, i.e., insolvency risk and DCR, are different. In fact, the DCR is related to the competitive situation of the bank. Thus, its occurrence is independent from the problem of asymmetric information between banks and investors. While insolvency risk is the direct result of asymmetric information and moral hazard, because under these hypotheses an agency conflict might arise between shareholders and depositors, leading to excessive risk-taking, higher leverage and undercapitalization. This paper

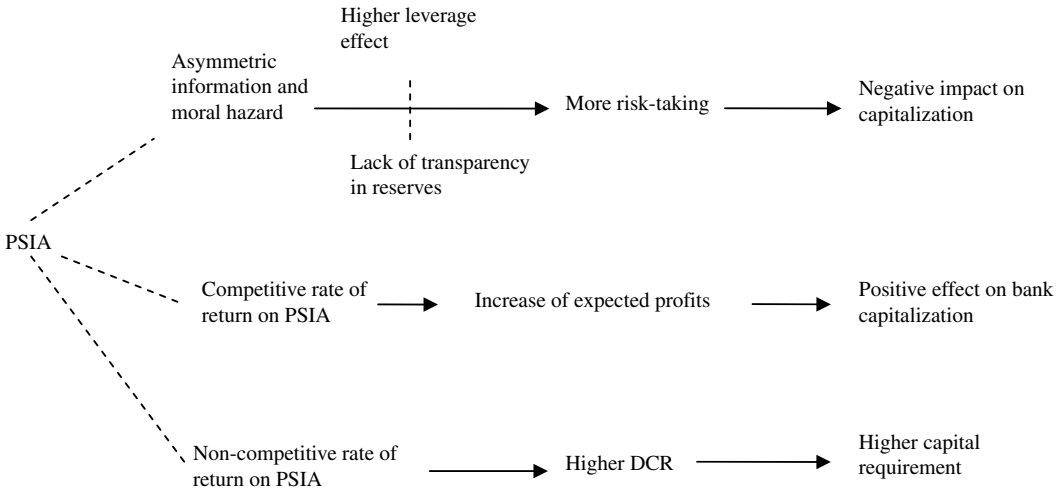

Diagram 1. Impact of PSIA on Islamic banks capitalization

contributes to the literature by separating these two risks associated with PSIA and identifying, with more acuity, the impact of these accounts on capital decision in Islamic banks. We try to verify these issues using a dynamic panel technique in the following empirical study.

3. Data and methodology

The originality of this study stands in the assumption that *PSIA* may originate moral hazard and excessive risk-taking from managers. *PSIA* can also exhort banks to maintain a large volume of reserves to cover the DCR, in order to preserve the *mudarabah* commission and avoid additional charge in capital.

Sample

In this research on the impact of PSIA on the Islamic bank capital ratio, our procedure for data collection during the period 2005–2009 is based on two steps: first, we used the Bureau VanDisjk Bankscope CD-ROM database (2009) and Zawya website specialized in Islamic financial data.[10] From the sources of information mentioned above, 389 Islamic banks are retained. Because we exclusively focus on commercial banks, investment banks and conventional banks with Islamic windows are excluded. The Islamic windows cannot be selected because data on conventional and Islamic products are grouped into the same financial statements. After this initial screening, we obtain 123 Islamic deposit banks and Islamic subsidiaries of conventional banks (mainly in Malaysia). In a second step, and in order to increase the accuracy of our selection procedure, data were collected directly from financial reports and the Bankscope database for verification.[11] Data on PSIA are collected mainly from annual reports because they distinguish between current accounts, savings accounts and investments accounts, which Bankscope does not allow. From this second screening, we retain 59 banks from 17 countries for a total of 295 observations. This sample seems to be fairly representative because it includes the main centers of Islamic finance, namely Malaysia, Bahrain, Pakistan and Iran. Finally, we use the World Economic Outlook report (International Monetary Fund, 2010), to get the data on annual growth in real GDP of each selected country. Table (1), below, shows the selected sample.

Table 1. Sample.

Countries	Number of Islamic commercial banks
Saudi Arabia	3
Bahrain	5
Bangladesh	5
Indonesia	3
Iran	3
Jordan	2
Kuwait	2
Malaysia	14
Pakistan	6
Qatar	3
South-Africa	1
Sudan	1
Syria	1
Turkey	4
United Arab Emirates	4
United Kingdom	1
Yemen	1
Total: 17 countries	Total: 59 Islamic commercial banks

Methodology

Model, variables and hypothesis

Partial adjustment model

To analyze the impact of *PSIA* on bank capital decisions, we use the partial adjustment model of capital. According to this model, a bank aims to achieve an optimal level of capital C* by operating a discretionary adjustment. But the existence of adjustment costs constraint the bank to partially adjust capital from one period to another, which requires the introduction of the parameter α. Consequently, for a period (t), discretionary change in capital and risk-taking for a bank (i) is explained by the difference between the target (optimal) level of regulatory capital and its lagged level (C_{t-1}).

$$\Delta C_{i,t} = \alpha\,(C_{i,t}^{*} - C_{i,t-1}) + \varepsilon_{i,t} \qquad (1)$$

We assume that the optimum level of capitalization C* depends linearly on group of exogenous variables which enter in the process of board of director's decision, so the equation (1) can be written as follow:

$$C_{i,t} = \alpha_0 + \alpha_1 C_{i,t-1} + \alpha_2 PSIA_{i,t} + \alpha \Sigma X_{i,t} + \varepsilon_{i,t} \qquad (2)$$

where PSIA is the ratio of investment accounts to liabilities, *X* represents a set of explicative variables divided into two categories: bank specific variables and exogenous variables. The parameter α_1, linked to C_{t-1}, is equal to $(1 - \alpha)$. The existence of adjustment costs imply that α must be negative, so we expect a positive sign of α_1. We suppose, also, that the error term $\varepsilon_{i,t}$ can be decomposed as the sum of two independent components, a random country–specific effect μ_i and a white noise $\upsilon_{i,t}$.

Variables

– *Total capital ratio (CAR)*

The dependant variable is the total capital ratio, i.e., the *Cooke* ratio, denoted *CAR*. It is equal to the regulatory capital instruments divided by the volume of risk-weighted assets.[12] The *Cooke* ratio has some advantages since it includes in the numerator only eligible capital instruments accepted by banking authorities. This indicator measures with more accuracy the solvency of a bank, since it associates a risk-weight to every class of assets.

– *Equity capital ratio* (CAP)

In order to check the robustness of estimations, we add a second dependent variable denoted *CAP* measured by the ratio of equity capital instruments to total assets. There exist two main differences between CAR and CAP ratios. The first difference is that the numerator of the equity capital ratio contains only the highest quality instruments like common

stock, retained earnings, statutory reserves, etc. But not all the instruments of CAP ratio can be eligible from a regulatory view. The second difference stands in the denominator of CAP ratio, which is composed of total volume of assets without risk-weights. Despite these differences, CAP ratio is also mainly used by the literature along with CAR ratio to evaluate bank solvency (Shrieves and Dahl, 1992; Bikker and Metzmakers, 2004). Moreover, CAP ratio allows us to get robust results because data are more available for equity capital ratio than for the *Cooke* ratio.

– *Investment accounts (PSIA)*
Our primary focus in this research is on the sign of the parameter α_2 related to the variable PSIA. The relation between *PSIA* and *CAR* ratio can be either positive or negative. Indeed, the higher PSIA ratio may be a sign of stronger market power and better competitiveness. In these conditions, the bank is able to increase the volume of its assets, to diversify risk and to invest in more profitable projects, inducing a positive impact on capitalization. However, the impact of the volume of PSIA on CAR ratio can be negative. In presence of asymmetric information and moral hazard problems, higher PSIA ratio may encourage bank's managers to take excessive risk through higher leverage. Thus, when PSIA dominates the liability structure, the bank can be incited to affect more PSIA in risky investment to maximize its value, which may ultimately have a negative impact on capitalization and solvency.

– *Failure risk (Z-SCORE)*
Target capital level depends also on risk-taking decisions. Bank risk-taking can be measured by the Z-score, which is a proxy of failure risk widely used in the literature (Goyeau and Tarazi, 1992, Boyd and Runkle, 1993; Lepetit et al. 2008; Čihák and Hesse, 2007; Čihák and Hesse, 2008; Laeven and Levine, 2009). In this sense, a high risk of insolvency may be due to excessive risk-taking. Several theoretical and empirical studies have investigated the causality between the risk-taking and the capitalization of conventional banks. Different results show that the relationship between risk and capital can be either positive or negative (Shrieves and Dahl, 1992). In order to measure bank risk, we will use the variable Z-score. The latter is also an indicator of financial stability, which is calculated as follows:

$$\text{ZSCORE} = \frac{\frac{\text{Equity}}{\text{Total assets}} + \text{ROA}}{\sigma\text{ROA}}$$

σ_{ROA} is the standard deviation of the ROA.

A high Z-score indicates that the risk of failure is low and *vice-versa*. Our first assumption is a positive relationship between Z-score and CAR ratio, which means a negative relationship between risk-taking and CAR ratio (Ahmad et al., 2008). Accordingly, an increase in Z-score (a lower risk of failure) indicates an improvement in assets quality that increases the solvency of banks and thus CAR ratio, and *vice-versa*. The second assumption is a negative relationship between Z-score and CAR, which means that an increase in Z-score may induce the bank to under-estimate risks and to increase the volume of assets. In this case, one can observe a decrease in regulatory capital. Reciprocally, a decrease of Z-score may provoke an increase in CAR ratio, reflecting a prudent behavior from banks to avoid bankruptcy and regulatory sanctions.

– *Bank profitability (ROA)*
The return on assets noted ROA, measured by the ratio of net income to total assets, is assumed to vary positively with CAR ratio, since that banks can increase their capital using retained earnings (Gropp and Heider, 2007; Jeitschko and Jeung, 2007). Then, a positive relationship is expected between ROA and CAR.

– *Bank Size (SIZE)*
We assume that the volume of assets, measured by the natural logarithm of total assets, influence the level of capitalization chosen (Shrieves and Dahl, 1992; Aggrawal and Jaques, 2001, and Heid et al., 2003). The higher the volume of a bank's assets (SIZE) is, the easier it is to raise the required funds offered by the capital market. Thus, large banks are expected to target a lower capital level than other banks (Shrieves and Dahl, 1992; Rime, 2001, Van Roy, 2005). The relationship between SIZE and CAR is assumed to be negative.

