



Significance and Key Challenges in Conducting Stress Testing for Islamic Commercial Banks

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Abstract: With the current cross-border growth in Islamic finance, Islamic commercial banks (ICBs) are looking forward to being perceived as an industry in the process of becoming mature. This would require the establishment of some basic infrastructure, including sophisticated risk management tools that enhance the soundness and resilience of the ICBS. This paper focuses on the latter that is the role and significance of stress testing as a risk management tool. The stress testing has become part of the regulatory and supervisory authorities within the financial stability analysis. The global financial crisis (2008) has placed the spotlight squarely on stress tests. Though, ICBs operate within the similar financial environment, and their balance sheet composition, however, calls for different treatment in stress testing. Apart from the specificities of ICBs, there are key issues and challenges that should be given due considerations in developing an appropriate stress testing regime. This paper explores key specificities and challenges. The paper argues that in the beginning, conducting the stress testing may not appear a simple task for the ICBs. 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 programmes.

Keywords: Islamic commercial banks (ICBs), stress testing, financial stability, IFSB.

Introduction

The Islamic financial services industry (IFSI), with its inclusive proposition, has grown in size and geographic coverage, now encompassing new jurisdictions and more institutions. Islamic banking in the early 2000s was a niche market in most jurisdictions with only a few institutions offering basic depository and financing instruments. This was coupled with low awareness and demand for Islamic banking services, particularly in Asia Pacific and developed markets.¹ According to the IFSB Islamic Financial Services Industry Financial Stability Report (2013), Islamic banking remains the pillar of most Islamic assets, developments are seen across all asset classes and beyond traditional products and services. The Report outlines that the Islamic banking industry charted a compound annual growth rate (CAGR) of 38.5% between 2004 and 2011. Strong growth was witnessed pre-2008 before showing marked slowdowns in profitability and financing activity, particularly in the Gulf Cooperation Council (GCC) region.

¹ IFSB Islamic Financial Services Industry Stability Report 2013.

Despite slower growth post-global financial crisis (GFC), the fundamentals of Islamic commercial banks (ICBs) remain sound.

During the GFC, the over-reliance on existing models used by banks (including ICBs) as a risk management tool such as value-at-risk (VaR) to assess the banks' risks have failed to detect the vulnerabilities. This is because VaR involves fitting the possible magnitudes of a risk exposure under a normal distribution curve, and as such is a type of risk measurement tool (with the weakness that it underestimates risks with "fat tailed" distributions and does not measure them correctly for skewed distributions). This has highlighted the need of having in place alternative tools such as stress testing to assess the risks.

Stress testing has been useful tool but appeared to be "*less of an issue*" until the GFC 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, both United States regulator and the Committee of European Banking Supervisors (CEBS) predecessor to the European Banking Authority (EBA) conducted stress testing exercise to strengthen the financial system and boosting market confidence. There has been also a revision of stress testing guidelines by the Basel Committee on Banking Supervision (BCBS) and EBA respectively addressing the issues which were not adequately covered in the previous stress testing framework.

It is important to note that the stress guidelines as presented by BCBS and EBA do not address the specificities of the ICBs 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*² (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 ICBs and their respective supervisors.

As noted, the balance sheet of ICBs varies from their conventional counterparts in a number of ways, which in turn has a direct impact on how the stress testing will be conducted in ICBs. On the left-hand side of balance sheet of ICBs, 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 the selling the benefits of such an asset), profit-sharing (*Mushārahah* and *Muḍārahah*), 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 in respect to the asset as well as credit risk in respect to the amount due from the counterparty. These specificities of ICBs are important to be comprehended before designing and executing the stress testing exercise within the ICBs.

The conceptual and technical understanding of the stress testing has been discussed widely in the academic literature from macro stress testing perspective in particular (Borio et al., 2012; Buncic and Melecky, 2011; Cihak, 2004a and 2004b; Jones et al., 2004; Rouabah et al., 2010; Souto, 2010; Sorge, 2004). However, the discussion has been centered towards assessing the implications for the conventional banks rather than the implications for the ICBs. This is could be argued due to less number of ICBs worldwide compared to their conventional counterparts. However, the presence of ICBs globally highlights the importance of discussing the specificities and key challenges of ICBs in terms of conducting stress testing.

