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Risk Management in Changing Benchmark Rates Regime: Prudential Implications for Islamic Banks and Supervisors

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Abstract

Post-global financial crisis scenario has presented extraordinary challenges to the global economy, in general, and the banking industry, in particular. This has brought the financial industry to a set of new challenges including risk management in changing benchmark rates risk for Islamic banks. Thus, in recent years, the management of benchmark rates (or interest rates) received considerable prominence in the banking sector due to a number of reasons including supervision of banks' benchmark rates under Basel II Pillar II. Taking into account the specific features of Islamic banks, the purpose of the paper is to theoretically and empirically review the possible prudential implications of lowly and increasing benchmark rates risk, and provide a sturdy risk management and regulatory perspective for Islamic banks and supervisors. For low rates perspective, policy rates of 12 central banks were collected and analyzed. However, for increasing rates scenario, we used duration gap and stress testing approaches, with a sample of 50 Islamic banks from 13 countries, for the period 2009-2015. Our empirical results indicate that persistently low benchmark rate regime carries strategic implications for Islamic banks including pressure on profitability, excessive risk taking and distortion in credit allocations. On the other hand, an increasing benchmark rate regime indicates the significant loss of the capital base, emergence of displaced commercial risk causing early withdrawals by the customers due to higher expectations in dual banking systems. This study concludes that implications under both scenarios call for a better risk management with appropriate tools and effective supervisory oversight for Islamic banks.

Keywords: Risk management, Low benchmark rates, Increasing benchmark rates, Islamic banks, Duration gap, Stress testing, Financial stability

1. Introduction- the Context

Post-global financial crisis (GFC) of 2007/2008 scenario has presented extraordinary challenges to the global economy, in general and the banking industry, in particular. This has primarily brought the financial industry to a set of new challenges including risk management in changing benchmark rates for Islamic banks. After the GFC, the attractiveness of the Islamic finance as a viable alternative has been well positioned into various jurisdictions and faiths. This attractiveness and recognition is established partly because international organizations such as the IMF and the World Bank, and international standard-setting organizations for conventional financial systems such as Basel Committee on Banking Supervision (BCBS), International Organization of Securities Commissions (IOSCO), and International Association of Insurance Supervisors (IAIS) have been working closely with the Kuala-Lumpur based

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Islamic Financial Services Board (IFSB), which is an international standard-setting body for Islamic financial services industry (IFSI). [2]

Islamic banking has established its presence in more than 60 countries and has become systemically important in 14 jurisdictions (IMF, 2017). It is essential to comprehend that Islamic banks or Islamic commercial banks' (ICBs)[3] operation activities, their balance sheet structures along with risks, differ from their conventional banking counterparts, the conventional banks in many aspects (IMF, 2017; Chattha, 2013). There is a strong empirical view that the underlying features of Islamic finance at ICBs are distinct from their conventional counterparts, which include, among others: (a) *Sharī'ah* principles and rules - *Sharī'ah* forms the basis of the framework of Islamic finance. It is derived from primary[4] and secondary sources[5]; (b) Prohibitions - Prohibitions are the cornerstone of Islamic finance, necessitating ICBs to structure their products and processes according to *Sharī'ah* principles. The following are specifically prohibited - '*Riba'* (interest), '*Gharar*' (uncertainty about the subject-matter and terms of contracts), and '*Maysir*' (gambling, hoarding, and dealing in unlawful goods or services). Based on the above, each *Sharī'ah*-compliant financial contract is required to adhere to certain procedures. The popular Islamic financing structures employed by ICBs are *Murābahah,* Commodity *Murābahah, Ijārah, Istisnā, Salam, Mushārakah,* Diminishing *Mushārakah, Mudārabah,* and *Wakālah.*[6]

The above-mentioned structures indicate specific implications for the ICBs in changing benchmark rates regime. Within these peculiar features of the Islamic banking, ICBs are exposed to a set of risks (e.g. credit risk, liquidity risk, operational risk, rate of return risk). One of the risks is the benchmark rates risk or rate of return (ROR) risk. It is a risk which can have impact on the ICBs, in both scenarios (i.e. increasing or decreasing). For this reason, it is recommended by the BCBS and IFSB to the regulators to underscore the significance of this risk in the banks' risk management processes. These include adequate risk management policies and procedures; appropriate risk measurement, monitoring and control functions; and comprehensive internal controls and independent audits.

Needless to say, the banking industry, being at the heart of ongoing economic developments, is going through a challenging time. To a greater extent is dealing with lower and/or increasing interest rates or benchmark rates.[7] In the mainstream finance, the benchmark rates or return on investment have always been featured as one of the important considerations in explaining the saving and consumption behaviour of individuals. In recent years, the management of benchmark rates has received considerable eminence in the banking sector due to various factors including: (a) the increasing instability of benchmark rates: (b) financial market conditions including the reason of a flat yield curve and the risk of yield curve remaining flat for longer period[8]: and (c) the growing international emphasis on the supervision and control of banks' benchmark rates under BCBS Basel II.

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[2] The IFSB was established in 2002 by central banks as a multilateral organization to set prudential standards for the IFSI. It deals with issues common to the banking, securities and insurance sectors and complements the work of the BCBS, the IOSCO and the IAIS.

[3] The term "ICBs" is used specifically to refer to Islamic Commercial Banks or Islamic Banks interchangeably in paper. The IFSB uses the term "IIFS" for ICBs.

[4] 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 agreed upon by the majority of the schools are *Ijma'* (consensus) and *Qiyas* (analogy).

[5] 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*, resumption 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*)).

[6] For the definition of these and other contracts, please refer to the IFSB glossary of terms, http://www.ifsb.org/terminologies.php.

[7] Some terms such as "policy rate" or "benchmark rate" or "interest rate" or "rate" are used interchangeably throughout the paper.

[8] The slow global recovery, post GFC, has pulled down expected returns to much lower level. The current economic state reflects an era of benign inflation, which is forcing investors to expect low economic recovery in next 2-3 years. Thus, given that the long-term nominal rates have been historically low, the short-term nominal rates are expected to remain at historically low level, leading to a flat yield curve.

In April 2016, the IMF's *Global Financial Stability Report* provided an assessment of the global financial system and markets. It also indicated heightened uncertainty and setbacks to growth and confidence. Six-months later, this uncertainty and sluggish growth remains a candid concern for the world's major and emerging economies. Since a bulk of Islamic finance operates within the emerging economies and also being an integral part of the global financial system, the impact of such uncertainty is inevitable for ICBs. In May 2016, the IFSB *Islamic Financial Stability Report* hinted two important moving-forward guidance pertaining to Islamic finance: (a) the increased fragility of emerging financial markets and the sharp decline of oil prices may negatively impact the profitability and asset quality of ICBs; (b) the monetary policy of Western central banks can induce yield volatilities and may shake investors' confidence in emerging markets' financial assets, including *Sukūk*. Now, a recent report (*Islamic Finance in 2017: Modest Growth and Amid Oil-Prices Woes*) published by S&P Global Ratings in September 2016 affirms the IFSB predictions and indicates a drop in Islamic finance growth in 2017. This suggests ICBs will be having prudential implications, which should be assessed from risk management's view.

Following the GFC, the role of the regulators also has been intensified to place prominence on the adequacy and capability of a bank's management of risks during their normal supervisory review process. Both the BCBS and the IFSB set clear guidance on risk management from supervisory perspectives, in particular for benchmark rates risk. The BCBS has specifically issued a document entitled, '*Principles for the Management and Supervision of Interest Rate Risk (IRR)'* (July 2004, amended in April 2016) to highlight the significance of IRR in the banking book. Similarly, IFSB-16 (2014) has indicated that it is essential for ICBs to have benchmark rate risk measurement systems including a number of generally accepted techniques (such as *gap* analysis and *duration gap* analysis) for measuring the benchmark rates risk exposure of both *earnings* and *economic value*.

In addition to the above considerations for low-rate environment and in light of the evolving global macroeconomic conditions, now there are implications of gradual tightening monetary policies by the Fed for banking industry including ICBs in the medium to long-term. Therefore, in light of the changing benchmark rates risk, lately economists and central banks are grappling with important concerns such as: Whether there is any impact or risk to Islamic finance, in general and to ICBs, in particular? How is it relevant to the ICBs and is there any profound impact on financial markets in emerging economies? How well are ICBs and their regulators (central banks) prepared to tackle this? How can we measure the impact of the changing benchmark rates risk? What are the potential concerns and vulnerabilities for ICBs and the remedies to counter low and/or increasing rates? The novelty of this paper is in examining and addressing these questions from a risk management and regulatory and banking supervisory perspective. With that in mind, the purpose of this paper is three-fold: (a) to review briefly the broader picture of low and/or higher benchmark rates; (b) to measure the impact of changing benchmark rates on the net worth (i.e. economic value) of ICBs; and (c) to provide a risk management and regulatory perspective for ICBs on the implications of low and/or increasing benchmark rates risk.

Using the data from 12 central banks, and 50 ICBs from 13 countries, our empirical results demonstrate while low benchmark rate regime carries strategic implications for ICBs including pressure on income and profitability, excessive risk taking, and distortion in credit allocations; an increasing benchmark rate regime exhibits various prudential implications for the ICBs including the significant loss of the capital base, emergence of displaced commercial risk (DCR) causing early withdrawals by the customers (or Profit sharing investment account holders) due to higher expectations in dual banking systems.

The remainder of the paper is organized as follows. Section 2 provides literature review covering an overview of the broader picture of changing benchmark rates risk globally and risk management perspective. Section 3 discusses data description and methodology used in the paper. Next section presents discussion and analysis covering key risks and implications for ICBs. Section 5 explains the risk management strategies and controls for ICBs and supervisors in changing benchmark rates risk. Last section concludes and offers suggestions for moving forward followed by an appendix.