– *Regulatory pressure (REG)*
Regulatory pressure is among the exogenous factors that can influence the capital level. We expect that regulatory sanctions encourage less capitalized banks to strengthen their capital in order to improve their solvency. If bank total capital ratio (*CAR*) is less than the minimal regulatory threshold (MinREG) plus one standard deviation of the bank's own total capital ratio (σ_{CAR}), than it is very likely that, during the next period, this bank will bear regulatory sanctions. The variable REG is defined as follows:

$$REG_{i,t} = 0, \quad \text{if} \quad CAR_{i,t} > MinREG + \sigma_{CARi}$$
$$REG_{i,t} = (MinREG + \sigma_{CARi}) - CAR_{i,t}, \quad \text{if} \quad CAR_{i,t} \leq MinREG + \sigma_{CARi}$$

This dummy variable is advantageous because it uses the volatility of bank's equity as additional information to capture regulatory pressure (Heid et al., 2003, Van Roy, 2005; Cannata and Quagliariello, 2006). This measure implicitly supposes that the increase in equity is costly for a bank. The bank prefers to hold capital in excess of the required minimum, especially if capital is quite volatile. We therefore expect a positive relationship between regulatory pressure and capital ratio.

– *Economic growth (GROWTH)*
Finally, in order to check weather macroeconomic environment can also be among the exogenous factors that can influence bank capital decisions, we introduce the economic growth in real GDP denoted GROWTH. We suppose that the improvement of economic conditions and the increase of investment opportunities should improve bank profits and strengthen their capitalization. However, a negative relationship could also be observed between GROWTH and CAR, when banks under-estimate risk during economic booms which induce them to decrease capital. During periods of recession banks become more risk-averse and adopt a more prudent behavior through strengthening capital and reducing credit supply. Thus we expect that the relationship between GROWTH and CAR can be either positive or negative (Bikker and Metzmakers, 2004; Jopkii and Milne, 2007; Stolz and Wedow, 2011).

Table 2. Statistical properties of variables (total sample – 59 banks).

	Mean	Median	Standard deviation	Minimum	Maximum
CAR	0.234	0.159	0.251	–0.029	2.119
CAP	0.163	0.110	0.171	–0.017	0.999
PSIA	0.442	0.450	0.199	0.002	0.910
ZSCORE	35.496	20.661	81.271	–2.543	1003.267
ROA	0.0147	0.013	0.0316	–0.258	0.132
SIZE (log)	7.445	7.553	1.497	2.111	10.726
GROWTH	0.057	0.058	0.043	–0.049	0.268
REG	0.054	0	0.159	0	0.874

Specification and estimation method

After presenting the model and the relationship between CAR ratio and the different explanatory variables, it is possible to rewrite equation (2) as follows:

$$CAR_{i,t} = \alpha_0 + \alpha_1 CAR_{i,t-1} + \alpha_2 PSIA_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 RISK_{i,t} + \alpha_6 REG_{i,t} + \alpha_7 GROWTH_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$CAP_{i,t} = \alpha_0 + \alpha_1 CAP_{i,t-1} + \alpha_2 PSIA_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 RISK_{i,t} + \alpha_6 REG_{i,t} + \alpha_7 GROWTH_{i,t} + \varepsilon_{i,t} \quad (4)$$

where the indexes *i* and *t* indicate the country and the year of observation respectively. The estimation method of this dynamic panel is the system Generalized Method of Moments (system GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998). The use of panel techniques is advantageous, since it is possible to use both the individual dimension and the temporal dimension of data. Compared to OLS method, the GMM system method is more efficient to control the endogeneity of variables in the model, and between the dependent variable and the other explanatory variables. Furthermore, the lagged dependent variable in the right of equation (3) generates a correlation between specific individual effects and explanatory variables. The system GMM method overcomes these problems through the combination of a set of equations where the variables in first difference are instrumentalized by their own lagged values and expressed in levels, and a second set of equations in levels using first differences as instruments. According to Blundell and Bond (1998), this provides more efficient estimators than first-difference GMM because even if the variables are very persistent, the instruments used in the level equation adequately predict the endogenous variables in the model. According to the same authors, Monte Carlo simulations give evidence that the system GMM method is more efficient than the first-difference GMM when using a small sample size, which is the case in this study. Finally, to test the validity of the model, we use the Sargan test of over-identifying restrictions to check the validity of instruments (lagged values) and the Arellano and Bond's serial correlation test to verify if errors exhibit second order serial correlation.

4. Results

Descriptive statistics

Table (2) shows that the average capital adequacy ratio for the total sample is 23.4%, with a median of 15.9% and a standard deviation of 25.1%. These high levels of regulatory capitalization show that Islamic banks succeeded to maintain financial soundness, despite strong competition from conventional banks. The statistics in table (2) highlight the importance of PSIA in total liabilities of Islamic banks. The mean and median of PSIA are respectively equal to 44,2% and 45%, with a standard deviation of 19.9%. This shows the importance to investment deposits in Islamic banking despite the DCR that they may face. Regarding the risk and profitability indicators, we note that ZSCORE is highly volatile, which explains the remarkable difference between its mean, which is around 35.496, and its median amounting to 20.661. Return on economic assets (ROA), whose average value is equal to 1.47%, is characterized by a low standard deviation of about 3.16%.

Graphical analysis of changes in CAR and PSIA ratios during the study period provides some interesting results. Following the figure (1), below, there was a net decrease of CAR ratio for the total sample beginning from 2007, which coincide with an increase of PSIA ratio. Figures (A.2.1) and (A.2.2), available in the appendix, show the same findings for the two subsamples of the Middle East and Asian countries.[13] Between 2007 and 2008, selected banks based in the Middle East recorded a high decrease of the Cooke ratio from 30% to less than 20%. While there was a slight rise of PSIA stabilizing at 45% in 2009. For Asian banks, the decline in CAR was less marked, from 25% in 2007 to nearly 20% in 2008. However, there was a rapid increase of PSIA ratio from almost 35% in 2006 to more than 45% in 2009.

Before interpreting the estimation results, it is interesting to study the problem of multicollinearity between

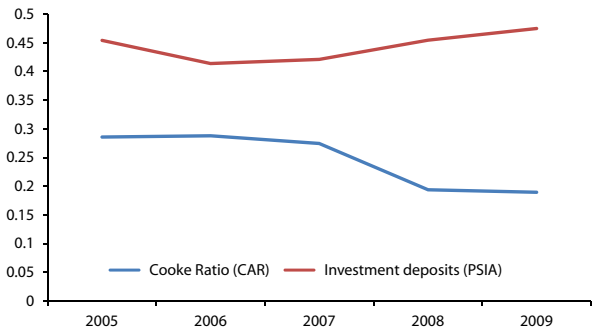

Figure 1. Change in CAR and PSIA ratios.

Table 3. Correlation matrix.

	CAR	CAP	PSIA	ZSCORE	ROA	SIZE	REG	GROWTH
CAR	1							
CAP	0.741	1						
PSIA	–0.170	–0.312	1					
ZSCORE	0.196	0.340	–0.098	1				
ROA	–0.338	–0.155	–0.063	–0.042	1			
SIZE	–0.386	–0.302	–0.028	–0.238	0.280	1		
REG	–0.076	–0.055	0.200	–0.006	–0.093	–0.190	1	
GROWTH	0.090	0.246	–0.110	0.066	0.265	–0.070	–0.093	1

Table 4. PSIA and capitalization of Islamic banks.

	Expected signs	CAR	CAP
CAR_{t-1}/CAP_{t-1}	+	0.30906*** (0.000)	0.43541*** (0.000)
PSIA	+/–	–0.14790*** (0.007)	–0.20565*** (0.002)
ZSCORE	+/–	–0.00072* (0.084)	–0.00017* (0.091)
ROA	+	0.91247* (0.055)	0.92727* (0.092)
SIZE	–	–0.02719* (0.071)	–0.01611 (0.154)
REG	+	–0.04035 (0.473)	–0.01970 (0.731)
GROWTH	+/–	–0.44493** (0.012)	–0.47109** (0.012)
Constante		0.42583*** (0.002)	0.29756** (0.017)
Observations		189	204
Statistic of Sargan (exogeneity of instrumental variables):		41.82	22.19
p-value of Sargan statistic:		0.199	0.509
Test of Arellano-Bond AR(2) (Second order auto-correlation):		–1.00	0.02
p-value AR2:		0.319	0.983

* significatif at 10%; ** significatif at 5%; *** significatif at 1%
This table shows the estimated parameters α in equation (3). Statistic p-value in parentheses. The study period extends from 2005 to 2009. Observations were made on a sample of 59 Islamic banks from 17 countries. CAR = Cooke Ratio. PSIA = Profit Sharing Investment Accounts/Total assets. Zscore (*cf*. equation (3)). ROA = Net income/Total assets. SIZE = Ln (Total Assets). REG = (MinREG + σ_{CAR}) – CAR. GROWTH = growth rate in real GDP.

explanatory variables, which can lead to biased results. To detect multicollinearity, it is possible to use the correlation matrix. According to Kennedy (1992), there is a serious problem of multicollinearity if the correlation coefficient is above 80% for each pair of variables. According to Table (3), several variables are correlated but not beyond the critical threshold of multicollinearity.

Nevertheless, the correlation matrix cannot detect all the problems tied with multicollinearity (Hamilton, 2004). A better estimation of multicollinearity is achieved by regressing each variable on all other explanatory variables. Thus, we use also the Variance Inflation Factor test (VIF), which is more reliable in detecting multicollinearity. Following the literature, there is a multicollinearity problem when VIF exceed the value of 10 for each variable and the value of 6 for all variables (Chavent et al. 2006). Table A1 in the appendix shows the values of VIF and the tolerance level on each variable of the model. We can note that all VIF values are below the threshold applied, namely

10. In addition the average VIF, equal to 3.28, is less than 6, demonstrating the absence of a multicollinearity problem. Like it was noted above from the correlation matrix, these results confirm the inexistence of a multicollinearity problem between the explanatory variables.

Besides, Table 3 shows that CAR ratio is negatively correlated with PSIA, which *a priori* confirms that there is a negative relationship between PSIA and capital probably induced by the moral hazard problem and excessive leverage. The ratio CAR is positively correlated with Z-score, giving evidence that a higher capitalization is associated with better solvency and a low probability of failure. The two variables SIZE and ROA are positively correlated, showing that large Islamic banks are more efficient than smaller banks, probably because of their ability to further diversify their asset-portfolio risk. There is also a positive correlation between REG and PSIA, which indicates that a high proportion of PSIA in total liability is associated with strong regulatory pressure. This may confirm the negative relationship observed between CAR and PSIA, given that a strong regulatory pressure, *i.e.,* an increase in REG, shows also that there is a problem of undercapitalization. Finally, GROWTH is positively correlated with ROA, giving evidence that Islamic banks profitability is stimulated during periods of economic expansion.

Estimation results

Table 4 shows the results of the system GMM estimator, obtained using the command "xtabond2" in STATA 11. The P-values associated with over-identifying restrictions test and serial correlation test are quite high, indicating that the null hypotheses of correlation between instrumental variables and error terms (Sargan statistic) and second order correlation (Arellano and Bond statistic) are rejected.

PSIA and total capital ratio

We begin by the estimation outputs of the total capital ratio (CAR) equation then we turn to analyze the robustness of the model by analyzing the results of the equity capital ratio (CAP) equation and then by adding other explanatory variables to the CAR and CAP specification.

Table 5. Robustness checks: Large and small banks.