Apart from its importance and significance as a risk management tool, the use of stress testing for ICBs has raised some important questions, such as: Why do ICBs conduct stress testing? What are the specificities of ICBs which necessitate special consideration of stress

² The term "IIFS" used in the paper also referred as to "ICBs" 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.

testing? Is stress testing framework provided by BCBS and EBA applicable to ICBs? What are key issues and challenges which ICBs should address before conducting bottom-up stress testing within the ICBs? These questions are explored thoroughly in this paper.

The remainder of the paper is organised as follows. Section 2 provides conceptual understanding of stress testing and discourses specific issues of ICBs. Section 3 discusses key issues and challenges in stress testing. Finally, Section 4 offers concluding remarks.

Conceptual Understanding of Stress Testing and Specific Issues of ICBs for Stress Testing

Conceptual Understanding of the term “Stress Testing”

As defined by the BIS,³ “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.

The conceptual and technical understanding of the stress testing has been discussed widely in the academic literature from macro stress testing perspective in particular (Alfaro and Drehmann, 2009; Buncic and Melecky, 2011; Borio et al., 2012; Cihak, 2004a and 2004b; Foglia, 2009; Hoggarth et al., 2005; Jones et al., 2004; Otani et al., 2009; Rouabah et al., 2010; Sorge, 2004; Souto, 2010).

According to Čihák (2004a), stress testing is a generalized concept, which compiles 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. Stress tests are also 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). From regulatory and financial stability point of view, in response to the current financial crisis, both the BCBS and CEBS, have emphasised on enhancing and strengthening the stress testing framework within the conventional banks.

In 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 total 21 principles comprising 15 “principles” for banks and 6 for supervisors. On the other hand, the CEBS has published its revised “*Guidelines on Stress Testing*” in August 2010. This CEBS document contains 22 Guidelines comprising 17 “guidelines” for banks and 5 for supervisors. It is important to note that the CEBS’s Guidelines is mainly built on BCBS Guiding Principles which are supplemented by a range of annexes that focuses on the stress testing of specific risks.

Though there seems to be extensive literature (including the international framework by BCBS and CEBS) on stress testing from many dimensions. However it has skewed towards assessing the implications for the conventional banks rather than discussing the implications for the ICBs. This is could be argued due to minority of the ICBs in society as compared to their conventional counterparts. 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 IIFS has exposed, such as *Shari`ah* non-compliance risk, fiduciary risk, rate of return risk, and displaced commercial risk (DCR) which need to be stressed by the ICBs. It also does not take into account the specific scenarios with special

³ See Committee for Global Financial System (CGFS), A Survey of Stress Tests and Current Practice at Major Financial Institutions, BIS, April 2001.

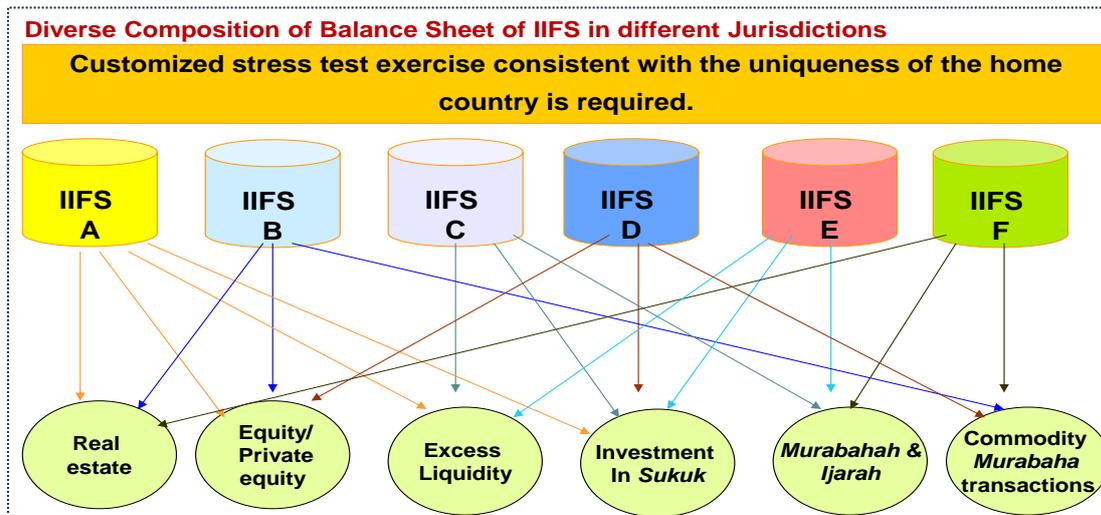
attention on the presence and impact of the investment account holders (IAHs) on the ICBs. This gap is addressed by the IFSB as highlighted below.