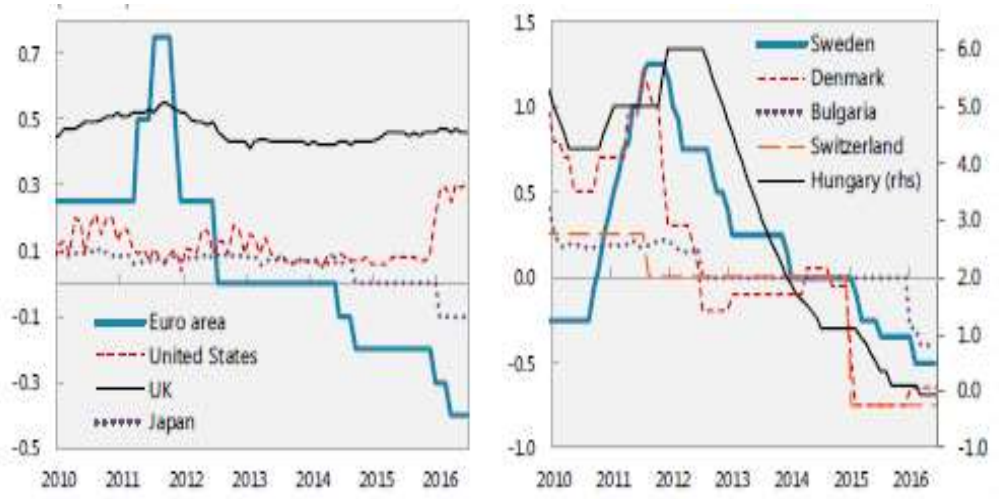
2. Literature Review

2.1 Overview of Changing Benchmark Rates Risk

For a long time, central bankers believed that the policy rate could not drop below zero, because households and corporates might start converting deposits into cash to avoid devaluation (Jobst and Lin, 2016). Now, this has been imaginable in recent years. Low interest rates in the USA, UK, and Australia, and even negative rates in the Eurozone, Denmark, Sweden, Switzerland and Japan underscore a low inflation world. The economists refer to this phenomenon as 'a new normal' for financial industry. Recently, we have seen that lower rates have been a problem in Japan and the EU in particular. A variety of economic factors have pressed these rates very low offering challenges to maintaining price and economic stability. Some of the key factors are related to the global supply and demand for funds, slower trend in productivity and economic growth. Figure 1 shows policy rates for four major economies: the United States, the Euro area, the United Kingdom and Japan; and the economies with negative territory.

It is understood, as the literature suggests that as rates are cut aggressively, investor seeking higher return will be in search of yield, and consequently, the flight of capital will influence the lending and consumption patterns within the jurisdiction. When banks pay customers on their mortgages and charge big corporate clients on deposits, though these challenges the financial intermediation model, the notion behind this mechanism is to encourage spending and discourage savings behaviour in order to provide a much-needed impetus to a slowing economy. This is one of the strategies for economic growth but it is apparent from the experience of certain central banks that there is a limitation of options to combat global disinflation and low-interest rate. The post-Brexit easing in monetary conditions – including delayed U.S. rate hikes has further compounded this problem.

Figure 1: Policy Rates for Major Economies, 2010-2016



Source: Jobst and Lin (2016)

It is important to recall that back in March 2016, the Bank for International Settlements (BIS) cautioned about policy risk backfiring if rates stayed negative for a prolonged period fix. Therefore, there has been intense debate in the industry on keeping the rates low or negative to provide desired stimulus to the economy. In fact, Mr. Raghuram G. Rajan, ex-RBI Governor has commented, "*low interest rates globally could distort markets and would be difficult to abandon and they are no substitute for reforms*".[9] His words show both wisdom and experience. This indicates that governments' reliance on central banks for ultra-loose monetary policy is not a viable option for a long-term rather it should be complemented

[9] www.nytimes.com/2016/09/05/business/.../india-raghuram-rajan-central-bank.html.

with carefully designed fiscal and structural reforms to better cope with a low interest rate environment.[10] A lot has been written recently by scholars explaining the impact and implications of low and/or negative rates environment on banks' profitability (Arteta et al., 2016; Busch, and Memmel, 2015; Bech and Malkhozov, 2016; Bean et al., 2015; Genay and Podjasek, 2014; Jobst and Lin, 2016; Linnemann, 2016). However, this literature does not highlight the implications for Islamic finance as very little has been explored from ICBs' perspective. Furthermore, these studies also do not provide discussion on: How is this relevant to the ICBs and is there any profound impact on financial markets in emerging economies? We address these questions in this paper.

Low-rate is just one dimension of the core issue. Recently, in light of the evolving global macroeconomic conditions (e.g. a gradual tightening of US monetary policy, heightened geopolitical risks and conflicts, and oil prices), now there are implications of tightening monetary policies for ICBs in the medium to long-term. In the context of the GFC, the Fed employed Quantitative Easing (QE), in which the benchmark rate was lowered from 5.25% (June 2006) to 4.25% (December 2007) until it reached 0.25% in 2008, and remained unchanged till December 2015. *After almost seven years of QE policy*, the Fed increased the benchmark rate by 25 basis points (bps) in December 2015 causing it to reach 0.50% under the policy normalization process. The similar 25 bps increase is seen in December 2016, and the most recently 25 bps in March 2017 and June 2017 respectively, thus reaching to 1.25%. This suggests that rate increases will be gradual, and it would have important implications for banking industry including ICBs.

Therefore, considering the specific features of ICBs and in light of the above both scenarios of low rate and increasing rate, there is need to empirically review the possible prudential implications of both scenarios for ICBs, and provide a risk management and regulatory perspective for ICBs and supervisors.

2.2 Risk Management for Benchmark Rates Risk – Prudential Perspective

For ICBs, there are various studies that highlight the significance of the ROR risk from different perspectives (e.g. Mokni et al., 2014; Fauziah et al., 2011; IFSB, 2005, 2010, 2011, 2014, 2015; Mohd. Ariffin et al., 2009; Romzie and Abdul Rahim, 2015; and Zainol and Kassim, 2010). However, these studies do not capture and quantify the impact of ROR risk on ICBs through duration gap as per IFSB recommendation, and also these studies do not provide adequate guidance on the identification of vulnerabilties for ICBs under changing bechmark rates risk.

In Islamic finance, a bulk of the initial literature on the benchmark rates risk emanates from the IFSB, which has played an imperative role in elucidating the ROR risk from several dimensions such as: definition of ROR risk (IFSB-1, 2005); ROR impact on ICBs and various disclosures of ROR risk (IFSB-4, 2007); a mechanism to measure the ROR risk and DCR (IFSB GN-4, 2011); ROR risk in stress testing (IFSB-13, 2012); ROR risk and sound benchmark rate risk management (IFSB-16, 2014); and the assessment of ROR risk under IMF-World Bank FSAP (IFSB-17, 2015). Particularly, IFSB-1 (2005) recommends the terminology of ROR risk for ICBs as they do not have their own benchmark rate, and they tend to use the market rate or relevant benchmark rate in pricing their financial instruments, such as the London-Interbank-Offered-Rate (knows as "LIBOR"). For instance, in the *Murābahah* contract, the rate is formulated from the LIBOR plus risk premium, and is held constant throughout the entire contract duration.

Particularly, IFSB-16 (2014) underlines the importance of ROR risk from the supervision point of view. This standard, which is the equivalent of Pillar 2 of Basel, requires regulators to place significant emphasis on ROR risk in ICBs' banking book. It further requires, "sound benchmark rates risk management involves the application of four basic elements in the management of assets and liabilities" (IFSB-16, 2014: 39). These four elements include: (a) appropriate BOD and SM oversight; (b) adequate risk management policies and procedures; (c) appropriate risk measurement, monitoring and control functions; and (d) comprehensive internal controls and independent audits. According to IFSB-16, regulators should obtain from ICBs sufficient and timely information with which to evaluate their level of benchmark rate risk. This information should take appropriate account of the range of maturities and currencies in each ICB's portfolio.

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[10] It is to be noted that monetary policy is set while carefully aligning with fundamental of the economy and reform plans, so, it cannot monotonously be decided only with linear combinations of growth rate.

The IFSB's most recent work on ROR risk is in IFSB-17 (2015), also known as Core Principle for Islamic Finance Regulation (CPIFR), which incorporates much of the Basel Core Principles (2012) for the assessment of ICBs from the IMF-World Bank FSAP. It outlines the use of the assessment methodology in assessing compliance with the CPIFR, and practical considerations in assessing ICBs. In particular, CPIFR 26 on ROR risk advocates that "the supervisory authorities should require ICBs (through policies and regulations) to have an appropriate ROR risk strategy and ROR management framework that provides a comprehensive ICBs-wide view of ROR risk" (IFSB-17, 2015: 53).

In addition to the above reflections, the existing literature - on risk management practices and tools from ICBs' perspective - shows a lot of variations and leaves important gaps. There are a wide range of studies on risk management practices for ICBs in different countries for dealing with different types of risk (Al-Janabi, 2008; Al-Ajmi and Hameeda, 2012; Al-Tamimi and Al-Mazrooei, 2007; How et al., 2005; Hussain and Naysary, 2014; Mohd. Ariffin et al., 2009; Romzie and Abdul Rahim, 2015; Usman et al., 2011) but these studies seem to focus on general risk management practices without combining institutional and regulatory perspectives using *duration gap* approach (Alden, 1983; Bierwag, 1987; Bierwag and Kaufman, 1992; Chattha and Bacha, 2010; Fooladi and Roberts, 2000; Koch and MacDonald, 2009; Macaulay, 1938).

Having discussed the ROR risk, it is important to define duration gap approach. Gup et al. (2007) citing Bierwag (1987), define duration as "the weighted average time (measured in years) to receive all cash flows from a financial instrument", and duration gap is the difference between the durations of a bank's assets and liabilities. In simple terms, it is defined as the "weighted average maturity in which the weights are stated in present value terms" (Chattha and Bacha, 2010: 16). Based on this definition, we can conjecture that (a) when duration gap is positive, any increase (decrease) in benchmark rates, will result in a decrease (increase) in the net worth (NW) or economic value of equity (EVE) of a bank (b) when duration gap is negative, any increase (decrease) in benchmark rates, will result in an increase (decrease) in the NW of a bank. However, when duration gap is zero, any increase or decrease in benchmark rates, will bring no change to the NW of a bank.

Similar to BCBS (2004, 2016), the IFSB-16 provided a detailed framework which formalized bechmark rates risk management through *duration gap*. The framework discusses, among others: (a) modalities of maturity gap calculations; (b) the standardized rates shock; (c) *duration-based weights* and calculation of precise duration of assets and liabilities; (d) and impact of changing market rates on banks. Moreover, Koch and MacDonald (2009) also contend that benchmark rates risk is measured by comparing the weighted average duration of assets (D_A) with the weighted average duration of liabilities (D_L). They identify four steps in the duration gap analysis: (a) developing an interest rate forecast; (b) estimating the market value of bank assets, liabilities and stockholders' equity; (c) estimating the weighted D_A and weighted D_L[11]; and (d) forecasting the changes in the market value of stockholders' equity across different interest rate environments.

3. Methodology

3.1 Data and Description

In the case of low-rate, in line with the purpose of the paper, and in relation to ICBs, we collected recent available policy rate data (as of July/September 2016) from a sample of 12 jurisdictions (Bahrain, Bangladesh, Brunei, Indonesia, Kuwait, Malaysia, Oman, Pakistan, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates) holding roughly 70% of total Islamic banking global assets. The policy rates of these 12 jurisdictions were collected from their respective central bank or monetary authority individually.