		Large banks		Small banks	
	Expected signs	**CAR**	**CAP**	**CAR**	**CAP**
CAR_{t-1}/CAP_{t-1}	+	0.30461*** (0.000)	0.46414*** (0.006)	0.36237*** (0.000)	0.19239*** (0.001)
PSIA	+/–	–0.11258** (0.023)	–0.10660* (0.088)	–0.22717* (0.054)	–0.23783*** (0.001)
ZSCORE	+/–	0.00003 (0.943)	–0.00049 (0.402)	–0.00059 (0.125)	–0.00018* (0.050)
ROA	+	1.63764*** (0.001)	1.13576** (0.035)	0.68293 (0.365)	0.64465 (0.170)
SIZE	–	–0.03202** (0.022)	–0.02254* (0.096)	–0.03910* (0.099)	–0.05064*** (0.002)
REG	+	–0.05038 (0.621)	–0.01064 (0.928)	–0.08974 (0.255)	–0.06042 (0.209)
GROWTH	+/–	–0.46026*** (0.003)	–0.32647* (0.056)	–1.32791** (0.033)	–1.18748*** (0.001)
Constante		0.43354*** (0.001)	0.31306** (0.027)	0.55487*** (0.001)	0.61563*** (0.000)
Observations		106	112	83	92
Statistic of Sargan (exogeneity of instrumental variables):		35.96	19.34	21.28	24.80*
p-value of Sargan statistic:		0.423	0.681	0.773	0.099
Test of Arellano-Bond AR(2) (Second order auto-correlation):		–1.59	–0.89	0.10	0.42
p-value AR2:		0.112	0.373	0.923	0.671

* significatif at 10%; ** significatif at 5%; *** significatif at 1%
This table shows the estimated parameters α in equation (3). Statistic p-value in parentheses. The study period extends from 2005 to 2009. Observations were made on a sample of 59 Islamic banks from 17 countries. CAR = Cooke Ratio. PSIA = Profit Sharing Investment Accounts/Total assets. Zscore (*cf*. equation (3)). ROA = Net income/Total assets. SIZE = Ln (Total Assets). REG = (MinREG + σ_{CAR}) – CAR. GROWTH = growth rate in real GDP.

The introduction of the lagged value of CAR ratio on the right of equation (3) implies the existence of capital adjustment costs. According to Table 4, the capital adjustment coefficient is statistically significant at 1% with a positive sign as expected. This result shows the presence of adjustment costs that impede banks to operate a complete adjustment of capital to the target level in each period. Regarding the effect of the control variables, it appears that the profitability indicator ROA is statistically significant at 10% with a positive sign, which is in accordance with our expectations. This result indicates that retaining earnings is one of the major ways for Islamic banks to improve the level of regulatory capital. The coefficient of SIZE is statistically significant at 10% and shows the expected negative sign. Therefore, large Islamic banks, probably due to their "too big to fail" status and their easier access to capital markets, target a lower level of regulatory capital than small banks do. Concerning the impact of regulatory pressure Table 4 shows that contrary to our expectations there is a negative relationship between REG and CAR. But this effect is insignificant, which indicates that regulatory pressure does not seem to be a determinant of Islamic banks capital decision. Finally, the coefficient of GROWTH is significant at 1% and has a negative sign. The negative relationship between economic growth and the ratio CAR confirm our second hypothesis that capital decisions are influenced by the business cycle. During economic expansion, Islamic banks are more able to increase the volume of assets and to fund more risky projects, which can decrease CAR ratio. Inversely, during recession periods the risk appetite declines and the loss expectations increase which constraint banks to reduce the volume of assets in order to improve their capital position.

Turning now to the main focus of this study, from Table 4 it appears that the coefficient of PSIA is statistically significant at 1% with a negative sign. This result is consistent with our expectation of a negative relationship between PSIA and CAR. It shows that under the hypotheses of asymmetric information and moral hazard, higher PSIA share in the liability structure is likely to increase managers' risk-taking and to boost leverage which would have a negative impact on capital and solvency. In other words, the negative effect of PSIA on capital through risk-taking is more pronounced than its positive effect through the management of the DCR. The coefficient of Z-score is statistically significant at 10% with a negative sign. This result demonstrates that there is a positive relationship between bank risk-taking and regulatory capital. Islamic banks tend to increase CAR ratio by strengthening regulatory capital or by improving the quality of their assets portfolio in order to avoid bankruptcy and regulatory sanctions (Shrieves and Dahl, 1992; Jacques and Nigro, 1997; Aggarwal and Jacques, 1998; Rime, 2001). Inversely, higher Z-score, *i.e.,* lower risk-taking, may induce Islamic banks to increase the volume of assets portfolio and to under-evaluate the probability of failure, which can lead to a decrease of CAR ratio.

Robustness checks

As a robustness checks, we estimate the model using CAP as dependent variable. The results presented in second column of table 4 are in line with our previous findings. In the two specifications PSIA is negatively correlated with bank capitalization. Then, as showed in Table 5, the sample was divided into large and small banks in order to test whether the relationship between PSIA and bank capital is affected by scale effect or not. To split the sample we used the median value of total assets as a threshold to classify banks according to their size. Consistent with the results presented in table 5, PSIA remain negatively and significantly correlated to capital in both groups of banks, even when CAP is used as dependent variable.

5. Conclusion

Focusing on the principle of PLS, which is the core of Islamic banking intermediation, this study concentrates on the impact of investment deposit accounts (PSIA) on capital decisions in Islamic banks. Estimation of a dynamic panel composed of 59 Islamic banks observed between 2005 and 2009, by the system GMM shows that the regulatory capital is negatively and significantly related to PSIA share in total liability. The robustness checks by using an alternative measure of bank capital and by dividing the sample into small and large banks does not alter our main findings. This means that under asymmetric information the volume of PSIA is able to influence Islamic banks' behavior and stimulate their preference toward excessive risk. Thus, our research demonstrates that the DCR is not the only risk originated by PSIA. Increasing the share of PSIA may also boost leverage and induce a problem of moral hazard and excessive risk-taking that could threaten Islamic banks' capital position and solvency. In accordance with this result, it is appropriate to suggest some recommendations to improve the governance and prudential regulation of Islamic banks.

First, it is essential that the IFSB guidelines make more emphasis on the impact of PSIA on Islamic banks' behavior especially in a context of asymmetric information. Banking authorities should add new measures to increase transparency of decisions related to the management of PSIA and to enhance market discipline exerted by IAH. These transparency measures should focus mainly on the quality of assets funded by PSIA, as well as on the way that the IRR are being computed. Similarly, it is important to involve the IAH in the governance scheme through direct access to information and by representing them in the bank's board of directors.[14]

Second, in order to contain excessive risk-taking emanating from PSIA, it would be useful for banking institutions to introduce an additional category of reserves that must be sensitive to assets risk which would be added to the other two categories of reserves, namely PER and IRR. Specifically, these "reserves for asset risk" should increase in proportion to bank's risk-taking and deduced from shareholders' returns in order to incite them to avoid excessive risk-taking, otherwise the shareholders will see their returns diminish. This reserve may also rebalance profit sharing between shareholders and IAH when there is a lack of transparency, as explained above.

Third and finally, according to Archer and Karim (2009), a strategic solution consists of separating the functions of retail banking and fund management in Islamic banks by creating an independent structure dedicated exclusively to the management of PSIA. This structure is similar to investment banks and investment companies to enforce more efficiently the principle of PLS and avoid the separation between depositors and shareholders.

Notes

1. This is the task of a supervising committee inside the bank, called Shariah Committee.
2. It is worth noting that Islamic law prohibits financial transactions involving the notion of "*Gharar," i.e.* moral hazard, excessive risk and excessive uncertainty.
3. For example, in the case of *Murabaha*, Islamic bank acquires a tangible asset, store and transfer it to a customer and assumes a part of the legal and business risk born by this asset.
4. Since the customers in restricted PSIA choose by themselves in what project they will invest their funds.
5. In this case, the bank earns only a management fee.
6. This operational risk, also called fiduciary risk, must be absorbed by the banks (AAOIFI, 1999).
7. Nevertheless, PSIA rate of return is often indexed to the market interest rate (Sundararajan, 2005).
8. The AAOIFI (1999) identifies this risk as the probability of loss of competitiveness due to a greater uncertainty regarding the PSIA rate of return. The IFSB (2005) make the following definition: "Displaced Commercial Risk refers to the risk arising from assets managed on behalf of Investment Account Holders which is effectively transferred to the Islamic Financial Institutions own capital because the IFI forgoes part or all of its mudharib's share (profit) on such fund, when it considers this necessary as a result of commercial pressure in order to increase the return that would otherwise be payable to Investment Account Holder's" (2005, § 76).
9. As under the Basel Committee on Banking Supervision guidelines, IFSB divides regulatory capital instruments as two main categories: the Tier one capital instruments (equity-capital, retained results, legal reserves) and the Tier two capital instruments (occulted reserves, loan loss provisions, long term subordinated debts, hybrid debt-capital instruments). The minimum capital ratio defined by the IFSB is equal to the sum of Tier one and Tier two divided by risk weighted assets, and it must not be lower than 8%.
10. http://www.zawya.com.
11. Annual reports are available on banks' websites.
12. Regulatory capital instruments a decomposed of the Tier 1 instruments (equity capital and reserves), the Tier 2 instruments (occulted reserves, loan loss provisions, hybrid capital-debt instruments, long term subordinated debts) and short term subordinated debt (for market risk).
13. *Cf*. Table (1).
14. Moreover, strengthening the rights of IAH can further legitimize the restriction of funds withdrawals by banks in periods of loss of competitiveness in order to reduce the DCR, and not to confine themselves to reserve management only.

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Appendix 1. Variance inflation factor.

	CAR		CAP	
Variable	**VIF**	**1/VIF**	**VIF**	**1/VIF**
SIZE	7.75	0.129014	7.56	0.132321
PSIA	6.23	0.160566	6.00	0.166591
GROWTH	2.58	0.386880	2.66	0.376637
CAR_{t-1}	1.90	0.527221	2.12	0.470920
ROA	1.90	0.527485	1.72	0.581736
REG1	1.31	0.762767	1.28	0.782236
ZSCORE	1.29	0.774573	1.24	0.808913
Mean VIF	3.28		3.22	

Appendix 2. Change in CAR and PSIA ratios per region.

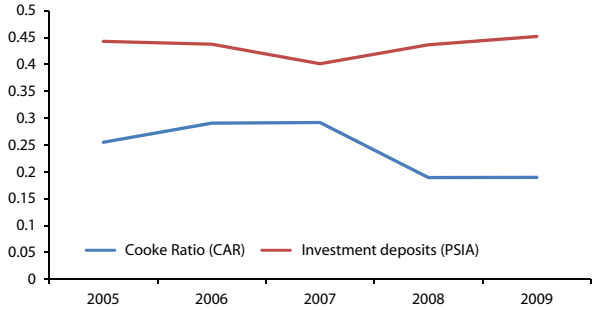

Figure A.2.1. Change in CAR and PSIA ratio in the middle east countries.