In March 2012, in line with its mandate to promote the soundness and stability of the IFSI, the IFSB published IFSB-13 to address the specificities of IIFS with respect to stress testing. 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 aims to provide a set of guidance intended to complement the existing international stress testing framework, while taking into consideration the specificities of IIFS as well as the lessons learned from the GFC. Out of 29, Twenty-two (22) Guiding Principles provide a framework for the ICBs with the aim to guide them in assessing and capturing vulnerabilities under various stress-testing scenarios including extreme but plausible shocks. There are Seven Guiding Principles for supervisory authorities, which can be used as a surveillance tool for periodically testing the safety and soundness of the financial system (including IFSI).

Specific Issues of ICBs for Stress Testing

Before identifying gaps in the existing framework in regard to stress testing for ICBs, it is necessary to comprehend the uniqueness of Islamic finance in banking industry. The unique features of an ICBs calls 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 2.1). The underlying unique features of Islamic finance for ICBs are explained below:

Figure 1.



Source: Author’s Study from Various IIFS’ Annual Report

Specificities of Islamic Finance

The underlying unique features of Islamic finance for ICBs include, among others:

- a) **Basis of shari’ah:** *Shari’ah* (Islamic law) forms the basis of the framework of Islamic finance. The *Shari’ah* is derived from primary and secondary sources.⁴

⁴The 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

- b) **Prohibitions:** The following are specifically prohibited – “*Riba*” - interest, “*Ghara*” – uncertainty (about the subject-matter and terms of contracts; this includes a prohibition on selling something not owned), “*Maysi*” - gambling, hoarding, and dealing in unlawful goods or services. Followed by these prohibitions, Islamic banks structure their products and processes according to *Shari’ah* rules and principles.
- c) **No re-pricing of sale contracts (*Murābahah*):** Under Islamic finance, once the sale price is fixed for financing in *Murābahah*, the ICBs 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.
- d) **Asset backed nature of structures:** Typically all Islamic structures followed by an ICB have an underlying assets backing the deal.
- e) **Adherences to procedures align with *shari’ah* rules and principles:** Each *Shari’ah*-compliant financial contract is required to adhere to certain procedures. When a transaction misses certain stage, the transaction will be rendered invalid in accordance to *Shari’ah* rules and principles. For example, in a *Murābahah* transaction, an ICB is permitted to earn profit only as a reward for risk undertaken as evidenced by the ICB taking prior possession of the asset. If the ICB does not have prior possession, the transaction will be considered invalid. In this scenario, the ICBs need to carefully structure their transactions and adhere to procedures and steps to ensure that the profits earned are according to *Shari’ah* rules and principles.
- f) **Risk transformation:** Another unique feature is the existence of transformation of risk on the balance sheet of an ICB. At different contract stages, transformation of risk takes place in *Shari’ah*-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 *Shari’ah*-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 1 below.

Table 1.

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)

Based on the above mentioned explanation, the unique features of Islamic finance give rise to specific risks and issues as the balance sheet structure of an ICB 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:

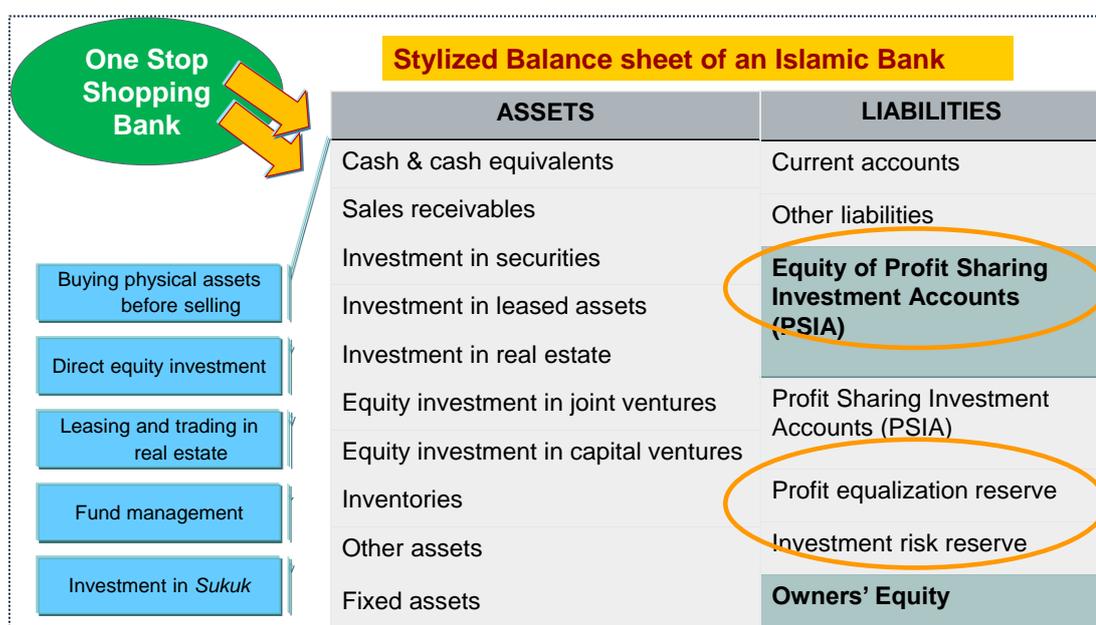
majority of the schools are *Ijma’* (consensus) and *Qiyas* (analogy). The secondary sources are techniques of legal reasoning that the mujtahid employs during his *Ijtihad*. The secondary sources include Juristic preference (*al-istihsan*), Consideration of public interest (*al-istislah*) *MaslahahMursalah*, 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*).