For increasing rates scenario, we selected a sample of 50 full-fledged ICBs globally from 13 countries, namely Bahrain, Bangladesh, Indonesia, Jordan, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey, UAE, and Yemen, for the period 2009-2015. The selected sample countries - hosting 50 ICBs – include some of the leading Islamic finance jurisdictions, where almost 90% of the total Islamic banking assets reside within the dual banking systems. The detail on the list of ICBs is shown in Table A.1 in Appendix

[11] In these steps, it is important to mention that on-balance sheet and off-balance sheet (OBS) effects are included when calculating the duration gap. These estimates are used to calculate duration gap. However, our study does not incorporate the OBS items.

A. It is pertinent to note that the accessibility of long-horizon data for the ICBs covering 2009-2015 - with relevant information on the undiscounted contractual maturity breakdown of the assets and liabilities - was a critical concern, and it posed a serious challenge.[12] Due to cross-country study, we used yearly data from the IMF International Financial Statistics (IFS) to convert all data into US$ to ensure consistency in the data and comparison.

Specifically, the data for the maturity breakdown of banks' assets and liabilities is manually and individually extracted from the ICBs' annual financial reports for the sample period. This ensured that the extracted data is reliable. For the purpose appropriate comparison, the study only includes 'On-Balance Sheet' items listed as total financing on the asset side (all maturity buckets), and customer's deposit (from one-month to long-term deposits maturity) on the liability side (Chattha and Bacha, 2010; Ruprecht et al., 2013). Unlike conventional banks, the data for the ICBs is complex due to the nature of the ICBs' balance sheet, as Islamic banks can participate or provide financing to their customers' projects or assets acquisition in numerous ways as per the *Sharī'ah* rules. Thus, financing, is taken from five common debt-based contracts[13] used by the ICBs across the countries: (a) *Murābahah* (or similar contracts such as *Bai' Bithaman Ajil* or *Bai Muajjal)*; (b) Commodity *Murābahah or Tawarruq*; *(c) Salam*;[14] (d) *Istisnā'*; and (e) *Ijārah*.

3.2 Stress Testing and Duration Gap

In terms of research method, we combined the qualitative and quantitative research approaches with special focus from regulatory perspective. In this paper, in line with the IFSB's recommendation, we used duration gap approach (i.e. weighted average maturity in which the weights are stated in present value terms) along with the sensitivity stress testing to measure the ICBs' vulnerability to benchmark rates risk. The research methodology for the determining the impact of increasing rate changes comprises two-stages. These two stages are explained below, along with some parameters and assumptions.

Stage 1: Determination of Duration Gaps of the ICBs

The determination of duration gap is critical before establishing the impact of increasing benchmark rates shock to ICBs. The duration gap of an ICB is demonstrated by comparing the weighted average duration of bank assets ($D_{A)}$ (Equation 1) with the weighted average duration of bank liabilities ($D_{L)}$ (Equation 2). In terms of a model, the study determines the duration gap with a four-step process, consistent with Koch and MacDonald (2009) and Chattha and Bacha (2010):

(a) Determining the D_A and D_L for each asset and liability item of the balance sheet (in this study, financing and deposit);

(b) Finding the weight (proportion) of each item within its category;

(c) Calculating the weighted duration of D_A and D_L using (a) and (b); and

(d) Calculating the duration gap (DGAP) through deducting D_A from D_L.[15]

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[12] Taking into account the data challenges, we removed many ICBs from being part of the sample for the study, although initially the study included a sample of more than 100 ICBs.

[13] According to IFSB (2017), the data on "financing by type of the *Sharī'ah*-compliant contracts" reveals that these are five major financing contracts used by the ICBs as of 2017Q1 cover almost 85% of total financing extended by the ICBs. http://www.ifsb.org/preess_full.php?id=400&submit=more.

[14] From *Sharī`ah* perspective, both *Salam* and *Istisnā'* represent an exception to sale rule (i.e. existence of assets at the time of sale).

[15] Where the total amount of interest bearing assets and liabilities are not equal, then the DGAP is;

$$D\ GAP = D_A - \left(\frac{L}{A} \times DL\right)$$

Weighted Average Duration of Bank Assets (D_A)

$$D_A = \sum_{i}^{n} w_i D a_i \quad (1)$$

Where,
w_i = Market value of asset i divided by the market value of all bank assets
$D a_i$ = Macaulay's duration of asset i (Equation 3)
n = number of different bank assets

Weighted Average Duration of Bank Liabilities (D_L)

$$D_L = \sum_{j}^{m} z_j D l_j \quad (2)$$

Where,
z_j = Market value of liability j divided by the market value of all bank liabilities
$D l_j$ = Macaulay's duration of liability j
m = number of different bank liabilities

The traditional Macaulay's duration (D) calculation:

$$D = \frac{\sum_{t=1}^{k} \mathrm{CF_t}(t)/(1+y)^t}{\sum_{t=1}^{k} \mathrm{CF_t}/(1+y)^t} = \frac{\sum_{t=1}^{n} \mathrm{CF_t}(t)/(1+y)^t}{PV\ of\ the\ Security} \quad (3)$$

Where:
D = Duration
CF_t = Cash Flow at t time
Y = Yield to maturity or rate of discount
T = Time at which cash flow is received
PV = Present value of the security
n = Number of years to maturity

Stage 2: Determination of Impact of rate changes for ICBs - Stress Testing

Once the duration gaps are calculated for the sample ICBs, the impact of rate changes (Δ) on the value of assets, liabilities and a banks' NW or EVE can be determined. The relationships can be shown as follows, in Equations 4 to 6:

$$\Delta \textbf{ In Value of Assets } = \%\Delta P = -D_A \times \left[\frac{\Delta i}{(1+i)}\right] \quad (4)$$

$$\Delta \textbf{ In Value of Liabilities } = \%\Delta P = -D_L \times \left[\frac{\Delta i}{(1+i)}\right] \quad (5)$$

The impact of change rate on the **bank's NW** is established using Equation (6):

$$\mathbf{\Delta NW} = -\mathrm{DGAP} \times \left[\frac{\Delta i}{(1+i)}\right] \times \mathrm{Total\ assets} \quad (6)$$

Where,
$DGAP$ = Duration Gap calculated using the four steps method, $D_A - D_L$;
ΔNW and Δi = Change in NW risk and Change in interest rate/profit rate

It is to be noted that the impact of rate changes on an ICB's NW is the consequence of changes in the market values of assets and liabilities. This means that when profit rate changes; it causes a change in the market values of assets and liabilities. Hence, the rate of change and impact on an ICB depend on the D_A or D_L. After reviewing the IFSB regulations on stress shock (sensitivity analysis), we undertake two different levels of stress shocks: normal shock (S1) and moderate shock (S2). Under S1, the study applies 100 basis points (bps) increase in benchmark rate; for S2, the study applies 200 bps increase in benchmark rate. For S1, a standard scenario that is considered includes a 100 bps parallel fall or rise in all yield curves. However, with respect to S2, the overall impact on NW for a 200 bps shock is within the limit prescribed by the BCBS as well as the IFSB. Other researches, for instance Baldan et al. (2012), have also used 200 bps shock in their study.

As per IFSB-13 (2012: 39): "… sensitivity analysis 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." This indicates that the shock can be +/–, and that it is for each factor individually. Chattha and Archer (2016) and Chattha (2016) provide a comprehensive guide to conducting the sensitivity stress testing for ICBs, including a stress testing matrix and a three stage methodology that can be considered by ICBs.

Within the context of stress testing, nevertheless, to apply the shock to ICBs, is neither sufficient nor desired. The important concern is to determine the vulnerability of an ICB, and benchmark it with an appropriate indicator for Pillar II. In this respect, the IFSB suggests, "supervisory authorities should be particularly attentive to the capital sufficiency of outlier IIFS, those whose ROR risk in the banking book leads to an economic value decline of more than 20% of the sum of Tier-1 and Tier-2 capital following a standardized benchmark rate shock or its equivalent." This is empirically established in this study, and the results reflect the findings using this regulation for the ICBs.

4. Results, Discussion and Prudential Implications

4.1 Islamic Banking - How ROR is relevant to Islamic finance?

Islamic banking remains the most dominant form of asset-based intermediation system with approximately 80% of Islamic financial assets held within the banking sector in different asset classes, products and services. The industry's assets remain heavily concentrated in the Middle East region and a select few Asian countries. The top 10 Islamic banking jurisdictions account for almost 94% of the global Islamic banking assets. According to the IFSB *Islamic Financial Stability Report* (2016), the Islamic banking sector assets in full-fledged ICBs, subsidiaries and windows amount to approximately USD1.50 trillion as of IH2015 with a CAGR of 15.4% between 2008 and 2014.[16]

Moreover, IFSB *Stability Report* (2016) exhibits that Islamic banking sector in some jurisdictions (e.g. Brunei, Kuwait, Malaysia, Qatar, Saudi Arabia, the United Arab Emirates (UAE) and Yemen) is becoming gradually substantial. These jurisdictions seem to have accomplished at least 15% market share for their Islamic banking compared to total banking assets. This represents that between them, these financial institutions account for more than 5% of the total global Islamic banking assets. The IFSB designates these jurisdictions as systemically important. This increasing prominence and higher market share of the industry pose a number of challenges for the stability of financial systems where ICBs operate, in particular the implications of changing benchmark rates risk.

[16] The global IFSI reached an overall total value1 of USD1.88 trillion as of 2015 YTD (IFSB, FSR 2016).

4.2 Changing Benchmark rates[17] Risk – Case for Islamic Banks

At the outset, it is important to note that ICBs do not deal directly with interest rate or benchmark rate; however, as a matter of practice, most Islamic banking products and financial instruments, are priced with reference to a conventional benchmark rate (e.g. the LIBOR). Although, this entices criticism but in a dual banking systems - where conventional banks operate side-by-side ICBs - changes in the market rates tend to introduce some risks in the earnings of ICBs, value of assets, management of liquidity, and funding cost (Chattha and Bacha, 2010). In this context, the case in point is the changing benchmark rates and their implications to the ICBs.[18]

In ICBs, investment account holders funds (IAH) (also referred to as "profit sharing investment accounts (PSIA)) are invested in fixed-return assets such as *Murābahah;* accordingly, the IAH or depositors expect a return reflecting current market conditions. This return is related to market rates and relevant benchmark rates on the return on assets and on the returns payable on funding. This phenomenon is referred to as "ROR risk" by the IFSB as discussed briefly in Section 2. Therefore, in addition to an increase in benchmark rates (which may result in IAH having expectations of a higher ROR, while the returns on assets may be adjusting more slowly due to longer maturities), a scenario of a decrease in benchmark rates also offers important and interesting perspective, which is explored in this study. In the latter case, an important question that comes out is how IAH, which constitute a bulk of funding, will pay (a fee) for investing money with the Islamic bank? On the other hand, for Islamic capital markets (being a second largest segment of the Islamic finance), the issue is similar to what conventional financial markets are facing: can *Sukūk* yields go negative at any given time considering the global yield trend?