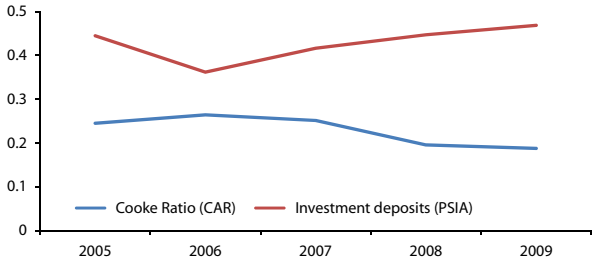

Figure A.2.2. Change in CAR and PSIA ratios in the asian countries.

"Credit default sharing": New Islamic financial instruments for hedging default risk

Nader Naifar
Associate Professor of Finance, Department of Finance and Investment, College of Economics and Administrative Sciences, Al Imam Mohammad Ibn Saud Islamic University (IMSIU), PO Box 5701, Riyadh, Saudi Arabia,
E-mail: naneifar@imamu.edu.sa, Tel: +966552124679

Abstract - The central cause of all recent financial crises (including the Asian financial crisis, the European sovereign-debt crisis and the subprime mortgage crisis) was the debt crisis. The primary objective of this study is to examine the principles of risk-sharing promoted by Islamic finance as a possible reform of or complement to the current financial system. The secondary objective of this paper is to explain how and why the famous credit default swap (CDS) markets expanded and why they contributed to the recent financial crisis. In addition, we propose a new financial instrument to hedge default risk (credit default sharing) based on the principles of risk-sharing and Islamic insurance "Takaful" (sharing responsibility and mutual cooperation) as a substitute for CDS. We explain that "credit default sharing" can reduce counterparty risk, improve banks' monitoring incentives, reduce systemic risk and contagion in financial systems and eliminate "empty creditors."

Keywords: sustainable finance, Islamic finance, risk-sharing, credit crisis, systemic risk, counterparty risk, credit default swap, Takaful, financial stability.

1. Introduction

The financial crisis of 2007–2008, also known as the global financial crisis and the subprime crisis, started with the collapse of two Bear Stearns hedge funds and peaked with the default of the U.S. investment bank Lehman Brothers. Mian and Sufi (2009) show that mortgage credit-underwriting standards were relaxed from 2001 to 2005 with the significant number of high-risk borrowers. Relaxed standards were associated with increased mortgage lending, growing housing prices, and an increase in defaults. According to Naifar (2011,a), the main problem facing financial institutions that have either invented subprime loans or purchased subprime asset-backed securities is that the decline in housing prices has contributed to the impressive increase in subprime and Alt-A mortgage defaults. Several important credit default events occurred during the subprime crisis, including the bankruptcies of Lehman Brothers on September 15, 2008, Washington Mutual, Circuit City, Chrysler, and General Motors. The acquisition of Bear Stearns by JPMorgan Chase in May 2008, the takeover of mortgage giants Fannie Mae and Freddie Mac, and the bailout of American International Group injured the confidence of investors and creditors. Eichengreen et al. (2012) argue that the decision to let Lehman Brothers fail, which damaged the global economy and created a financial tsunami, was a critical mistake that will be debated for years. In the aftermath of the subprime crisis, the enormous increase in sovereign debt has emerged as an important negative effect because public debt dramatically increased in an effort by the U.S. and the European governments to reduce the accumulated growth in private debt in the years preceding the subprime crisis.

The global financial crisis and the recent European sovereign debt crisis have raised concerns over the use of CDS. Cont (2010) argue that the effect of CDS markets can contribute either positively or negatively to financial stability depending on how counterparty risk is managed in these markets. Non-standard contract CDS markets in which protection sellers may lack sufficient liquidity resources and capital may amplify contagion. According to Delate et al. (2012), deterioration in budget increases risk and simultaneously increases the bond spread and the insurance cost priced in the sovereign CDS premium. A CDS is a contractual agreement to transfer the credit exposure of fixed income products between parties. The CDS, initially intended to be an instrument for hedging and managing credit risk, has been condemned during the recent financial crisis as being detrimental to financial stability. CDS were supposed to protect lenders against default risk. Instead, they provided a false sense of protection that

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helped propagate the credit crisis. In addition, CDS played a prominent role in the bankruptcy of Lehman Brothers, the collapse of AIG, and the sovereign debt crisis of Greece, and have been pinpointed during the recent crisis as being detrimental to the stability of financial systems.

As risk-sharing financial instruments gain large acceptance, a financial system founded on risk-sharing principles will become the basis for a sustainable financial system. According to Askari (2012), excessive leverage combined with an inherent mismatch in assets and liabilities exposes institutions to unsupportable risk and threatens the overall soundness of the financial system. Firms in emerging markets and developing countries must avoid debt-creating flows and adopt financing systems founded on "risk-sharing" promoted by Islamic finance instead of "risk-shifting" as a basis for a sustainable finance. The majority of emerging countries in Asia are actively considering risk-sharing-based instruments through Islamic finance (e.g., Islamic bonds or Sukuk) as a possible alternative. This paper reviews the recent financial crises with a special focus on the subprime crisis, examines the principles of risk-sharing promoted by Islamic finance and studies its implications on sustainable financing. The paper then explains how and why CDS markets expanded and why they contributed to the recent financial crisis. Finally, the paper develops a new financial instrument for hedging default risk (credit default sharing) based on the principles of risk-sharing and "Takaful" as a substitute for CDS.

The remainder of the paper is organized as follows. Section 2 presents the principle of risk-sharing promoted by Islamic finance. Section 3 presents CDS contracts and studies the contribution of this instrument to the credit crisis and financial instability. Section 4 provides the structure of the new financial instrument "credit default sharing," and discusses the possible contribution of this instrument to financial stability. The article ends with a conclusion.

2. Risk-sharing and Islamic finance

At their root, all recent financial crises are debt crises. Excessive leverage combined with a very poor regulatory framework exposes corporations to unsupportable risk and threatens the overall soundness of the financial system. An alternative to the current financial system must be founded on risk-sharing instead of risk shifting as a basis for sustainable finance. In this section, we study the principles of risk-sharing promoted by Islamic finance to reform or complement the current financial system. Islam is not only a divine service like Judaism and Christianity but also involves a code of conduct that regulates and organizes humankind in both spiritual and material life (Presley and Sessions, 1994). An Islamic economic system operates on the basic principle of markets (supply and demand should determine prices). Islamic finance is finance in compliance with the rulings and principles of Islamic law (or Shariah). The central feature of Islamic finance is the prohibition of the payment and receipt of interest (or Riba) . The best definition of "Riba" is the prohibition of charging interest when lending money and of any addition to money that is unjustified (such as a penalty). Based on Islamic principles, all profits should match work effort. Lending money by charging interest permits the lender to increase his capital without any effort because money by itself does not create surplus value. The lender does not receive profits for offering money unless he shares in the provision of the enterprise, and profits must be variable (not fixed or guaranteed).

In addition, Islamic finance prohibits investing in transactions involving gambling, alcohol, and drugs, and transactions including uncertainty about the subject matter and contrast terms (or Gharar). Selling something that one does not own is also prohibited. In addition, contracts with uncertain fundamental terms regarding price, time, delivery and each party's obligations and rights are prohibited under Shariah. Furthermore, under Islamic law, the transfer of debt and, therefore, the buying and selling of debt are prohibited under Shariah. The sale of an asset followed by a buy-back of the same asset at an increased price is also not permitted under Islamic law. Islamic finance precludes the assumption of excessive risk by prohibiting excessive debt instruments.

The governance structure in Islam differs from common corporate governance practices in its standardization of rules, which must obey the Shariah rules stated in the holy Quran and Sunnah (prophet saw). Effectively, the governance structure should meet the expectations of Muslim investors by providing financing modes that are compliant with Shariah. The association between risk–return and the notion of profit and loss sharing and partnerships inherent in Islamic contracts are central to Islamic finance. To enhance corporate governance, regulators must adopt policies and practices that eliminate moral hazard, excessive debt creation, and leverage. Corporate governance requires a reduction in debt financing and leverage in favor of the expansion of risk-sharing-based instruments.

Insurance in Islamic finance also differs from common insurance practices and is based on the principle of "Takaful" and cooperation. Islamic insurance (or Takaful) has emerged as a complementary Islamic banking system throughout the world. The concept of "Takaful" implies compensation and sharing responsibilities among the community. Conventional insurance involves elements prohibited by Islamic law such as uncertainty (Gharar), gambling and interest (Riba). Islamic insurance generally uses contracts based on joint venture partnerships.

The strong condemnation of interest by Islamic law led Muslim thinkers to explore ways to finance firms and investors on an interest-free basis. In Islamic financial markets, Sukuk (or Islamic bonds) are the fastest growing part of Islamic finance. The investment concept of Sukuk was created in the last few years as an alternative to interest-bearing instruments, namely conventional bonds. Sukuk represents a proportional ownership of tangible assets or a pool of assets. The features of Sukuk securities are similar to those of a conventional bond, which has a fixed-term maturity and is tradable based on normal yield prices. However, major differences include the fact that conventional bonds that yield fixed interest rates are prohibited under Shariah principles. A basic principle of Sukuk is highlighted in the sharing of profits and losses among parties in a business transaction.

As the previous discussion attests, Islamic finance reduces debt financing and promotes direct asset financing, which allows for risk-sharing instead of risk shifting.

3. CDS and the recent financial crisis

One of the most important changes in the lender–borrower relationship in the past few years has been the creation and subsequent development of the credit derivatives market, particularly CDS. In this section, we present the main characteristics of CDS and discuss the contribution of this instrument to the recent financial crisis.

What is a CDS?

The most widely traded credit derivative product is the CDS, which is a contract between two parties—the protection buyer and the protection seller—through which the protection buyer is compensated for the loss generated by a credit event in a reference instrument. If the buyer owns the reference entity, the CDS acts as a hedge against default. The protection against default was the initial motivation for introducing CDS. A default is often referred to as a credit event and includes such events as failure to pay, restructurings and bankruptcy. Generally, the protection seller compensates the buyer for the difference between the face value of the debt and its market value following the occurrence of a credit event. The protection buyer pays the protection seller a premium in basis points of the notional. The premium paid to the protection seller is called CDS spreads and reflects both the probability of default and the loss given a default. Figure 1 presents the cash flow structure in a CDS transaction.

Since its creation in the mid-1990s as a means to transfer credit exposure for commercial loans, the CDS market has experienced dramatic growth and approximately doubled in size each year between 2002 and 2007, reaching a peak of $62 trillion in 2007. Despite a significant contraction and recession after the 2008 global financial crisis, the CDS market is still valued at $30 trillion, more than double the total capitalization of all U.S. stock markets. The notional amount of outstanding CDS decreased by 19 percent in the first six months of 2009, from $38.56 trillion to $31.22 trillion. The notional amount of outstanding CDS was $26.3 trillion at mid-year 2010, a decrease of 13.7 percent from $30.4 trillion at year-end 2009. The notional amount of outstanding CDS was valued at $26.93 trillion at mid-year 2012, according to the Bank for International Settlement.