- a) Unique risk characteristics of Islamic financial transactions and contracts have called for guidance on risk management controls from the perspective of an ICB (addressed in IFSB-1)⁵;
- b) In the capital adequacy of the ICB, the calculation of risk weighted assets in each contract requires the recognition of various stages and requires special attention to IAHs (addressed in IFSB-15);
- c) The presence of IAHs in the ICBs needs governance committee to protect the rights of IAHs (see IFSB-3)⁶;
- d) Above all, the *Shari'ah*-compliance requirements in all aspects of the ICBs operation also need adequate *Shari'ah* governance system (see IFSB-10)⁷.

Balance Sheet Structure of an ICB and Key Issues for Stress Testing

In addition to specificities of Islamic finance as presented in above, it is worth highlighting the balance sheet structure of an ICB, which is also different compared to the conventional institutions (banks) and has different effects on risk management (please refer to Figure 2).

Figure 2.



Source: Author's Study from Various IIFS' Annual Report

In addition to the traditional banking risks (such as credit, market and operational risks), ICBs are also exposed to other specific risks such as *Shari'ah* non-compliance risk, fiduciary risk⁸, rate of return risk⁹, and DCR¹⁰. Hence, while conducting transactions in the ICBs, there

⁵ IFSB-1(Guiding Principles on Risk Management), Dec 2005.

⁶ IFSB-3 (Guiding Principles on Corporate Governance), Dec 2006.

⁷ IFSB-10 (Guiding Principles on *Shari'ah* Governance Systems), Dec 2009.

⁸ 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).

exist transformation of risk which is inherited in the *Shari'ah*-compliant transactions (based on the types and stages of the contracts – see Table 2.1). Such specific risks should be well captured in stress testing scenarios, analysis and measurement of regulatory or economic capital.

As noted in above that under the *Shari'ah* 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 ICBs cannot claim more than the pre-fixed sale price. Thus ICBs 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 ICB where, unlikely but not impossible, extreme price/rate changes are experienced.

An increase in capital requirements imposed by regulators or supervisors forces the ICBs to cut and decrease the availability of financing for individuals and corporations. This regulatory burden should be stressed by the ICBs in their stress testing programs which is taking into account the differences identified by the IFSB-15 in terms of capital adequacy. Capital adequacy is one of indicator of ICB's soundness. Hence, in order to determine capital assessment of the ICB (i.e. whether an ICB is undercapitalised), the stress testing techniques would be significant, and it will let know on how an ICB'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)”¹¹ – 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 ICB 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 ICBs 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 supervisory discretion formula in the denominator of CAR.

DCR is also important consideration, especially with respect to recent smoothing practices among Islamic banks. Stress testing techniques are needed to determine the circumstances on the utilisation of reserves such as profit equalisation reserve (PER)¹² and

⁹ 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).

¹⁰ 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 *Mudārabah* funding contracts (see IFSB-1 for detail).

¹¹ 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 IFSB GN-4.

¹² 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.

investment risk reserves (IRR)¹³, to inquire whether they are sufficient enough to cover unexpected losses. Different stress testing scenarios will be needed to absorb abnormal shocks in the times of stress.