With respect to benchmark rates, for ICBs, there is a fundamental issue (i.e. no re-pricing of sale contracts, e.g. *Murābahah*[19]) that needs to be understood. Under Islamic finance, once the sale price is fixed for *Murābahah* financing, the ICBs cannot claim more than the pre-fixed sale price, even if the assets were to become 'non-performing' or the benchmark rate has been changed either upward or downward (Chattha, 2013). This indicates that if benchmark rate is increased by a regulator, the conventional banks can easily adjust the impact accordingly. (For instance, if the rate is up, the conventional banks can re-price the loans as per the prevailing market rates). ICBs, however, due to the nature of the sale contract and adherence to *Sharī'ah* rules and principles, cannot adjust the impact because the rate cannot be changed once it is fixed. They will have to wait until the contract matures. This leaves the ICBs vulnerable from a risk management perspective compared to their peers and reflects an important consideration for asset-liability management (ALM).

On the other hand, if the benchmark rates were going down, as discussed above, then in principle ICBs would not be at disadvantage at least for the cash flows that have been contractually agreed with the customers under *Murābahah* financing until the maturity of the contracts. Nevertheless, there will be concerns on extending new financing at lower rates, which subsequently can lower ICBs' net profit margin (NPM).[20] Another possibility that ICBs can face during the lower benchmark rates regime is the early settlements of financing, as it would appear expensive to the customers. In this context, it should be noted that the prohibition of interest (*Riba)* in Islamic finance does not allow ICBs to refinance debts on the basis of renegotiated higher mark-up rates. However, debt rescheduling or restructuring arrangements (without an increase in the amount of the debt) are allowed. Refinancing may be sought by customers to

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[17] It is not in the scope of this paper to debate on the usage of the benchmark rate at ICBs as the matter should be referred to the *Sharī'ah* supervisory board (i.e. a specific body set up or engaged by the institution offering Islamic financial services to carry out and implement its Sharī`ah governance system). However, for discussion on *Sharī'ah* perspective for Islamic benchmarking, see ISRA Research Paper, 17 (2010).

[18] Khan and Ahmed (2001) uses 'benchmark risk' or 'rate of return' terminology instead of 'interest rate risk' as to avoid unnecessary confusion since ICBs do not deal directly with interest rate. Subsequently, this term was used by the IFSB (2005), and other academicians and researchers (e.g. Ariss and Sarieddine, 2007; Cihak and Hesse, 2008; Chattha and Bacha, 2010).

[19] The balance sheet of the ICBs' suggests that *Murābahah* financing is the most dominant form of financing.

[20] Similar to their conventional counterparts, the role of ICBs is maturity transformations, where they borrow funds in short-term and offer long-term financing/investments. Therefore, banks benefit from steep yield curve, which translates into wide spread between long-term and short-term market rates. It is important to underline that when yield curve steepens ICBs NPM rises and conversely, when yield curve flattens bank's NPM falls. In this way, low short-term rates can compress NPMs.

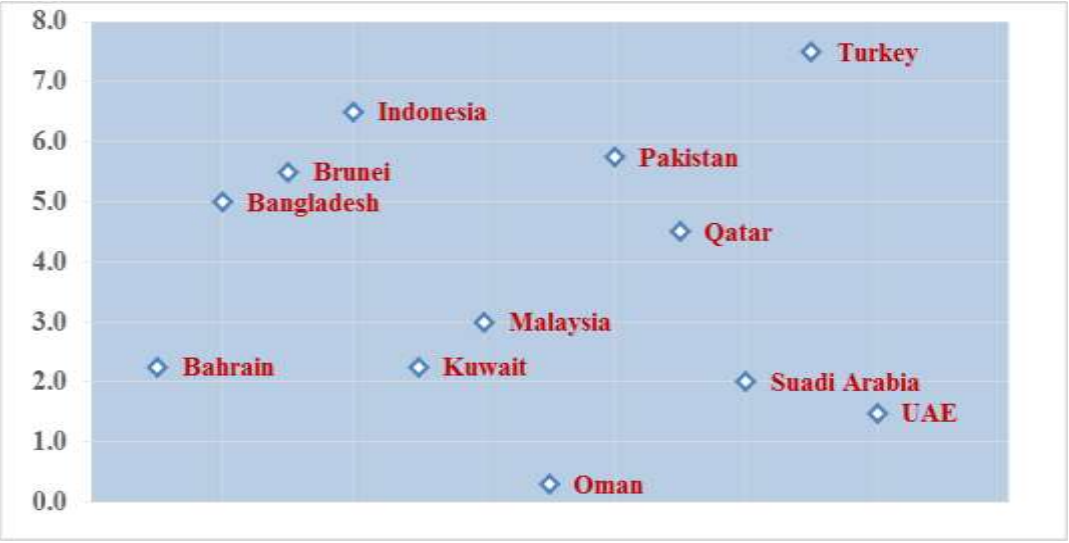
benefit from more competitive rate. Detailed implications and controls are discussed in the following subsections.

4.3 Risks and Prudential Implications under Low Rates Scenario

In order to analyse the possible risks and implications of the low-rate environment for ICBs, the comprehension on the policy rates in key Islamic finance jurisdictions is important. Largely, it is argued that the benchmark rate risk may not hit the traditional Islamic finance markets soon but it may slowly and surely spread beyond EU and Japan. There are immediate concerns and implications if ICBs are operating in the jurisdictions which are described in Figure 1.[21]

Recent available data from a sample of 12 jurisdictions suggests that policy rates are positive and most of the central banks are keeping above 200 bps (Figure 2). The historical trend, nevertheless, is in line with the global economic development. In the context of central bank policy rates, it is important to note that these rates are the monetary tools of central banks, which they use to control the money supply in the country, determining and maintaining day-to-day liquidity in the system and to determine other bank rates. It is also worth noting that these rates are always lower than the rates on which conventional banks (ICBs) lend (finance) customers in local currency-denominated loans/financing.

Figure 2: Policy Rate by Central Banks Having Islamic Finance (%)



Source: Authors' workings from sample central banks data

Note 1: Every country's economy is driven by something called "Policy Rates". In essence, these rates are used by central banks as the main indicator to convey signals to the market revealing the stance of their monetary policy. There are different names and examples of policy rates across the jurisdictions. For instance, Kuwait and Oman call "discount rate" as policy rate, whereas in Bahrain (1-week deposit rate), U.A.E. (1-week CD repo rate), Saudi Arabia (repo and reverse rate), Qatar (central bank deposit and lending rates), and Pakistan (policy rate).

Note 2: The latest available policy rate for each central bank is used in Figure 2. Of 12 central banks, for eight central banks, the data (i.e. policy rate) is as of July 2016; two central banks (as of September 2016); one as of June 2016 and another as of August 2016.

[21] In the current global environment not only are the rates low, so are the expected returns in any asset class (e.g. equity, bond and RE). Therefore, this may affect the ICB as well. At this point it's not clear how long such low rate will last (with a complicated dynamics of lower bound oil price); however, are there any build up risks – in search of yield and how carefully supervisors handle these risks, would be worth questions to address in future.

Note 3: The repo rate is a rate at which commercial banks can borrow from a central bank to cover temporary shortages of liquidity. In this process, the central bank normally buys domestic government securities from the banks and sells them back two weeks or one month later. This rate is used to control inflation, that is, price stability. On other hand, the term 'reverse repo' is the rate at which a central bank would borrow from commercial banks.

As indicated above, the rates in the Islamic finance jurisdictions are positive but yet they are on a declining trend. If the rates continue sliding, this would mean that ICBs can face a variety of challenges (e.g. squeeze on profits, excessive risk taking, distortion in credit allocations, and late signalling of credit quality), depending on their individual circumstances and the jurisdictions in which they operate. In addition, the actual impact will depend on the business model and portfolio sophistication of an ICB. For instance, the impact will be different when an ICB is highly concentrated in a financing portfolio as compared to an ICB which has considerable exposures in investments (e.g. listed and non-listed equities, *Sukūk*, real estate, mutual funds) or investments and/or financing.

Within the argument above, the key implications are assessed from two perspectives: the balance sheet and the profit loss statement (PLS) (Figure 3). In the former case, though ICBs would benefit from lower bank-funding costs, however, the impact would be to the new investment of *Sharī'ah*-compliant financial assets (mainly through *Sukūk* due to low yield), possibly lower financing by the ICBs resulting in less economic activity within the country, and deterioration of asset quality (possibly due to due to non-performing financing and early settlements by the customers). In the latter case (i.e. PLS), NPM - through *Sharī'ah*-compliant financing - will squeeze resulting low retained profits.[22] This profitability concern will have implications for Tier-1 capital, which is the core measure of an ICB's financial strength from a regulator's point of view. As per IFSB and BCBS, Tier-1 is composed of Common Equity Tier-1 and Additional Tier-1. The former forms the highest quality of capital for an ICB and is composed of common equity share capital, retained earnings and some other reserves, the latter is consists of *Sharī`ah*-compliant instruments and some reserves.

[22] Note that ICBs profits are not likely to decline in countries with large outstanding financing amounts due to the fact that banks' customers are contractually obliged to pay back house/car financing instalments until the maturity of the their contracts. That said, there will be no exposure to those financing, but certainly new financing at lower rates will reduce the banks' financing margins which need to be off-set with other measures as discussed in Section 4.5.