CDS have several advantages for portfolio managers, including mitigating concentrations of credit risk, promoting diversification, enhancing trading liquidity and signaling creditworthiness. Many studies on credit risk management have concentrated on estimating default probabilities from corporate bond data and exploring the determinants and the dynamics of the term structure of credit spreads. Prior empirical research has been conducted on single-name CDS products. Longstaff et al. (2005) explore the notion that a significant part of the bond spread is the result of illiquidity, making bond prices a poor proxy for credit risk. Blanco et al. (2005) argue that CDS spreads are more sensitive to firm-specific factors than bond spreads. Abid and Naifar (2006) show that CDS spreads are useful indicators of credit risk, particularly in contexts in which the underlying debt markets are less liquid. CDS spreads are generally considered a market consensus on the creditworthiness of the underlying entity. Alexander and Kaeck (2008) argue that credit spreads inferred from corporate bond prices are affected by tax considerations and illiquidity.

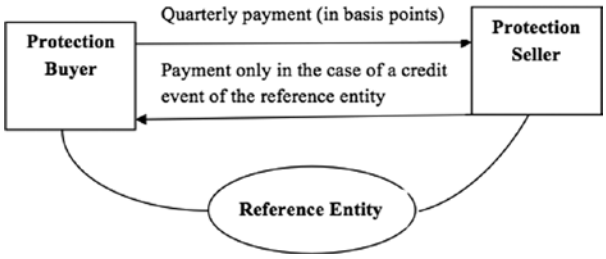

Figure 1. A common CDS transaction.

Traded indices also exist that are based on CDS and that are averages of these contracts under different names. The indices are constructed based on a set of rules, with the overriding criterion being that of the liquidity of the underlying CDS. CDS indexes have been introduced that give investors an efficient method to buy and sell market-wide or sectoral credit risk. According to Naifar (2011,b), single-name CDS spreads are much less liquid than indices, and the credit spreads that are inferred from corporate bond prices are affected by tax considerations and illiquidity. Liquidity for benchmark indices is enhanced by including only the most liquid single-name CDS. In June 2004, the iBoxx and Trac-x CDS indices emerged to form the Dow Jones iTraxx index family. The iTraxx indexes also cover credit derivatives markets in Europe, Asia and Australia. The iTraxx CDS index provides liquid market prices of credit spreads of different maturities and in different economic sectors. Therefore, CDS index spreads have become a preferred proxy for the default risk premium, rather than single-name CDS spreads.

The contribution of CDS to the credit crisis

In principle, CDS should make financial markets more efficient and improve the allocation of capital. Yet, many observers have identified that CDS have contributed to the recent financial crisis. CDS were supposed to protect lenders against default risk. Instead, they provided a false sense of protection that helped propagate the credit crisis. CDS reduce the incentives of banks to be cautious regarding credit quality; thus, banks become more indifferent to risk. Creditors may not be as attentive in monitoring borrowers once they hedge their credit exposures using CDS contracts. Morrison (2005) argues that because CDS can undermine bank monitoring, borrowers may inefficiently switch to bond financing; CDS can weaken bank monitoring and therefore reduce welfare. Using a model with banking and insurance sectors, Allen and Carletti (2006) show that credit risk transfer can lead to contagion between the two sectors and increase the incidences of financial crises.

According to Stulz (2010), the separation of risk bearing and funding made possible by CDS can also create problems with the incentive to monitor and resolve situations of financial distress. Then, for a bank that made an important loan to a firm and simultaneously buys CDS protection against a default event of that loan

has lower incentives to monitor the loan. The seller of protection (who guarantees the creditworthiness of the debt security) cannot monitor the firm's debt because it has no contractual relationship with the firm. In addition, banks can borrow more money and increase the amount of loans to firms because they can hedge their risk exposure to such firms by using CDS. Hirtle (2008) argues greater use of CDS protection leads to an increase in bank credit supply and improved credit performance. Ashcraft and Santos (2009) show that the use of CDS protection has led to an improvement in borrowing terms, primarily for safety and transparency. Such improved access to capital may increase borrowers' financial flexibility and resilience to financial distress.

Another related study addresses CDS and empty creditors. According to Mengle (2009), an empty creditor hedges its exposures and is indifferent to a firm's survival. Bolton and Oehmke (2011) formally modeled the empty creditor problem. Credit insurance with a CDS instrument affects the borrower–lender relationship in the event of financial distress because it separates the creditor's control rights from his cash flow rights. Hu and Black (2008), Yavorsky (2009) and Subrahmanyam et al. (2012) have raised concerns about the possible consequences of such a separation, arguing that CDS may create empty creditors (holders of debt and CDS) who no longer have an interest in the continuation of the borrower, and may push the borrower into inefficient bankruptcy or liquidation.

An investor might prefer to drive the firm into bankruptcy and, hence, trigger payments under the CDS contract rather than work out a restructuring plan. According to Bolton and Oehmke (2011), projects that can be financed in the absence of CDS may obtain more efficient financing because the presence of CDS lowers the borrower's incentive to inefficiently renegotiate down payments for strategic reasons. In addition, CDS protection is fairly priced and correctly anticipates creditors' potential value-destroying behavior after a non-payment. Thus, creditors have an incentive to over-insure, which results in inefficient empty creditors who refuse to renegotiate with lenders to collect payment on their CDS protection.

As with other OTC derivatives, CDS are exposed to counterparty risk, and they facilitate speculation involving negative views of a firm's financial stability. Traditionally, CDS have been traded in the over-the-counter (OTC) market, meaning that buyers and sellers independently negotiate terms and settle contracts. CDS contracts are generally considered a zero-sum game within the financial system, as there is a buyer for each seller of CDS contracts. Counterparty risk exposure affects CDS spreads and can be important in a case in which the default dependence structure between the protection seller and the underlying entity is important. Because credit events for reference entities occur suddenly (reference entities jump to default), counterparty risk is important in CDS transactions. Moreover, the risk is significant if the protection seller has insufficient reserves to cover CDS payments in the case of a credit event. CDS protection sellers such as American International Group (AIG) and Ambac faced ratings downgrades because of large mortgage defaults and increases in their potential exposure to CDS payment losses. AIG had CDS that insured $440 billion of MBS (mortgage-backed securities) and obtained a government bailout. In addition, no central clearinghouse existed to pay CDS in the event that a party to a CDS proved unable to honor its obligations under the instrument's protection contract. The bankruptcy of Lehman in September 2008, a major CDS dealer, aggravated the market's perception of counterparty risk. Furthermore, CDS can be used to hedge risks and to speculate, and it then presents a source of systemic risk. Systemic risk is generally defined as the probability that the financial system is incapable of supporting economic activity. In other words, systemic risk refers to possibilities of propagating default among other financial institutions during a short period. According to a European central bank report (2009), a number of structural features in the CDS market contribute to transforming counterparty risk into systemic risk. First, most of the CDS market remains concentrated in a small group of dealers with large exposure. Second, the interconnected nature of these dealers can result in large trade replacement costs for market participants in the event of dealer failures. Third, many banks appear to have become net sellers of standard single-name and index CDS contracts, which imply exposure to market risk.

Many observers focused on counterparty risk on credit derivatives and CDS that caused a worse credit crisis. Credit derivatives greatly expose financial institutions to credit risk. The failure of a financial institution to honor its payments may cause other financial institutions to fail as they experience losses on their exposures, and this contagion may cause a collapse of the financial system. Jorion and Zhang (2007) analyze the intra-industry information transfer effect of credit events as captured in the CDS and equity markets. They find that contagion is reliably associated with industry characteristics. Moreover, contagion effects are better captured in the CDS market than the equity market. When Lehman failed to reach a deal with any of a number of possible buyers and investors, and then collapsed on September 2008, several firms and financial institutions became financially weaker, causing a contagion effect of Lehman's failure through losses on credit derivatives contracts because of the failure of the counterparty. The financial system bears systemic risk caused by the interconnectedness of the CDS market.

4. "Credit default sharing": New financial instrument

This section presents a new financial instrument for hedging default risk based on the "risk-sharing" principle. The concept underlying this instrument is based on the combination of the most important characteristics of CDS (hedging default risk) with the principles of Islamic cooperative insurance (Takaful) and the laws and regulations governing the protection of many of the world's financial markets (clearinghouse or central counterparty).

Structure of "credit default sharing"

In simple terms, "credit default sharing" is a financial contract between cooperative banks for hedging default risk based on the principles of risk-sharing and "Takaful," which means guaranteeing one another. Banks are both buyers and sellers of protection. We present the main steps of "credit default sharing" transactions.

Step 1: Some cooperative banks organized in a country constitute a guaranty fund that represents all cooperative banks. The resources of the constituted fund are from the cooperative banks' donations, margin calls and investment returns of surplus cash-savings.

Step 2: Each bank pays a variable sum of money in the form of a donation depending on the degree of risk of each bank portfolio (without recovery). The guaranty fund also functions as a clearinghouse that becomes the counterparty to all trades. The fund can select credit (through screening process), diversify and manage the credit risk of the total credit portfolio through membership requirements based on minimum capital requirements for cooperative banks (in the form of a donation).

Step 3: The guaranty fund prevents cooperative banks from facing additional exposures to the total credit portfolio and special margin calls depending on the degree of risk. The guaranty fund may adjust collateral requirements several times daily to account for changes in parties' creditworthiness. Margins are requested to absorb short-term losses and first losses in the case of default. All cooperative banks pay an equally fixed sum of money to cover losses in the case of a default event. The amount of equally fixed sums of money is determined by the amount of expected losses in the case of default (loss given default) divided by the number of all cooperative banks. In the case of credit risk reduction, the amount of margin available is invested in a short-term horizon or refunded to banks according to the agreement within credit default sharing contracts.

Step 4: Even with continual collateral adjustments and margin calls, guarantee funds sometimes have difficulty collecting sufficient collateral to account for "jump-to-default risk." In the case of large losses not covered by margin calls, cooperative banks contribute to the guaranty funds with additional equally payments in accordance with the principle of Takaful (and not according to the risk of their position). The sharing responsibility and mutual cooperation of all banks reduce extreme risks, contribute to overall financial stability and reduce systemic risk by immunizing each bank from the default of others. Computing an appropriate additional payment for bank members should be based on loss given a default and a default dependence structure between all names in the total credit portfolio using copula functions. In case of a default, no payment will be made by the guaranty fund. Figure 2 illustrates the main steps of "credit sharing transactions."

"Credit default sharing" and financial stability

This section presents the possible implication of "credit default sharing" on financial stability compared with CDS. "Credit default sharing" can eliminate the empty creditor problem caused by CDS (see Hu and Black, 2008; Bolton and Oehmke, 2011). Creditors protected by CDS have little incentive to participate in out-of-court restructurings of firms in difficulty, even when continuation is optimal. The incentives to the restructuring are even lower if creditors are over-insured and then their protection reward exceeds the maximum amount that they can receive during restructurings. However, "credit default sharing" based on a risk-sharing principle increases incentives to exert monitoring efforts to reduce default risk because losses from defaults will be supported by all cooperative banks. Moreover, margin calls improve incentives for monitoring and mitigating risk.