In the credit risk, while calculating the CAR, *Shari`ah*-compliant risk mitigation techniques employed by the ICBs also require 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 ICBs 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 ICBs, particularly in the case of economic downturns. Under standardised approach for credit risk, stress testing should reflect on how an ICB will be affected under various defaults which increases NPF which may erode net income of the Islamic bank. In this perspective, credit risk implications will be different in different contracts which will require the ICB to consider different scenarios for stress testing. For instance, financing extended through predominantly *Murābahah* may require ICB to consider different types of scenarios compared with *Ijarah* and *Istisna*. In addition, another consideration for the ICBs 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 ICB, 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 *Mushārahah* or diminishing *Mushārahah* etc.) undertaken by the ICBs is also imperative under the stress testing. In addition, the stress testing programs should also include the *Shari`ah*-compliant securitisation at ICBs. In this regard, the stress testing for capital treatment for the securitisation exposures of an ICB 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, securitisation exposures as mentioned in IFSB-15.

Key Issues and Challenges in Conducting Stress Testing

Post GFC, stress testing has been one of major challenges in risk management. While a range of practices to address the stress testing needs have evolved over the last years banks (including ICBs) still face a number of challenges and difficulties along the way. Despite the usefulness of the forward-looking stress testing as risk management tool and whether the stress testing is conducted as a fiduciary responsibility or as a regulatory requirement, there are several challenges and issues that can impede the accurate execution of stress testing exercise within the ICBs. These issues, as discussed below, warrant that an ICB and its respective supervisor should pay due consideration for successful implementation of stress testing at institutional-level and system-level. Some of the key challenges and issues are discussed below:

Comprehensive and High-Quality Data and IT Support

The lack of data and/or the inability to get to it fast is considered one of the major obstacles in stress testing as up-to-date, *comprehensive and high-quality data* is needed when conducting credible stress tests. There is also a possibility that the data may not be up to date or the ICBs 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 ICBs (i.e.

¹³ 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.

establishing a strategy and a plan, with the involvement and approval of the BOD for acquiring the data needed).

Further, the lack of internal data to derive adequate internal computation of expected loss is very true for most ICBs as they have not had losses so far. To overcome data gaps, it is vital to start collecting data and enhance the granularity of the distribution curve as time evolves 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, ICBs would have to document the source and any known limitations comprehensively (para. 21 of IFSB-13). A periodic validation process is necessary to enhance the model as time evolves. Chief Risk Officers (or equivalent positions) in ICBs should start strategizing internal modelling techniques to overcome future data requirements. The fact that current data is scarce should not hinder ICBs to start the process of collecting risk factors.

The ICBs would need much stronger IT support than they have, that is, more robust software and hardware support would be needed at the time of implementation of stress testing. This will allow the ICBs to streamline the data requirements for the purpose of conducting stress testing at enterprise-level.

Models and Modelling Expertise

Once the data and IT support challenges are addressed, the next key challenge for the ICBs is how to do it, that is, the existence of relevant *models and modelling expertise* for the proper functioning of stress testing exercises. This would be another key challenge for ICBs as lack of adequate models may weaken the capacity of ICBs 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 ICBs.

Availability of *comprehensive guidance on conducting the stress testing* will be key issue for ICBs. In the absence of such guidance, ICBs may not conduct standardise stress testing resulting in underestimation of risk. In this context, ICBs will benefit from specific guidance from the respective regulator or supervisory authority on specific scenarios and shocks while conducting stress testing.

Modelling expertise also implicates capacity building challenge for the ICBs. In this context, training and development of the staff involved (or to be involved) in the exercise would be required. Training of the techniques/tools applied should be given to the risk related personnel, while software related training should be given to the IT. With this, a sample document or operational manual can be developed to teach the staff involved in the stress testing exercise.

Solvency Stress Testing and Consolidation Perspective

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 (CAR) 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*¹⁴. Similarly, market and operational risk components in the denominator of the CAR can be calculated in different ways.

Keeping in view that some of the ICBs are leveraging on expertise from their parent, non-Islamic banking institution, it is important to comprehend that having different stress testing practices would result in complications when consolidating the results to obtain a “bank-wide” view.