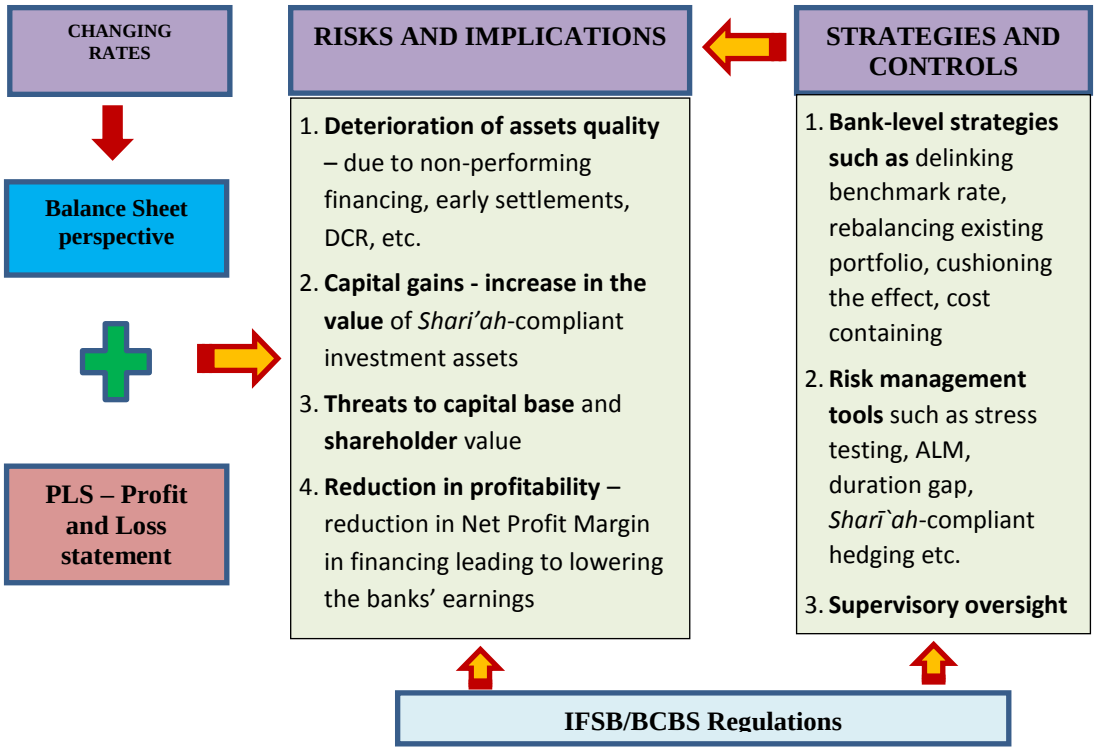


Figure 3: Changing Benchmark rates: Diagnostic Analysis and Prudential Implications

About profitability amid the low rates regime, the IFSB *Stability Reports* (2015 and 2016) also point out that the *profitability* of ICBs has recovered but it is still below the 2008 level, and net profit margin have declined. This shows that the profound impact - of low rates regime coupled with sharp declining commodities prices mainly oil - have contributed to the deterioration of ICBs' profitability and to an extent, asset quality. Furthermore, generally, the term structure (maturity dates) of assets and liabilities points out that ICBs tend to have longer maturities on the asset side of the balance sheet compared to shorter maturities to fund these assets (Chattha and Bacha, 2010). For this very reason, this intermediation poses serious challenges and put a significant emphasis on the management of the ALM and NPM by ICBs.

As the lending/financing standards are relieved, negative policy rates transmission can be observed to the wider economy for both households and corporates. Nevertheless, any reduction in rates makes savers worse off while borrowers benefit and could have important intergenerational implications (Jobst and Lin, 2016). When banks lower lending/financing rates to both households and corporates, they will have to offset the negative impact on lending/financing margins either by some small increase in fees and commissions or cost cutting. This suggests increasing fee-based (*Wakālah*) activities within the ICBs.[23] In light of the substantial reductions to the deposit rate will weigh on banks' equity prices as investors will be likely to revise down their expectations of banks' future earnings. This also raises financial stability concerns for a regulator. In particular, the downward stickiness of deposit rates encourages banks to substitute less stable wholesale funding for deposits which can offer more incentives for hoarding cash.

As alluded above that the ICBs' assets under *Murābahah* cannot be re-priced when benchmark rates are going down, but it is important to see how it works on the deposit side. On the liabilities side, a closer look at the deposit composition of the ICBs reflects the following considerations for the NPM in light of the lower benchmark rates:

[23] In EU, though margins get real tight, the banks have done exceptionally well to stay profitable in negative rate. For instance, low impairment charges and greater wholesale funding at negative rates has benefitted them. These measures appear to be relevant and ICBs can benefit equally.

(a) Concerning *PSIA*, the ICBs that cannot change the PSR (profit-sharing ratio) due to contractual stipulation, but they can pass on the rate of return to the PSIA, which is commensurate to the market rates. In this case, the impact to ICBs' NPM will be lesser as on the asset side cash inflows (which are contractually agreed with the customers) will not change and they will pay the market rates to the PSIA;

(b) If the ICBs offer more *current accounts* (e.g. *Qard* or *Wadī'ah*), then the cost to these accounts will be closer to zero. This in turn, will have less impact to the ICBs' NPM. These current accounts in ICBs are similar to traditional deposits, and these banks sometimes provide these accounts with a "gift" (*Hiba*) to provide level playing field. Lately, in certain jurisdictions, some ICBs are launching immense campaigns to derive more current account based-funding, which seems to be sticky in nature, and hence cheaper for the banks.

(c) Commodity *Murābahah*[24] (also terms as reverse *Murābahah*) based funding (or CMT) will have to reflect the market conditions in particular the likelihood of the arrangements being rolled over by the counterparty. As the counterparties look for a stable and fixed return through *Sharī`ah*-compliant structures, the lower benchmark rates can play an important role in their decision whether to roll-over their term deposit funding or withdraw and look for higher yields on alternative asset classes.[25] In this respect, the ROR risk for this type of deposit is different from ROR risk in connection with a PSIA. The former has a contractually fixed return *ex-ante* in the form of the cost plus profit, whereas in the latter, holders of PSIA have no such contractually fixed rate of return.

In summary, the above considerations reflect that on the substance, with a negative benchmark rate a *Mudārabah*-based deposit account would not work. One based on CMT might do so, with the *Murābahah* payable at maturity being less than the original cash price. Another solution worth considering would be one based on *Wakālah*, such that the bank would get its fee while the depositor would get the return from investing the funds (less the fee). If the return were negative, the depositor would bear the loss but that would not be inevitable so the product might be more attractive than the CMT-based deposit with a built-in negative return. Moreover, it is clear that with benchmark rates so low, ICBs are highly exposed to ROR risk as rates are bound to rise eventually and if an ICB is locked into financing assets with very low returns it will be seriously squeezed. Effective ALM with gap analysis will be crucial. *Ijārah*-based financing can be re-priced based on a benchmark. *Murābahah* can be offered in the form of a revolving credit (say 3-monthly). Within this, greater attention on the appropriate supervision of ICBs' liquidity, including the newly introduced measures of liquidity such as the liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) is important (Daniel and Philipp, 2014) as banks are faced with, among others, perennial issues of short-term *Sharī'ah*-compliant financial instruments that meet the *Sharī'ah*-compliant high quality liquid assets (HQLA), which is a Basel III and the IFSB requirement under the LCR and NSFR.

4.4 Risks and Prudential Implications under Increasing Rates Scenario

The results reveal the important findings for the period 2009-2015. In aggregate, the study results show a general excess of long-term financing maturities and short-term liabilities maturities (Figure 4). The results indicate that: (a) 80% of the ICBs (40 ICBs) have positive and higher duration gap; (b) only 20% (10 ICBs) tend to have negative duration gap[26]; and (c) 7 ICBs have duration gaps in double digit figures

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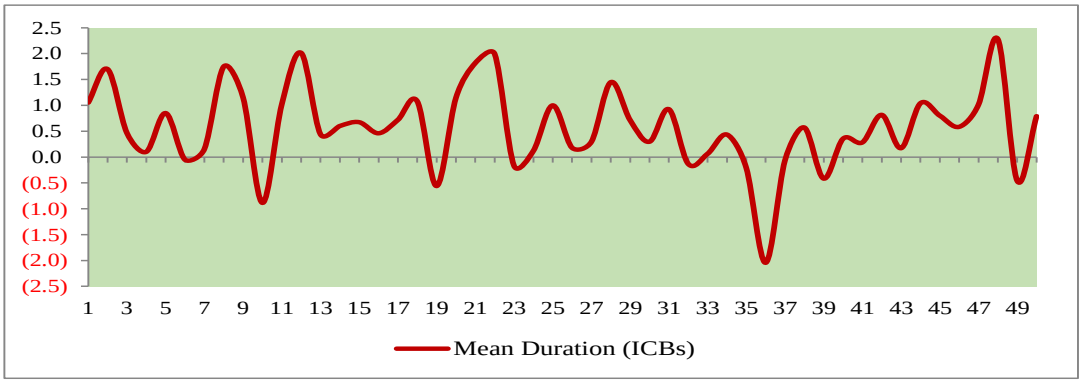
[24] As per IFSB GN-2, "Commodity Murābahah Transactions (CMT)" means a *Murābahah*-based purchase and sale transaction of *Sharī`ah*-compliant commodities, whether on cash or deferred payment terms.

[25] Using commodity *Murābahah* as a source of funding introduces a new category of item to the balance sheet of an ICB, which should be classified as a liability of the bank based on its contractual obligation. In principle, the advent of this concept in ICBs brings about a divergence from the traditional mode of mobilising funds in ICBs (e.g. *Mudārabah* (PSIA)).

[26] This negative duration gap is an indication that few ICBs have been managing the ALM more effectively; this implies that these ICBs would not be affected, should the benchmark rate be increased by their respective supervisory authorities. However, the problem is far more serious in the majority of the other jurisdictions which have positive duration gaps, suggesting crucial reviews of their business models.

in terms of years (Table A.2 in Appendix A). In addition, we also found that three ICBs (*Boubyan, Ahli United*, and *Islamic International Arab Bank*) have mean duration gaps close to zero, which appears to be a natural hedge against the increasing benchmark rates risk. The highest among the ICBs, with a duration gap of 15.99 years (or a mean of 2.28) is *Sharjah Islamic Bank* from U.A.E, followed by *AmIslamic Bank* from Malaysia, with a duration gap of 14.10 years (or a mean of 2.01). We provide specific implications of these findings below.

Figure 4: Variation of ICBs' Duration Gap (2009-2015)



Note 1: The Duration Gap is measured in years for each ICB. The Figure 4 shows cross-sectional variations across the 50 ICBs.

Note 2: The summary results of the 50 ICBs in Figure 4 are presented as per the four-step process indicated in Stage 1 in Section 2.2 and Equations 1-3. The details of the calculation of each ICB are available upon request.

In terms of cross-country analysis of duration gap and to comprehend the possible impact of increasing benchmark rates risk, we establish that for the ICBs, there are six (out of 13) jurisdictions (*Indonesia, Malaysia, Qatar, Saudi Arabia, Turkey* and *U.A.E.*) which are responsible for over 90% of the contribution to total duration gap. Among these six, *Malaysia* is the highest contributor reflecting 74 years of duration gap for 11 ICBs, followed by *U.A.E* with 39 years of duration gap for 4 ICBs, and *Indonesia* and *Turkey*, with 26 and 19 years of duration gap for 2 and 4 ICBs respectively. Considering that Malaysia probably has the most well-developed and competitive banking sector among the study's 13 sample countries, it is a concern that Malaysian ICBs have significantly higher mean duration gaps that will expose them to increasing benchmark rates risk.