CDS contracts, which provide a form of insurance against losses, pay off only as long as the seller of protection itself is solvent. CDS markets suffer from counterparty risk created by their trading partners' potential default. According to Kress (2011), trading partners, however, are not always able to fulfill their contractual commitments; bankruptcy or illiquidity may prevent the protection seller from satisfying the contract. "Credit default sharing" transactions mitigate

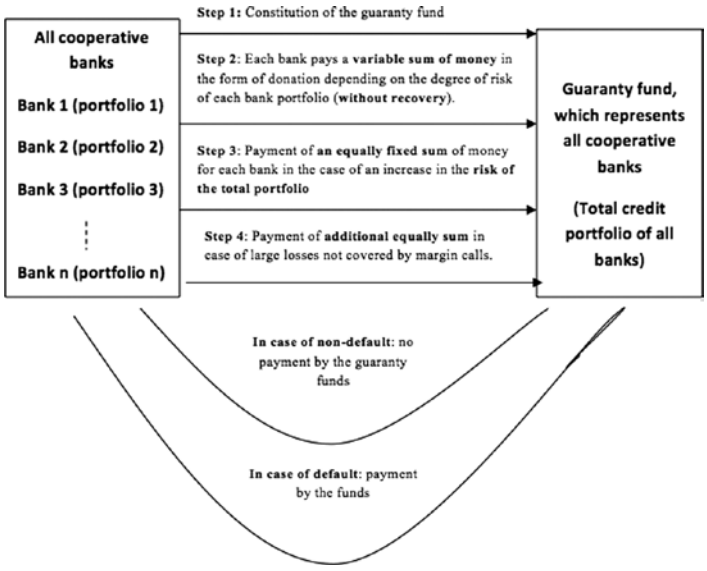

Figure 2. A "credit default sharing" transactions.

counterparty risk because it requires cooperative banks to post collateral through the constitution of a guarantee fund, contributions to the fund through donations and daily margin calls. This collateral is intended to minimize losses sustained by the banks. In addition, the principle of "Takaful" founded on the cooperative principle and mutual help among the group eliminates the counterparty risk in "credit default sharing" transaction.

The global financial crisis has also revealed that CDS markets increased systemic risk in the financial system. The default of Lehman Brothers created a potential systemic risk because market participants and investors did not expect this bankruptcy. An increase in systemic risk in the financial sector should increase the default risk of each institution, generating an increase in the CDS spread. One way to mitigate systemic risk is to impose capital requirements. In the case of "credit default sharing," requiring the cooperative banks to hold capital in proportion to its hedging activities counters the hidden leverage embedded in these activities. The presence of the guarantee fund (which represents all cooperative banks) minimizes risks to the financial system by reducing interconnections and dispersing losses. Margin calls and extra capital requirements strengthen the balance sheet of the guarantee fund for a given amount of hedging. The systemic benefits of the guarantee fund are manifest, but we anticipate that some readers will consider the downsides of the guarantee fund, which are primarily concentrated risk and posing threats to financial stability. In contrast, "credit default sharing" is based on risk-sharing and "Takaful," which means guaranteeing one another. Each of the cooperative banks pools resources and efforts to support the losses of participants within the group.

As the previous discussion attests to, "credit default sharing" can eliminate "empty creditors," reduce counterparties, improve a bank's incentive for monitoring and reduce contagion and systemic risk in financial systems.

5. Conclusion

The emergence of Islamic finance as a new paradigm in financial systems has been met with widespread indifference by many western economists. However, the recent financial crisis appears to be a moment of epochal change and the current financial system has been seriously questioned. The current financial system is inherently unstable because it is pre-eminently a debt- and interest-based system, creating excessive debt and leverage through the credit multiplier. Whereas many papers exist that discuss how the subprime mortgage crisis has wide-ranging effects on the housing market, the economy, regulators, central banks, stock markets, and exchange rates movements, little research has been conducted on policies and regulations adopted in the aftermath of the crisis.

An alternative to the current model is the Islamic model that reduces debt financing and instead promotes equity- and risk-sharing-based instruments. Islamic finance, which conducts finance in compliance with the rulings of Islamic law, is not only a fast-growing field but has now officially moved into mainstream financial markets. In this paper, we attempt to stimulate policy makers, regulators and supervisors about the principles of risk-sharing and "Takaful" promoted by Islamic finance as a possible reform or complement for current financial systems and efficient financial markets. Financial institutions in emerging and developed markets must avoid "risk-shifting" instruments and adopt hedging instruments that allow for risk-sharing and mutual cooperation.

To enhance financial market stability and to reduce systemic risk, regulators must adopt policies and practices that eliminate moral hazard and excessive debt creation and leverage, and that provide efficient insurance solutions that match market needs and ensure financial stability. In this paper, we explain how and why the markets of the famous CDS expanded and why they contributed to the recent financial crisis. In addition, we propose a new financial instrument for hedging default risk (credit default sharing) based on the principles of risk-sharing and mutual cooperation as a substitute for CDS. We explain that "credit default sharing" can reduce counterparty and systemic risk, improve a bank's incentive for monitoring and, therefore, increase welfare, reduce contagion in financial systems and eliminate empty creditors. Whereas the future remains uncertain and open, an analysis of the past financial crisis along these lines provides crucial insights for policymakers into strategies for shaping that future.

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Performance at risk: Another approach to value at risk for Islamic finance[1]

Alioune Diagne
Senior Consultant, Theorem Consulting, alioune.diagne@theorem–consulting.com, +336 09 39 95 35

Abstract - Basel Accords promote Value at Risk (*VaR*) – which is the most used method – as the preferred one to measure and report market risks of financial institutions. Using *VaR* usually requires having asset valuation models and identifying their risk factors as model input parameters, allowing thus to stress them and calculate valuations (mark–to–market or mark–to–model). The previous requirements will make *VaR* calculation – roughly adapted from conventional finance – complicated for Islamic finance as there are not well–known valuation models, and the risk factors may not be easily identified. Moreover, Islamic finance induces specific risk considerations, like pricing market risks in *ijârah*[2] contracts, in which they pertain to leased assets' residual values. Such data might be either inexistent or uneasy to exploit in usual financial activities. Although difficult to achieve, the regulators will expect an Islamic financial institution (IFI) to be able to measure and report such risks.

We propose in this paper to consider the performance that can be missed versus the same capital invested in the *sukuk*[3] market that serves as a reference. We assume that an IFI has economic models, possibly validated by either auditors or regulators, which produce asset revenue as a time series of cash flows that can be valuated with comparison to *sukuk* revenue. From these cash flow time series we can model and compute the expected performance and hence the Performance at Risk (*PaR*) using methods and techniques from the *VaR* framework. Doing so, we aim at capturing the volatility of returns through the volatility of revenues. Then we show how the *PaR* can be used for management needs (e.g. displaced commercial risk measurement) as well as regulatory needs (e.g. regulatory capital measurement). Therefore, the paper proposes a *VaR's* paradigm shift towards its effective application to Islamic finance in order to compute market risk.

Keywords: Islamic finance, market risk, performance at risk, value at risk, displaced commercial risk, regulatory capital, economic capital

1. Introduction

Islamic finance bans interest and ambiguity – some people say uncertainty – about both the subject matter and the terms of the contract and enforces risk-taking[4] through trade and investment on *fiqh*–compliant[5] tangible assets while sharing profits and losses (Usmani, 2001). The capability to make profits and discard losses is of that fact a central goal and a major competition issue therein. Simply stated, performance measures the growth (resp. the decrease) generated by profits (resp. losses). Modelling and forecasting performance helps Islamic financial institutions in disclosure of reliable and timely information on the profits and losses towards regulators and clients willing to hold accounts sharing them. It can also be used in defensive as well as offensive management strategies. In a defensive strategy performance will be measured over a minimum and conversely under a maximum in an offensive strategy. Besides, it may help in determining necessary capital reserves for those management strategies. In this paper, we propose an approach for performance modelling and forecasting based on Value at Risk (*VaR*) methods and techniques (Best, 1998) applied on a model of the performance built in order to support them. We then compute the Performance at Risk (*PaR*) and show how it can be used in the daily operations of an Islamic finance institution for both regulatory and customer relationship management needs.

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2. Performance modelling and forecasting

Definitions

Consider a financial instrument F costing P_t^F at time t and earning P_{t+h}^F at horizon h in the future. We consider that there is a discounted zero–coupon *sukuk* costing S_{ht} at time t and maturing at horizon h (see section 2.3.1). The performance of F at time t is (Alexander, 2008):

$$X_{ht}^F = \frac{S_{ht} * P_{t+h}^F - P_t^F}{P_t^F}$$

The initial value P_t^F is indeed an amount P_0^F invested at a time t_0 in the past. We can – in a naive version of performance – consider that $P_t^F \equiv P_0^F$ ignoring the cost of funding. We can also – in the most elaborated version – calculate a funded cost based on the overnight discounted *sukuk* price from day to day as if the initial amount was invested in the *sukuk*. If we consider *sukuk* return as some kind of risk free return (keeping in mind that Islamic finance discards risk-free investment), performance based on funded cost tells us how much the asset performs over (or under) the market. This funded version of portfolio value at time t is not considered further in the paper for sake of simplicity.

X_{ht}^F is the h–day performance of instrument F. The α quantile $x_{ht,\alpha}$ of this random variable is the performance at risk of that instrument for the horizon h and the α confidence level:

$P\left(X_{ht}^F < x_{ht,\boldsymbol{\alpha}}\right) = \alpha$ so that:

$$PaR_{ht,\alpha} = \begin{cases} -x_{ht,\boldsymbol{\alpha}} \text{ expressed as the performance at risk} \\ -x_{ht,\boldsymbol{\alpha}} * P_t^F \text{ expressed as the corresponding capital at risk} \end{cases}$$

PaR has two components that we will always consider together in the sequel of the paper. Performance and capital at risk are tightly linked making of *PaR* a twofold concept. Under *PaR* considerations, risked performance of $x_{ht,\alpha}$ on an investment of P_t^F means a need of $+x_{ht,\alpha} * P_t^F$ in capital deposit invested in the most liquid asset – i.e., the *sukuk* – in order to be at least neutral regarding profit and loss at the horizon. We will from now on refer to the performance component as $PaR_{ht,\alpha}^{Performance}$ and to the capital component as $PaR_{ht,\alpha}^{Capital}$.