Implementation of ICAAP

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 the ICBs. To avoid this, supervisors should require ICBs the implementation of internal capital adequacy assessment process (ICAAP). The ICAAP requirements can play significant role in capital planning according to the risk profile of the ICBs rather than keeping CAR at regulatory requirements level. It is also important to note that linking stress-testing with ICAAP may eventually result in double-counting the effect of "Buffer requirements" under the soon-to-be-implemented Basel III requirements. If capital must be increased as a result of stress-testing and at the same time as a result of Buffer requirement (which already increases the minimum CAR thresholds under Basel III), the ICBs will definitely end up over-capitalised resulting in inefficient utilisation of capital.

Selection of Methodologies – Application of “Proportionality”

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 ICBs will have to use the combination of both approaches depending on their risk profile and strategic decisions. 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).

While ICBs 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 ICBs do not underestimate the risk. In the methodology, the application of principle of proportionality will be critical to be applied within the ICBs in the presence of qualitative and quantitative aspects of stress testing.

With respect to proportionality, one key question arises on what constitutes a small and a large ICB; however, this does not mean any abrogation of end quality of their stress test methods. It is expected that respective supervisory authority would be able to determine such distinction. IFSB-13 puts importance on this issue and recommends that a less sophisticated or a smaller ICB may place greater emphasis on the qualitative elements of its stress testing

¹⁴The *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.

programs and hence may use *sensitivity analyses* to form a first approximation of the impact. Whereas a large and sophisticated ICB 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*).

Use of Reverse Stress Tests

Development and execution of *reverse stress tests* (to complement the existing stress testing framework) may also appear challenging as it requires an ICB 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 ICB's business model to fail (para. 127 of IFSB-13).

Robustness of the ICBs and Approach to Stress Testing

Another significant challenge for the ICBs under the stress testing would be whether the stress testing results remain within the *risk appetite statement* of the ICB 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.

Some ICBs may demonstrate that their *liquidity buffers framework* is robust enough having liquidity coverage ratio (LCR), more than 100% or 200%, as set out in set out in the Basel III document *The Liquidity Coverage Ratio and liquidity risk monitoring tools* (January 2013). Consequently, 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 ICB-level as there is significant trade-off in liquidity and profitability.

Besides, some ICBs may also 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. In this respect, ICBs should note that the GFC has indicated the inter-linkages 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 ICBs should conduct real estate stress testing taking into account cross-correlations and inter-connectivity of the markets.

Holistic View of Stress Testing Results

Assessment and validation of the stress testing results by the regulators or supervisory authorities will be a crucial challenge for the ICBs. Remedial actions required in response to each and every stress testing programme may distort holistic review of the ICB's safety and soundness. Supervisory authorities should be cautious and take a more holistic view of all the remedial actions and their impact on the ICBs.

Some ICBs 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 ICBs may fail the stress test. In this case, the challenge for an ICB would be on the submission of results to the supervisor for validation of the stress testing programmes.

Consumption of Enormous Resources – Cost vs. Benefit of Stress Testing

A sophisticated stress testing framework specifically designed for *Shari'ah*-compliant products and services of ICBs will be a major task for smaller banks, as this will consume enormous resources and will require large investments. Each ICB should make its own assessment of the stress testing programme and related cost-benefit analysis. The costs may seem to be high for some ICBs, particularly small or medium-sized ones. However, the costs must be weighed against the potential loss mitigation, the value of the information and risk control gained, and the capital management that will result from an effective, well-designed stress testing programme.

Given that an infinite number of scenarios could be run, the total number needs to be limited, and an IIFS would need to balance maximising the coverage of the scenarios against managing the costs of running the scenarios and filtering results into a form that can be discussed and taken on board by the BOD and translated into action. When referring to the costs for ICBs of developing and implementing such a stress test exercise, it is important to note that there will be cost also for the supervisory agency (under the top-down calculations approach) in checking the quality of the models and outcomes by the ICBs.

Concluding Remarks

The paper discussed key specificities and several challenges and issues for effective implementation of stress testing programme both at the institutional-level and system-level. Apart from the fact that the stress testing is being used by the ICBs, now it has also become part of the regulatory and supervisory authorities within the financial stability analysis. This implies that accurate designing and execution of stress testing exercise within the ICBs at institutional-level and within the supervisory authorities at macro-level is going to be an important consideration.

In the beginning, undertaking the stress testing exercise may not appear a simple task for the ICBs. 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 programmes. The stress testing itself is not that complex, rather the relationships that need to be understood which requires *sufficient knowledge* (including mathematical, economics, statistical, and accounting and financial skills) of the financial data and translation of economic behaviours into financial impacts. This raises capacity building issues within the ICBs and at supervisory level that need to be given due consideration in developing an appropriate stress testing regime.

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