The significantly higher duration gap can be attributed to the various reasons including business model of these ICBs. This phenomenon of ICBs having more long-term financing with short-term deposits demonstrates their inability to raise the long-term deposits, consequently creating a severe mismatch in the assets and liabilities. The finance theory and academic literature suggest that when the duration gap is positive and higher, then an increase in the benchmark rates by bps from a central bank would bring severe consequences to the NW risk or EVE and the capital base of the banks including ICBs. We test this perspective below.

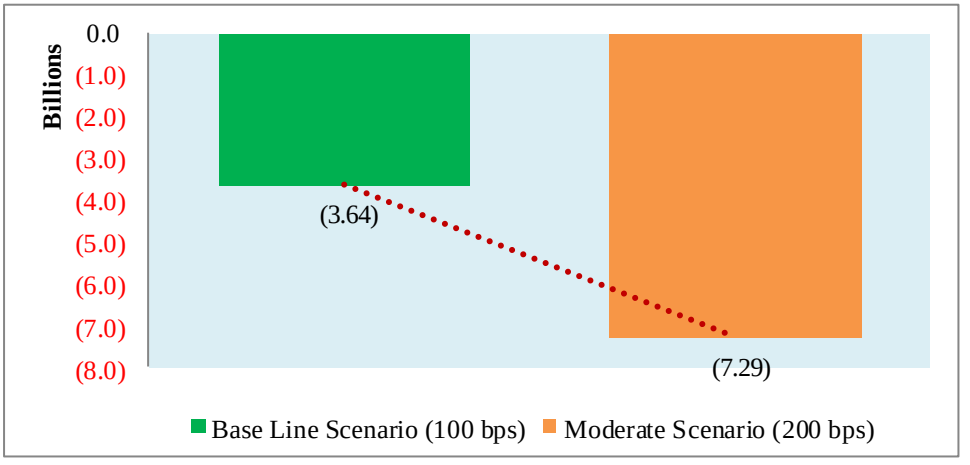
The tendency to have a higher duration gaps in ICBs does not explain the reasons for the same. This necessitates identifying the reasons why ICBs find themselves plagued by relatively higher duration gaps. The balance sheets of the ICBs' suggest that *Murābahah* financing is the most dominant form of financing extended by the ICBs to the customers to meet their different needs. Furthermore, the results reveal that in some cases, there is a correlation between the financing and the duration gap. However, this needs to be empirically tested to ascertain whether this factor, or any other factor, significantly influences the duration gap, with a larger sample size over a long period of time. In addition, different reporting standards (e.g. AAOIFI) contribute largely to the variation of the duration gaps in ICBs, in particular the disclosure of the

maturity of assets and liabilities in different maturity buckets. This suggested that there is little evidence for the ICBs to have implemented the AAOIFI accounting standards.

Having examined the business models of the 13 jurisdictions of the sample under observation, we establish that ICBs tend to have higher duration gaps since they can not avail of certain risk management tools and techniques, due to certain *Sharī'ah* limitations. These techniques include: (a) lack of *Sharī'ah*-compliant hedging instruments (e.g. swaps and options); (b) lack of financing or assets' tradability (i.e. factoring of financing); (c) lack of adjusting the price of assets due to sale contracts; and (d) lack of floating rate assets and fixed rate liabilities. The study also showed that ICBs' higher duration gap could be linked to the unavailability of *Sharī'ah*-compliant financial instruments for different maturity buckets. This indicates for an ICB to: (a) identify the profit rate sensitive products and activities, in which risk is involved; (b) establish a limit structure to monitor and control benchmark rates risk through pre-defined time maturity buckets (or time bands); and (c) estimate the NW under different stress shock scenarios on a regular basis under Pillar II.

As indicated in Section 3, NW risk or EVE refers to the potential squeeze or reduction in NW that will result from a given change in benchmark rates. The study results are based on the assumption of current benchmark rates of 5% rising to 6% or 7%, with 100 bps and 200 bps respectively (Figure 5). As duration gap is negatively correlated with NW risk, the results demonstrate that the ICBs with the highest duration gaps have the highest NWR, in both percentage terms and $ values. Thus, the banks with negative duration gaps would have a positive percentage EVE, implying that their EVE would increase if benchmark rates went up by 100 bps and 200 bps respectively.

Figure 5: Magnitude of the Total NW risk or EVE of ICBs



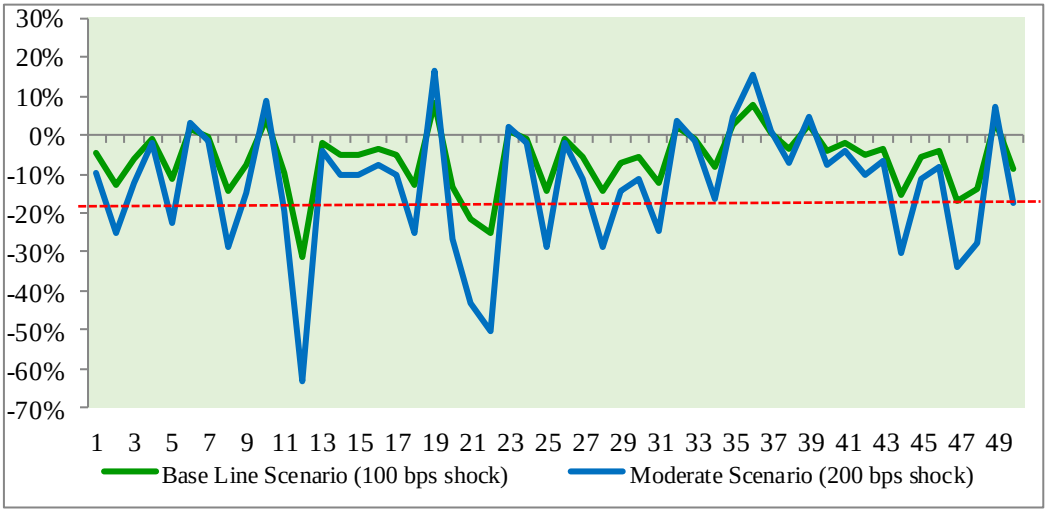
Note 1: Using Equations 1-6, the above figure reflects the impact of the increasing benchmark rates risk under S1 and S2 which is measured in US$ for 50 ICBs.

Note 2: The details of the calculation of each ICB are available upon request.

Figure 5 summarises the effects on the value of assets, liabilities and economic capital for a benchmark change of 100 bps and 200 bps in profit rates. As we can see from Figure 5, in 2015 (used as the base year), the total NW risk of ICBs is about $ 3.64 billion and $ 7.29 billion under S1 and S2 respectively, with a difference of $ 3.65 billion which is a significant (7% of total asset size of the ICBs, $ 558 billion) amount considering the amount of total assets of the ICBs under observation. This shows that, for instance, an increase of 100 bps further could bring additional $ 3.65 billion economic loss of equity (EVA) for ICBs. In an economic environment, in which, benchmark rates are expected to rise, the ICBs are exposed to serious EVE risk. This demands serious consideration from the regulators and ICBs' management to address the duration gap. This also highlights the role of the ALCO. It is also noteworthy to specify that the impact of a similar decrease in profit rate will be approximately opposite to the impact disclosed above for the ICBs.

Furthermore, to support our findings, we also found evidence from some ICBs which have been measuring the impact of NW or EVE with a *parallel shift* in the yield curve through monthly monitoring of the re-pricing gaps and monitoring pre-approved limits set on EVE. For instance, one of the sample ICBs assumed a 2% change (i.e. 200 bps) in rates of assets and liabilities to calculate the dollar ($) impact on earnings on the residual period up to one-year. Moreover, by using the above estimations for ICBs, we also determined whether the respective ICB falls above or below the recommended threshold limit set by the BCBS and the IFSB. Figure 6 plots the summary of the results for the ICBs' NW risk under two scenarios, S1 and S2. In general Figure 6 indicates that 47 ICBs pass the required threshold limit of 20% and only three ICBs could not pass the stress test under S1. On the other hand, when the shock is increased to 200 bps (S2), the vulnerability of the ICBs becomes more significant and visible, such that 14 ICBs did not pass the required limit. This shows that if the shock is further increased by any number of bps, there is a strong possibility that the majority of the ICBs will fail the stress test.

Figure 6: ICBs – NW Risk or EVE Risk as % of Capital under S1 and S2



Note 1: Using Equations 1-6, the above figure reflects the impact of the increasing benchmark rates risk under S1 and S2 which is measured in US$ for 50 ICBs.

Note 2: The dotted line represents the 20% threshold as prescribed by the IFSB-16, which means that if an ICB is below this line, then it is breaching the limit and hence, there is need for additional capital charge for that bank as the impact of increasing benchmark rates risk leads to an economic value decline of more than 20% of the sum of Tier-1 and Tier-2 capital, following a standardized benchmark rate shock.
Note 3: The details of the calculation of each ICB are available upon request.

4.5 Risk Management Strategies and Controls (for Changing Benchmark Rates Risk)

Based on Figure 3, changing benchmark rates risk environment can be managed through appropriate strategies and controls. From a risk management perspective, there is no exhaustive list of the strategies but ICBs can address this phenomenon by three approaches. Of these three approaches, the first two relate to purely ICBs and the last one discusses the supervisory perspective. These proposed approaches will ensure and enable the ICBs to envisage the damage in advance and prepare themselves for the contingency planning; on the other hand, these controls would provide some comfort to their supervisors in their supervisory review process under Pillar 2. It is expected that the impact of these controls will be dependent upon the size, business model, and sophistication of the ICBs.

4.5.1 Bank-level Strategies at ICBs

The first approach for the ICBs is to have a combination of bank-level operational strategies. There are three strategies which are worth mentioning in this context. First, ICBs may start delinking the use of benchmark rate or to avoid the use of benchmark rates in their products. Considering that this issue has immensely been debated in the industry from a *Sharī'ah* perspective, such delinking may be more appropriate to build a truly *Sharī'ah*-based Islamic banking model. This requires that the ICBs develop and offer more equity-like (*Mushārakah* and/or *Mudārabah)* or *Wakālah* based products. In this respect, one of the notable recent example is by the Central Bank of Pakistan (State Bank of Pakistan, SBP), which has issued a circular[27] granting ICBs option to dissociate from interest rate benchmark for financing provided on the basis of participatory (*Mushārakah* & *Mudārabah*) and *Wakālah* (Agency).[28] In this way, ICBs will use an alternative to the use of benchmark rates and they will diversify their products thus having a minimum exposure to the use of conventional benchmark rates. However, a more robust internal ROR from portfolio of risk sharing instruments with service-based income could be explored.