Since performance is based on the discounted profit and loss (P&L) and discounted P&L can be cumulated at a portfolio level, performance can therefore be considered at portfolio level. The horizon here can be taken equal to the minimum of or any other valuable time horizon (see section 2.3.1 below). The model of performance is extended to a portfolio containing n instruments $\{F_1, \ldots, F_n\}$ costing $\{P_t^{F_1}, \ldots, P_t^{F_n}\}$ at time t and earning $\left\{P_{t+h_1}^{F_1}, \ldots, P_{t+h_n}^{F_n}\right\}$ at horizons $\{h_1, \ldots, h_n\}$ as follows:

$$X_{ht}^{Portfolio} = \frac{\left(\sum_{i=1}^n S_{h_i t} * P_{t+h_i}^F - \sum_{i=1}^n P_t^{F_i}\right)}{\sum_{i=1}^n P_t^{F_i}}$$

where each $S_{h_i t}$ is the discounted price at time t of the zero–coupon *sukuk* maturing at horizon h_i. $X_{ht}^{Portfolio}$ will be noted X_{ht}[6] for short in the remainder of the paper.

Variations on the defined performance model like downside risk metrics can be used for specific management strategies. $Y_{ht} = \sqrt[2]{\frac{1}{N}\sum_{i=1}^n (X_{ht_i} - B_i)^2}$ and $Z_{ht} = (X_{ht} - T)^+$ are two kinds of such variations. Y_{ht} is the tracking error versus a benchmark B on a sliding window of N days whereas Z_{ht} is a kind of insurance cost against performance decrease with a threshold T.

Properties

VaR is known to present some must–have properties for every risk measure (Hull, 2009). Let's examine them for *PaR*. The properties are:

1) *Monotonicity: A portfolio with worse results than another in every state of the world should have worst risk measure.* Worse results mean less discounted P&L for an equal initial value and less discounted P&L means worse performance. The *PaR* follows in both its components capital and performance.
2) *Translation invariance: Adding K amount of cash should make the risk measure decrease by K*. Consider adding K amount of cash to a financial instrument portfolio. For the sake of simplicity we consider that K is invested in the *sukuk* at market rate and therefore has no P&L at time t. Actually it appears that $\frac{X_t}{X_t^*} = \frac{P_t^F + K}{P_t^F}$ where X_t^* is the *PaR* of the portfolio that receives the K amount of cash, and is the *PaR* of the initial portfolio. Thus $X_t = X_t^* * \left(1 + \frac{K}{P_t^F}\right)$ shows that X_t^* decreasing proportionally as the contribution of K to the portfolio. The $PaR_{ht,\alpha}^{Performance}$ decreases of $\frac{K}{P_t^F}$ and the $PaR_{ht,\boldsymbol{\alpha}}^{Capital}$ decreases in a similar way.
3) *Homogeneity: Changing the size of the portfolio by a factor λ while* keeping *relative amounts unchanged therein should result in risk measure being multiplied by λ.* Such a change leaves $PaR_{ht,\alpha}^{Performance}$ unchanged because each asset contributes the same way to the portfolio before and after the change. However $PaR_{ht,\alpha}^{Capital}$ increases by a factor λ as the initial value of the portfolio has increased in a same manner.
4) *Subadditivity: The risk measure of the result from merging portfolios is less than the sum of their respective risk measures before merging*. When portfolios are merged their performance contributions to the result are lessened. Diversification reduces performance as it reduces risk. The subsequent decrease of both PaR components is straightforward. PaR as previously defined is then a valid risk measure. We can make on the underlying performance model the same hypotheses that the VaR underlying model allows us to use and the same methods and techniques to compute and interpret quantiles.

Methodological features

PaR parameters

Economic business models

We expect each IFI to have robust and reliable business models from which we derive revenues of assets as the principal inputs – with a deep, liquid and efficient *sukuk*

market – of the hereafter described approach. Such models must take into account the pro–cyclicality and the stability of the surrounding economic system. It does not sound like an unrealistic assumption as it is just one of the criteria of viability of the IFI's business. These models can be stressed when needed, with scenarios to simulate degradation or improvement of the surrounding economy whenever it undergoes downturn or growth. The assumption on the *sukuk* market can be alleviated by taking into account the alternatives used in the daily lives of IFIs in order to derive the zero–coupon returns (see next paragraph) and investment opportunities. Therefore, in the sequel of the paper, each reference to *sukuk* may stand either for *sukuk* when they exist of for their replacement in the marketplace.

Discounted P&L and performance

We need to calculate P&L to date t in order to determine the performance at this date. Therefore, we assume that *sukuk* are to Islamic finance what bonds are to conventional discounted P&L and performance. We need to calculate P&L to date t in order to determine the performance at this date. Therefore, we assume that *sukuk* is to Islamic finance what bond is to conventional finance. The *sukuk* market is hence supposed to be liquid, deep and efficient enough to serve our other expectations. It is also supposed not presenting arbitrage opportunities. With this latest assumption, we aim at having a unique zero–coupon return per time horizon (Musiela et Rutkowski, 1998). Given this, we can consider having a term structure of zero–coupon *sukuk* that allows computing discounted value of future cash flows. The term structure can be built with a classical method of stripping from a panel of *sukuk* like it can be done for a panel of bonds (James et Weber, 2001). To build it, we will give preference to Islamic money market instruments and sovereign *sukuk* in each given local market. When the sovereign *sukuk* are not available, we will choose other *sukuk* of the marketplace with the best ratings and largest volumes, aiming this way at better liquidity and most efficiency. When the *sukuk* market is not representative – like it would be in western capital markets – we can use foreign *sukuk* from a representative offshore market. In the definitive absence of any valuable Islamic instruments to build the curve, we can use – as an evolutionary solution – conventional debt market yield curves until we obtain an Islamic solution as IFIs use them in their daily operations. The risk managers can stress such curves in order to mimic the difference observed between Islamic instrument yields and the conventional ones.

The performance shall be measured at the gross level, i.e., without including the various possible operating charges (e.g. the *mudârib*–fee in a *mudârabah*[7] contract where the IFI plays the agent role) or the use of reserves to improve bad performances. This ensures that it is only affected by market risks. Otherwise it may be affected by other parameters like the management decisions to use reserves or give up fees in order to improve profitability whenever it is too bad. Performance needs to be measured per se so that it only includes the market risks and the other risks that are inherently linked to them by the nature of the contracts (think about the commingling of market and credit risks on an asset–based *murâbahah*[8]).

Risk factors identification

One of the *VaR* main concerns is the identification of risk factors and the mapping of the portfolio to them. As far as *PaR* for Islamic finance is concerned, the identification of every single risk factor is very difficult and even impossible. We do not yet have standard models to mark–to–market or even mark–to–model the value of instruments. So we cannot identify the various risk factors and their impacts as inputs of the pricing models. When measuring performance, we use only discounted cash flows that are often enforced to be known by the nature of the Islamic contracts and instruments. When they are unknown by nature like in a *mushârakah,*[9] we expect the IFI to have reliable forecasts, what is a minimum for any conscientious investor. From that, *PaR* attempts to measure the volatility of revenues and use it as a proxy to the volatility of returns. We assume that the volatility of revenues factorizes every single market risk and sums up everything in cash flow changes. These cash flows changes then report the commingling of the various market risks without allowing isolating and stressing of each of them in order to measure the lonesome and combined impacts on the valuation. This simplification is very relevant in Islamic finance where, for instance, the raw material prices bought in a foreign currency can deeply impact an *istisnâ*[10] project. Measuring each single impact without clearly stated valuation models might be unworkable.

PaR horizon

The choice of horizon is often discussed in *VaR* computation processes (Best, 1998) (Alexander, 2008), (Saita, 2007). *VaR*'s horizon is relevant to the quality and availability of the inputs to its calculation more than to management and regulatory features. In (Klaassen et van Eeghen, 2009) authors consider that for performance measurement the natural time horizon coincides with the performance cycle of the IFI. A one–year period aligns more with the financial reporting period towards regulators and clients. A longer period may align more with the life cycle of investment project whereas a shorter one may align more with short–term consumer financing. A one–day period – as practiced somewhere in conventional finance – is not relevant because of the presence of quite illiquid assets. The driving parameters are the pace and frequency of the trading activity and the composition of the market portfolio. We can by the mean of the discounted *sukuk* prices discount all the P&L to this horizon since we consider that there is no arbitrage opportunity between the discounted *sukuk* maturing at the various h_i horizons.

Risk survey in Islamic finance

Islamic finance comes with a twofold position toward risk: common features with conventional finance and appropriate specific features (Akkizidis et Khandelwal, 2007), (Khan et Ahmed, 2001 (1422H)). The common features relate more to operational and credit risk whereas market risks for Islamic finance is quite different from the conventional one. Market risks in conventional finance can be hedged and or transferred to the market through sale. Market risks in Islamic finance will be necessarily supported in almost all cases, because hedging instruments trading is scarce and debt trading is banned, discarding most often the sale even through securitization. Hedging instruments may exist or be synthetized with *fiqh*–compliant means expected to undergo successfully *sharîah* validation of their substance. Even still, they need to be liquid and actively traded to be efficient, which is not the case for the time being.

Besides the differences in risk mitigation, Islamic finance features more specifics in terms of market risks. Identifying market risks for investment into *mushârakah* and *mudârabah* contracts is not easy at all. It means identifying market risks for every single project invested in while their link to the market may not be evident. Some of the projects may be *istisnâ* in some pioneering craft body – far from the ever invested in application domains – where the IFI did find some valuable investment opportunity. Remember that the ultimate goal of a banking systems is to finance the economy, so there should not be banned investment domains. It would not be relevant to invest more money for handling the identification of the market risks in order to meet regulatory obligations. The whole business can so be jeopardized. Moreover, any failure in the instalments of the investment or in the whole quality or the time to market of the produced asset will affect the mark–up expected from the project and thus ends up as a market risk.

PaR computation

Methods and techniques to compute *PaR* are the same as in the *VaR* framework. Actually *PaR* has been defined in that purpose. We examine the pro and cons of each of the *VaR* calculation methods when it comes to their application to the *PaR*.

Parametric PaR

Under the simplifying hypotheses that the portfolio's assets price changes are normally distributed, *VaR* is deduced from the means and standard deviations of the assets. The assets are supposed to be linear ones excluding optionality in the simplest approach although extensions exist to take into account this optionality. The main advantage of parametric *VaR* is that it is a closed form analytical solution that is quickly and simply implemented. This approach to *VaR* calculation can then be used in real life on liquid portfolio with linear products inside.

For application to *PaR*, the difficulty comes from the illiquidity of the assets that makes uneasy to estimate volatility. Moreover the correlation between the portfolio assets may be difficult to determine. Beyond all these considerations, the computation of the performance component of *PaR* will not be done straight as there is no obvious link between performance and covariance. It could be deduced from the capital component that would be more obvious to obtain formally as being the calculated *VaR*.

Historically simulated PaR

Usually historical simulation in *VaR* involves identifying market variables affecting the portfolio and then building scenarios from their past day to day variations to be input when valuating the portfolio. The assumption behind is that the past joint distributions of asset returns reasonably predict the current ones. The observations can be weighted with different methods in order to discard the stationary nature assumed on the market variables when we consider that each day-to-day variation contributes the same way to the model. Here there is neither limitation on the assets in the portfolio nor hypotheses on their prices changes.