Second, ICBs should get involved in rebalancing existing portfolios (i.e. ALM optimizations) and depending on banks business model, the ALM framework needs to be reviewed to understand the impacts. Recently, some of the ICBs have worked out initiatives which can serve as important benchmarks for other ICBs to manage their ALM.[29] Moreover, owing to strict *Sharī`ah* prohibitions, it is also important to note that the ICBs have limited opportunity to use a range of *Sharī'ah*-compliant financial derivative instruments (such as profit rate swaps, cross currency swaps, etc.) to manage the increasing market benchmark rates shocks, which makes them more vulnerable. In this respect, the application and implementation of the International Islamic Financial Market (IIFM) standards including (*Tahawwut* (Hedging), *Mubadalatul Arbaah* (Profit Rate Swap), *Mu'addal Ribh Thabit* (Fixed Profit Rate), *Mu'addal Ribh Mutaghayyer* (Floating Profit Rate)) will be helpful for the ICBs to manage the benchmark rates risk.

Third, ICBs should cushion the effect of changing benchmark rate by altering the business, that is, higher fee income and/or carefully adjusting tolerance to loan-loss provisions. In this context, as stated above, it is important to bear in mind that re-pricing is not allowed for Islamic contracts on the asset side; however, increasing fees across the products is a viable strategy. Thus, the banks may consider introducing handling fees on a manual services and paper based transactions, as well as introducing value added promotional services for the merchants to boost revenue. Lastly, through the adoptions of new value-add distribution strategies and lowering personnel and non-personnel costs (e.g. the ICBs can selectively reduce branches and move towards digital transformations (FinTech), where the cost saving will have immediate impact).

4.5.2 Risk Management Tools

The second approach is to use risk management tools such as *stress testing*, ALM techniques, *duration gap analysis* to effectively manage the changing benchmark rates risk and in calculating the economic impact of the ROR risk on the ICBs' balance sheet. In particular, within these tools, an emphasis should be made to stress testing by ICBs, where banks should include a profitability scenario under low profit rate regimes into their constrained bottom-up stress-testing programme (Chattha, 2016). From a risk management perspective, mainly in stress testing exercise, this negative rate or low-rate was an anchor

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[27] State Bank of Pakistan, IBD Circular No. 1 of 2016, Exemption from KIBOR as Benchmark rate for Participatory and *Wakālah* Modes Based Products, available at http://www.sbp.org.pk/ibd/2016/C1.htm.

[28] The circular by the SBP, however, also indicates that ICBs desirous of availing this exemption shall ensure, among others: (a) adequate measures for risk management to mitigate equity investment risk in participatory mode based products; (b) compliance with minimum *Sharī'ah* requirements set vide various circulars and AAOIFI *Sharī'ah* Standards; (c) submission of the details of *Mudārabah*, *Mushārakah* and *Wakālah* based products (new/revised) for delinking with KIBOR benchmark including:(i) detailed mechanism for pricing under these modes with proper policies for risk mitigation;(ii) amendments in agreements and related documents; (iii) approval of ICBs' product by their *Sharī'ah* board;(iv) criteria for selection of firms/companies with whom ICBs can execute *Mushārakah* or *Mudārabah* contract.

[29] For instance, Abu Dhabi Islamic Bank has launched its first *Sharī'ah*-compliant equity investment structured note of the year 2017. It is a capital protected equity investment note. On the other hand, KFH Kuwait's volume of trade in the Sukūk market reached $11.4 billion for the year 2016. This was mainly due to the fact that KFH is one of the Primary Dealers for the International Islamic Liquidity Management Corporation (IILM) *Sukūk*. The IILM *Sukūk* is a short-term programme for liquidity management.

scenario in EU as profitability and net margin were under threat in this regime. This issue is equally relevant to the ICBs and they should consider in their stress testing framework under Pillar 2 of the BCBS, the low-yield rate environment and its implications on the profitability and NPM for sustainability. On the other hand, for increasing benchmark rates risk, ICBs should include more severe shocks to ensure that they remains solvent and above the minimum regulatory capital adequacy requirements.

In regard to stress testing, it is worth noting that in May 2009, from a regulatory and financial stability point of view in response to the GFC, the BCBS issued "*Principles for Sound Stress Testing Practices and Supervision*" comprising 21 principles. Three years later, in March 2012, in line with the BCBS framework on stress testing, IFSB-13 (*Guiding Principles on Stress Testing)* provided a comprehensive stress-testing framework for both ICBs and their supervisory authorities as BCBS did not cover the specificities of ICBs. The framework consists of 29 *Guiding Principles* (22 for ICBs and 7 for supervisors).[30]

4.5.3 Supervisory oversight dimension - ICAAP and Pillar 2 assessment

Lastly, ICBs should include benchmark rates risk implications into their internal capital adequacy assessment process (ICAAP) under Pillar 2 supervisory requirements. In this respect, regulators will have to determine that ICBs have adequate systems to identify, measure, evaluate, monitor, report and control or mitigate ROR risk in the banking book on a timely basis. The ICAAP will ensure that ICBs are well aware of additional capital requirements to cope with the changing benchmark rates. From a regulatory point of view, as alluded earlier that both the BCBS and the IFSB set clear guidance on the risk management in particular for the ROR risk in their respective standards. To ensure ICBs take into account the implications of benchmark rate risk or ROR risk on their balance sheet and income statement in their stress testing and ICAAP exercises, the regulator/supervisor should ensure that its supervisory assessment including *On-site Examinations*[31] and *Off-site Supervision Department*[32] places significant emphasis on quality of an ICB's risk management system.

5. Conclusion and moving forward

The global banking industry, being at the heart of evolving global macroeconomic conditions, is going through a challenging time, in particular the GCC economies which are highly dependent on oil, and to a greater extent, dealing with changing benchmark rates risk. Considering that the bulk of Islamic finance - while being an integral part of the global financial system - operates within the emerging economies, the impacts of such economic uncertainty are inevitable for the ICBs, which are thoroughly assessed in this paper. The paper provided an overview of the broader picture of changing benchmark rates risk globally and risk management perspective and implications for the ICBs.

In light of the low-rate environment, the paper reflected that persistently low benchmark rate regime carries strategic implications for the behaviour of institutional investors as well as financial institutions including banks. The primary risks to ICBs may include pressure on profitability, excessive risk taking (e.g. if ICBs search for yield by increasing financing to lower quality borrowers highlighting default risk), distortion in credit allocations (when economy is not growing), and late signalling of credit quality thus delaying balance sheet/credit restructuring. In a low-rate regime, we also argued that though, lower rates can have a positive effect on the economy, thus helping to lower bank-funding costs and boost asset prices; yet, concerns about their negative effect on ICBs' profitability, financial stability, and sustainability equally resonate to be comprehended.

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[30] Drawing on these 29 *Guiding Principles,* Chattha and Archer (2016) provide technical guidance (including a stress testing matrix) on how to carry out stress testing in accordance with these principles.

[31] On-site work is used as a tool to provide independent verification that adequate policies, procedures and controls exist at IIFS, determine that information reported by IIFS is reliable, obtain additional information on the IIFS and its related companies needed for the assessment of the condition of the IIFS, monitor the IIFS's follow-up on supervisory concerns, etc. (IFSB-17, 2015).

[32] Off-site work is used as a tool to regularly review and analyse the financial condition of IIFS, follow up on matters requiring further attention, identify and evaluate developing risks, and help identify the priorities, scope of further off-site and on-site work, etc. (IFSB-17, 2015).

Considering the current and potential growth projections in light of the prevailing policy rates, as such, the dominant Islamic finance jurisdictions are not likely to go into a very low or negative benchmark rates trajectory in near future. Nonetheless, so long, the ICBs use the conventional benchmark rates in their products, their exposure to the volatility of the rates, remains a candid concern for them and their supervisors. For ICBs, managing risks (funding to extending credit) is not vastly different to conventional banks, but it will be a test on the substance of actual Islamic finance: how would the Islamic banking product/structures will adopt to inverse of the risk-return relationship (you get paid to borrow)? In particular, given the lack of disclosures for the IAHs/PSIA, which are labelled as retail investors and being less sophisticated, they would face it extremely difficult to digest the economics behind the low or negative yield phenomenon and would barely accept such thing. This will certainly challenge the whole idea of financial intermediation which significantly relies on a leveraged model.

With respect to increasing benchmark rate scenario, our research findings have identified several implications for ICBs and their supervisors. Under this scenario, with use of the duration gap approach combined with the sensitivity stress testing for benchmark rates risk management under the prescribed IFSB standards, the study implications (including DCR, withdrawal risk and early settlement risk by customers) highlight the dire need for comprehending the influence of changing benchmark rates risk on Islamic banking operations. We argue that benchmark rates risk management is like a two-edged sword for ICBs, as in both cases, they are potentially exposed to risk. For instance, with an increasing benchmark rate, the EVE and capital base of the ICBs will be affected, and with a decreasing benchmark rate regime, they are still exposed to risk of profitability and non-performing assets as customers of the ICBs may exit and chose early settlement. In this respect, our approach allow supervisors to require the ICBs to hold an additional capital charge under Pillar II for benchmark rates risk in their banking book. The determination of the number of ICBs failing the recommended threshold set by the IFSB-16, outlines the need for additional charge for those ICBs which did not pass the required threshold limit under S1 (100 bps), and S2 (200 bps). Our findings also imply that ICBs' supervisors should assess, through their *Off-site Surveillance Department*, whether the internal measurement systems of ICBs adequately capture the ROR risk in their banking books.

It is reasonable to envisage that in an economic environment in which benchmark rates are expected to rise, larger duration gaps, as found in the study, will pose a serious challenge to ICBs as the benchmark rate cycle turns. This will eventually expose the ICBs to serious EVE risk, thus, requiring them to have in place proper risk management strategies. For the ICBs to fully deflect this risk, while being part of a dual banking system, would require them to undertake significant improvements in their risk management tools, and applying innovative new techniques including PLS, to reduce the asset-liability mismatches. Therefore, in our view, irrespective the direction (upward or downward) of the rate and the jurisdiction in which it matters, the management of this risk, with appropriate tools (such as duration gap, ALM, ICAAP, and stress testing, and *Sharī'ah*-compliant financial derivative instruments), is pivotal for ICBs for a variety of reasons and implications as reflected in the paper. Moreover, in the pursuit of financial stability, supervisors also have to ensure that ICBs continuously safeguard risk management, as fragile economic and financial environment can eventually transmute a stable banking system into a considerable stress.