Applied to *PaR*, historical simulation consists in building the scenarios from the day-to-day past variations of the discounted *sukuk* prices. The discounted P&L is then calculated by applying those variations as shifts on the present discounted *sukuk* prices. The validity of the approach will heavily rely on the availability of sufficient past discounted *sukuk* prices, what we don't expect to be easily found. The depth of the *sukuk* market and overall quality of available data will not serve such expectations by now. This would not be a stopper issue where conventional yield curve used.

Monte Carlo simulated PaR

An alternative to the historical simulation is the Monte Carlo simulation. Unlike historical simulation – where the asset price change shape is dictated by the past events – Monte Carlo simulation assumes normality of asset price changes. The technique of eigenvectors and eigenvalues is used to handle correlated asset's price changes in a portfolio.

For *PaR* computation, the scenarios applied to *sukuk's* discounted prices are obtained by simulation. This is the most straightforward way to compute *PaR* in the current state of the art as it by passes the lack of *sukuk* past data. Monte Carlo simulation seems the simplest and most robust way for inception and set up of *PaR* computation based on *sukuk* in an Islamic finance institution when the *sukuk* market will be representative enough.

3. Performance analysis

The capital protects an institution from insolvency in case the difference in value between its assets and liabilities decreases so that the amount of capital becomes negative. The economic capital represents an estimate of the worst possible such capital decline within a horizon of time at a given confidence level (Klaassen et van Eeghen, 2009). It is different from the regulatory capital as it is an internal estimate of what the institution considers it needs to run its business safely and not an estimate of what the regulators consider so. The two considerations of the risks undergone by the business are almost always different, each IFI having its own business oriented viewpoint whereas the regulator has a standardized one. Actually, economic capital must be – in order to be efficiently managed – allocated according to the different risk sources like market volatility, credit defaults, operational errors and displaced commercial risk. Hence business economic capital is allocated to offset odds that come from market movements when everything else remains as fair as expected. Business economic capital is set up therefore to cover the expected losses incurred from the market.

Economic capital

Islamic finance generally sets up two kinds of business reserves that can be put in relation with economic capital (Hennie et Zamir, 2007; James et Weber, 2001). Profit Equalization Reserves (PER) are set up to face unexpected losses whereas Investment Risk Reserves (IRR) are set up to face expected losses. PER is taken – whenever the realised performance gives room for doing so – from gross income to smooth future return on investment accounts when it is necessary. IRR is taken from the investor's benefits – excluding the IFI's share – to offset losses whenever they occur.

Usually *VaR* figures are considered measures of market risks and hence reveal expected losses incurred by the

market. Our model of performance is based on cash flows, and the figures are obtained by varying them. We don't expect such variations to come from anywhere except market shocks, because physical damage on the assets will result in cash flow's full destruction and not just variations no matter their importance. *PaR* capital component is therefore a candidate to measure the needed level of IRR business reserves and to drive its usage. The *PaR* capital component is the smallest part of the IRR to be invested in the *sukuk*, the remainder can go to more profitable and less liquid investments. In fact, Performance at Risk (*PaR*) – or else stated Earning at Risk (*EaR*) – has been first discussed in (Maten, 2000) as reported in (Saita, 2007). Once measured, it can be linked formally to the economic capital for business risks as – according to (Maten, 2000) – the capital to be invested in the *sukuk* in order to cover losses or missed earning that may come from business risks under the horizon h.

Displaced Commercial Risk (DCR) is the risk incurred from profit and loss sharing. According to the founding principles of Islamic finance, some accounts act as loss absorbing. It is about the Restricted Profit Sharing Investment Accounts (RPSIA) and the Unrestricted Profit Sharing Investment Accounts (UPSIA). The restriction regards the management mandate granted to the IFI. Actually, PSIA holders are willing to share profits but they secretly hope that the IFI is managed in a way that shelters them from losses. They are therefore in search of the best performing IFI. *PaR* can help measure the DCR economic capital. Indeed the *PaR* capital component measured from a benchmarked-performance gives the economic capital needed to be at least as good as the benchmark. This is nothing less than the insurance cost against loosing PSIA accounts for the profit of the benchmark, or the cost of DCR that must be hedged by the PER. The selection of the benchmark is dictated by the IFI's environment and business aims. It must at least take into account the *zakat*[11] level of 2.5% to which some of the customers must be liable.

PaR can help determining the convenient level of IRR and PER and hence knowing the economic capital needed to cover them. Whenever either IRR are insufficient to cover the *PaR* capital component or PER are insufficient to cover the DCR, the IFI must allocate the adequate economic capital to ensure the viability of the business. Otherwise, it is a matter of IRR and PER optimal management, and *PaR* helps to arbitrate between liquidity and profitability when investing reserves.

Regulatory capital

The profit and loss sharing principle makes regulatory capital requirements somewhat specific in Islamic finance. For that, the Islamic Financial Services Board (IFSB)[12] proposed an improved Basel II Pillar One Capital Adequacy Ratio (CAR) to capture this specificity as follows:

$$CAR = \frac{Core\ Capital + Supplementary\ Capital}{\sum_{Market,\,Credit}^{Operationnal} RWA - \sum_{Market}^{Credit}(RWA_{RPSIA} + (1-\alpha_r) * RWA_{UPSIA} + \alpha_r * RWA_{PER+IRR})}$$

where RWA stands for Risk Weighted Asset and a_r is a regulatory parameter fixed between 0% and 100% to capture the loss absorbing level of the UPSIA. An effective measure of regulatory capital enforces an efficient determination of the three risk components (market risk, credit risk and operational risk).

The capital at risk is an approximation of market RWA in spite of who owns them (the financial institution or the PSIA clients (Hull, 2009)). With *PaR*, one can then determine the market component of RWA whilst tuning all parameters, among which is the horizon according to regulatory requirements on *VaR*. The credit and operational components can be determined using conventional finance methods and techniques with marginal adaptations because of the deep similarities between the two industries.

The a_r is indeed a very important managing parameter. It might measure the loss absorption level of the clients according to the regulator's perception. The closer it is to 100%, the less the regulator is confident in the fact that the PSIA owners would be inclined to absorb the losses. The value set up by the regulator is hence necessarily a conservative one in order to be relevant to the whole market. An IFI may have an internal estimate a_{ri} for a_r different from the regulator's one in order to fine tune the DCR. According to its own clients profile, the a_{ri} may be less or greater than a_r. The DCR computed by *PaR* needs to be covered by a_{ri}%. *DCR* in cash economic capital from the PER eventually invested in the most liquid assets to match the loss absorption level as anticipated by the α coefficient's philosophy.

4. Conclusion and future work

The *raison d'être* of Islamic finance is to conduct financing business according to Muslim ethics that establish that revenue cannot be guaranteed and only risk taking legitimates return deserving. These fundamental principles are concisely stated in the *fiqhi* axioms *al-qarâju bil-damân* and *al-ghunm bil-ghurm* (approximately meaning *revenue goes with liability* and *wealth results from endeavour* and implying that entitlement to return from an asset is intrinsically related to the liability to losses inherently linked to that asset). Risk is central to this finance and hence its management is compulsory. Managing risk in a way compliant with the international finance stakeholders' usage is a matter of principle and a guarantee of successful integration therein. With the expected development of Islamic investment banking, market risks will get more and more managing criticality as well as regulatory criticality. We have – for those reasons and for obvious but non-stated others – attempted in this paper to achieve a *VaR*'s paradigm shift in order to handle the market risk management and its regulatory and managerial implications for Islamic finance. The framework is built on clearly stated theoretical foundations and needs now to be validated practically in a real life Islamic finance's daily operations. At that time, experimentations may show whether the performance model fully captures and factors the risks related to the market with back testing, as the results may sometimes be puzzling versus the initial expectations. Cakir and Raei have proven that *sukuk* is not just behaving like euro-bonds towards *VaR* considerations(Cakir et Raei, 2007).

Notes

1. This work had been presented first as a master thesis to obtain the Executive Master in Islamic Finance from Paris Dauphine University in November 2010 and then at the International Sustainable Finance workshop held at the Paris Dauphine University on September 22nd, 2011 without proceedings.
2. The ijârah contract is a leasing contract.
3. sukuk is the Arabic plural noun of the singular sakk. sukuk is widely used as a singular and a plural in the non–Arabic literature on Islamic finance. We conform here to this usage.
4. The difference between risk and uncertainty is not obvious. One can define risk as a chance that can be captured by a model in a probabilistic universe and uncertainty as a chance that cannot be (Laramée 2007).
5. Fiqh is the Islamic jurisprudence. Whereas sharîah refers to the divine law itself, fiqh denotes the human interpretation of the divine commands. It always consists in deriving and formulating positive law in a number of branches (furûh) – including worship (ibâdât) and contractual law (mu'amalât) – relying on sources either textual (Quran, Sunnah or the Prophet's practices – May Allah grant him and his family peace and honour– and ijma or the juristic consensus) or methodological (such as ijtihâd or effort of reasoning by a qualified jurist, qiyâs or analogical deduction) known as its foundations (usûl alfiqh). We refer to fiqh–compliance rather than to sharîah–compliance due to the transcendence of sharîah.
6. Else otherwise stated reference to performance in the sequel of the paper means the one modelled by at the portfolio level.
7. A mudârabah contract is a trustee financing contract, where one party, the financier or rabb–almâl, entrusts funds to the other party, the entrepreneur or mudârib, for undertaking an activity with a predefined rule to share profit whereas losses that do not imply any kind of carelessness from the entrepreneur will be supported by the financier.
8. A murâbahah is a cost–plus sale in which the seller discloses the mark–up added to the cost price to the buyer who agrees with it.
9. A mushâraka contract is an equity participation contract, whereby two or more partners contribute to a capital (in cash or in kind) and possibly do some work to carry out an investment or to take stake in an existing project.
10. An istisnâ is a contract where a purchaser orders a manufacturer to manufacture a specific good not existing at the time of the contract.
11. Zakat is a religious levy or almsgiving as required in the holy Quran and is one of the five pillars of Islam (M. Kabir Hassan et Mervyn K. Lewis 2007).
12. The Islamic Financial Services Board (IFSB) is an international standard-setting organisation that promotes and enhances the soundness and stability of the Islamic financial services industry by issuing global prudential standards and guiding principles for the industry, broadly defined to include banking, capital markets and insurance sectors (excerpt from IFSB website).

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About the author

A. Diagne earned a masters in mathematics from University Cheikh Anta Diop in Dakar, Senegal, and a masters and PhD in computer science from University Pierre and Marie Curie in Paris, France. Upon graduation, he worked as a researcher in the field of software engineering. Over the past thirteen years successively he served as a financial software professional and business analyst in international capital markets. Diagne graduated from Dauphine University, Paris, France, in the first-ever executive master course on Islamic Finance during the academic year 2009–2010. He is a seasoned expert of capital markets' IT.

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