At this end, it is hoped that the initial discussion on this subject provides a broader policy dialogue, though more empirical examination of the subject is needed. Therefore, due to limitation of the research, we suggest that future studies can consider larger sample size of 100 banks (50 ICBs paired with 50 conventional banks), with 10+ years' data to further generalise the results and implications. The future studies can also consider convexity (*second-order approximation*) as this study only used the *first-order approximation* rather than convexity with *parallel shift* in the yield curve rate. Under the stress shocks, more severe scenarios of 300 bps can be considered in stress testing by the ICBs. Cross-sectoral perspective with duration gap can also be captured. Lastly, the determinants of the duration gap for ICBs can be studied through Panel GMM estimation or *Random effect* or *Fixed effect* approach.

Appendix A: Details on the Sample ICBs and Duration Gap

Table A.1: Details of the Fully-Fledged Islamic Banks (ICBs)

#	Name of an ICB	Country
1	ABC Islamic Bank	Bahrain
2	Al Barakah Bank	Bahrain
3	Al Salam Bank	Bahrain
4	Bahrain Islamic Bank	Bahrain
5	Ithmaar Bank (ex-Shamil Bank)	Bahrain
6	KFH Bahrain, Bahrain	Bahrain
7	Khaleeji Commercial Bank	Bahrain
8	Exim Bank Ltd	Bangladesh
9	First Security Islamic Bank	Bangladesh
10	Islamic Bank Bangladesh Ltd	Bangladesh
11	Bank Syariah Mandiri	Indonesia
12	Bank Syariah Muamalat Indonesia	Indonesia
13	Islamic International Arab Bank	Jordon
14	Jordan Islamic Bank	Jordon
15	Ahli United Bank	Kuwait
16	Boubyan Islamic Bank	Kuwait
17	KFH Kuwait	Kuwait
18	Kuwait International Bank	Kuwait
19	Affin Islamic Bank Berhad	Malaysia
20	AlRajhi Malaysia Berhad	Malaysia
21	AmIslamic Bank Berhad	Malaysia
22	Asian Finance Bank Berhad	Malaysia
23	Bank Islam Malaysia Berhad	Malaysia
24	Bank Muamlaat Malaysia Berhad	Malaysia
25	CIMB Islamic Bank Berhad	Malaysia
26	Hong Leong Islamic Bank Berhad	Malaysia
27	KFH Malaysia Berhad	Malaysia
28	Public Islamic Bank Berhad	Malaysia
29	RHB Islamic Bank Berhad	Malaysia
30	Al Barakah Bank	Pakistan
31	Bank Islami Pakistan	Pakistan
32	Dubai Islamic Bank Pakistan	Pakistan
33	Meezan Islamic Bank	Pakistan
34	Barwa Bank	Qatar
35	Masraf Al Rayan	Qatar
36	Qatar International Islamic Bank	Qatar
37	Qatar Islamic Bank	Qatar
38	Al Rajhi	Saudi Arabia
39	Bank Al Bilad	Saudi Arabia
40	Bank Al Jazira	Saudi Arabia
41	Al Barakah South Africa	South Africa
42	Al Barakah Turkish Finance House	Turkey
43	Bank Asya	Turkey
44	Kuvet Turk Participation Bank	Turkey
45	Turkiye Finans Participation Bank	Turkey
46	Abu Dhabi Islamic Bank	UAE
47	Dubai Islamic Bank	UAE
48	Emirates Islamic Bank	UAE

49	Sharjah Islamic Bank	UAE
50	Tadhamon Int. Islamic Bank	Yemen

Note: The list of the ICBs is presented in alphabetical order of the country.

Table A.2: Detail of ICBs' Duration Gap (Yrs.)

#	ICB Bank Name	2009	2010	2011	2012	2013	2014	2015	Grand Total	Mean
1	ABC Islamic Bank	1.21	0.99	1.14	1.09	1.10	0.90	0.94	**7.37**	**1.052**
2	Abu Dhabi Islamic Bank	1.60	1.67	1.68	1.67	1.60	1.79	1.89	**11.90**	**1.700**
3	Affin Islamic Bank Berhad	0.60	0.55	0.38	0.38	0.37	0.41	0.57	**3.25**	**0.465**
4	Ahli United Bank	0.21	0.16	-0.08	0.11	0.10	0.10	0.11	**0.71**	**0.101**
5	Al Barakah Turkish Finance House	0.88	0.82	0.67	0.68	0.87	0.99	1.04	**5.95**	**0.851**
6	Al Barakah Bank Pakistan	0.16	0.00	-0.28	-0.37	-0.32	0.23	0.22	**-0.36**	**-0.051**
7	Al Barakah Bank Bahrain	-0.05	-0.02	-0.09	0.28	0.24	0.37	0.35	**1.07**	**0.153**
8	Al Barakah South Africa	1.55	1.66	1.85	1.92	1.84	1.27	2.15	**12.24**	**1.749**
9	Al Rajhi	0.81	1.22	1.28	1.25	1.13	1.12	1.24	**8.06**	**1.152**
10	Al Salam Bank	-1.21	-0.79	-1.17	-0.85	-0.98	-0.79	-0.41	**-6.21**	**-0.887**
11	Al Rajhi Malaysia Berhad	0.31	1.61	1.26	0.97	0.94	0.83	1.22	**7.13**	**1.019**
12	AmIslamic Bank Berhad	3.01	2.69	1.78	2.07	1.78	1.67	1.10	**14.10**	**2.015**
13	Asian Finance Bank Berhad	0.62	0.87	0.56	0.44	0.36	0.15	0.09	**3.08**	**0.440**
14	Bahrain Islamic Bank	0.44	0.75	0.21	0.94	0.69	1.29	-0.11	**4.20**	**0.600**
15	Bank Al Bilad	0.74	0.66	0.70	0.75	0.68	0.59	0.59	**4.72**	**0.674**
16	Bank Al Jazira	0.30	0.47	0.57	0.63	0.37	0.42	0.45	**3.22**	**0.460**
17	Bank Asya	0.69	0.89	0.90	0.76	0.01	0.90	0.90	**5.04**	**0.720**
18	Bank Islam Malaysia Berhad	1.08	1.47	0.78	0.15	2.76	0.70	0.59	**7.54**	**1.077**
19	Bank Islami Pakistan	-0.19	-0.41	-0.98	-1.33	-0.51	-0.73	0.22	**-3.93**	**-0.561**
20	Bank Muamlaat Malaysia Berhad	1.25	0.91	0.95	1.18	2.25	0.81	0.67	**8.02**	**1.146**
21	Bank Syariah Mandiri	1.31	1.15	1.25	3.08	1.99	1.89	2.06	**12.73**	**1.819**
22	Bank Syariah Muamalat Indonesia	2.01	2.05	1.95	2.16	4.31	0.75	0.72	**13.96**	**1.994**
23	Barwa Bank	-1.81	-0.27	-0.24	0.73	0.55	-0.10	-0.04	**-1.18**	**-0.169**
24	Boubyan Islamic Bank	0.02	0.00	0.04	0.14	0.17	0.21	0.27	**0.84**	**0.120**
25	CIMB Islamic Bank Berhad	2.03	0.62	0.72	0.70	0.91	1.15	0.86	**7.00**	**1.000**
26	Dubai Islamic Bank	0.15	0.15	0.18	0.20	0.29	0.17	0.12	**1.25**	**0.179**
27	Dubai Islamic Bank Pakistan	0.48	0.42	0.30	0.22	0.22	0.20	0.23	**2.08**	**0.297**
28	Emirates Islamic Bank	1.19	0.91	1.41	1.56	2.19	1.46	1.43	**10.14**	**1.448**
29	Exim Bank Ltd	0.54	0.61	1.01	0.65	0.63	0.74	0.81	**4.99**	**0.713**
30	First Security Islamic Bank	0.65	0.78	0.73	0.71	-0.34	-0.20	-0.25	**2.07**	**0.296**
31	Hong Leong Islamic Bank Berhad	1.14	0.80	0.68	0.80	0.85	1.54	0.67	**6.48**	**0.925**
32	Islamic Bank Bangladesh Ltd	-0.09	-0.04	-0.09	-0.16	-0.18	-0.33	-0.02	**-0.92**	**-0.131**
33	Islamic International Arab Bank	0.07	0.09	0.06	0.23	0.19	0.02	-0.22	**0.44**	**0.063**
34	Ithmaar Bank	0.30	0.31	0.28	0.34	0.50	0.72	0.60	**3.04**	**0.435**
35	Jordan Islamic Bank	-0.29	-0.31	-0.27	-0.13	-0.17	-0.18	-0.11	**-1.47**	**-0.210**
36	KFH Bahrain	-2.24	-2.04	-1.75	-2.02	-1.59	-2.13	-2.55	**-14.32**	**-2.045**
37	KFH Kuwait	-0.17	-0.17	-0.10	0.00	-0.02	-0.01	0.02	**-0.45**	**-0.064**
38	KFH Malaysia Berhad	0.15	0.09	0.66	0.79	0.88	0.75	0.68	**4.00**	**0.571**
39	Khaleeji Commercial Bank	0.03	-1.64	0.62	0.39	0.29	-0.76	-1.85	**-2.92**	**-0.417**
40	Kuvet Turk Participation Bank	0.00	0.09	0.49	0.41	0.31	0.57	0.61	**2.48**	**0.354**
41	Kuwait International Bank	0.33	0.30	0.31	0.33	0.28	0.25	0.19	**1.98**	**0.283**
42	Masraf Al Rayan	0.81	0.58	0.38	0.32	0.59	1.66	1.37	**5.71**	**0.816**
43	Meezan Islamic Bank	-0.01	0.53	0.10	0.11	0.08	0.17	0.21	**1.20**	**0.171**
44	Public Islamic Bank Berhad	1.48	1.29	1.26	1.16	0.92	0.56	0.61	**7.28**	**1.040**
45	Qatar International Islamic Bank	0.33	0.43	1.17	1.24	0.83	0.87	0.73	**5.60**	**0.800**
46	Qatar Islamic Bank	0.75	0.85	0.65	0.51	0.36	0.34	0.64	**4.09**	**0.584**
47	RHB Islamic Bank Berhad	1.79	1.32	1.31	0.99	0.66	0.33	0.71	**7.10**	**1.015**
48	Sharjah Islamic Bank	2.49	2.15	2.40	2.36	2.62	1.66	2.26	**15.94**	**2.278**
49	Tadhamon International Islamic Bank	-0.46	-0.39	-0.39	-0.35	-0.47	-0.58	-0.57	**-3.22**	**-0.460**
50	Turkiye Finans Participation Bank	0.66	0.79	0.77	0.74	0.81	0.84	0.92	**5.53**	**0.790**

#	ICB Bank Name	2009	2010	2011	2012	2013	2014	2015	Grand Total	Mean
Grand Total		**27.66**	**27.62**	**27.98**	**30.95**	**33.93**	**25.55**	**24.91**	**198.60**	**28.371**

Note: Duration Gap as per the alphabetical order of the ICBs' name.

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